How to Do Square-Foot Gardening

Learn how to start your own square-foot garden from Mel Bartholomew, who first introduced the technique over twenty years ago. Mel has literally traveled the globe teaching this revolutionary gardening system to millions of gardeners.

Featured Expert:
Mel Bartholomew

Mel Bartholomew a former engineer and efficiency expert didn't start gardening until he was in his middle-age. After years of using the traditional single row method he felt he was wasting too much of his valuable time and energy. So he decided to apply his skills of finding a more efficient way of gardening and ended up creating the Square Foot Gardening method. Contact Mel at info@squarefootgardening.com

Featured Expert:
Karen Bastow

Karen Bastow of Liberty, Utah shares how she has successfully implemented the technique of Square Foot Gardening as taught by its creator Mel Bartholomew. Contact Karen at info@squarefootgardening.com

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Whether you're an avid gardener or just starting out, HomeGrown is sure to provide you with a well rounded knowledge of the gardening basics and beyond, that is certain to help you cultivate your best garden yet.

So dig-in and remember, everything's better HomeGrown!

Host: Rebecca Cressman

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Click here to view the HomeGrown crew/cast list.

Host Rebecca Cressman with Dr. Frank Williams on the set at the BYU Terrace Garden

Amanda Dabney, Student Producer for HomeGrown, discussing soil sampling in Guatemala.

Host Rebecca Cressman and guest expert Larry Sagers during filming at the BYU Terrace Garden.

Miriam Casos, student producer of HomeGrown, with expert Samira Hradsky discussing herbs, in Paris, France.

Miriam Casos discussing hydroponics with Dr. Alfredo Delfin and Amanda Dabney student producer assisting cameraman Dave Bisson in Peru.

Miriam Casos and Jonice Hubbard, student producers of HomeGrown, with cameraman Dave Bisson as they prepare for taping in Gautemala.

James Greaves discussing spacing and planning using square foot gardening with expert Mel Bartholomew.

Host Rebecca Cressman on the set at the BYU Terrace Garden.

A high definition camera was used at the BYU Terrace Garden.

Crew working as they tape an interview in England.

Crew taping an episode on the HomeGrown set at the BYU Terrace Garden.

Student producers Miriam Casos and Amanda Dabney prepare for upcoming shots with expert Gene Rothert at the Chicago Botanical Garden.

This presentation of HomeGrown is made possible in part by a generous grant from Angel Partners. Angel Partners: Committed to the programs, services and technologies that support family values and lifelong learning.

>>Since he first introduced the technique of square-foot gardening over 20 years ago, Mel Bartholomew has literally traveled the globe teaching this revolutionary gardening system to millions of gardeners. On today's show we'll meet up with Mel and learn firsthand how to start our own square foot garden. And think of some extra tips for maintaining a successful one. Hi, I'm Rebecca Cressman, and you're watching HomeGrown!

>>Welcome to HomeGrown! The show that brings you all the dirt on vegetable gardening. Today we're headed off to learn how to build and cultivate a square foot garden. Our very own James Greaves tracked down the originator of the method, Mel Bartholomew, and got an up close and personal lesson on the basics of this deceptively simple gardening system. Let's take a look!

>>Mel, why did you do that square foot gardening?
>>Well I tried all the other kinds of methods, and I found that they were too much work, too much expense, for the harvest that you got. And I went all around the country and asked all the experts, "Why do we garden the way that we do?" And they all told me the same answer, you know what that was? Because that's the way we've always done it! And I said right then and there, I'm going to invent a new way to garden!
>>And how did you go about that?
>>Well, I took all the things that are wrong with single-row gardening. I listed every single thing, and then I went and found a simple, easy answer.
>>What are the things that are wrong?
>>Well, first of all, you roto-till up a whole big area to loosen the soil, and then you walk all over it again! That doesn't make sense, does it?
>>No.
>>So I thought why don't we reach into our garden and not walk on the growing soil?
>>So what is square foot gardening? How does that work?
>>Well, square foot gardening is done in 4x4' areas. And you can walk all the way around and we make a box. Because later I found out we don't have to improve the existing soil! If we start with a perfect soil, then put it in a box, walk all the way around it, we split that box up into 16 areas called a square foot. That's how it got its name. And then we plant something different in every single square foot. By golly, it worked! And you know what the best thing was? We didn't need fertilizer!
>>So what are the main differences between traditional row-gardening and square-foot gardening?
>>Well, when you have a row garden, you have a single row, you dig a furrow and you pour out a whole packet of seeds, right? And then you go back and you thin them all out—one every six inches, or eight inches (something like that). That seemed like a terrible waste of seeds. Plus, what do you have on each side of that single row?
>>A lot of dirt?

>>Well yeah, a lot of dirt! But that was dirt that you roto-tilled up, you fertilize it and you water it every time. And what's it going to grow? Weeds! Just weeds. So then what do you have to do?
>>You have to go and weed it…
>>Exactly! And I had to do that with my mother's garden when I was a teenager. Everything was weed and weed and weed. And everyone grew up with single rows because you have a 3-foot-wide aisle on each side of that little single row. So I thought why don't we make that single little row much bigger, still have your 3-foot aisles but reach in? Well I found out people could reach in two feet, so on both sides it's a 4-foot-wide. So now I have, if you would think of it as a 4-foot-wide row, in between the aisles. And you don't water and you don't fertilize those aisles.
>>You don't have to weed in the rows anymore. What other advantages are there?
>>Well, it takes about 10 percent of the work, 5 percent of the water. A big savings on water here, yeah! And you grow a much better crop because you're growing in perfect soil. And there's no work.
>>And do you grow just as much crop?
>>Oh, absolutely! The space savings is phenomenal. We can grow as much doing the square-foot system in 20 percent of the space as a single row. That means an 80 percent reduction! So the work…
>>So you can grow five times as much in the same land.
>>You're good at math, I can tell! So its 1/5 or five times as much. So we don't need that big huge area.
>>It sounds almost too good to be true. Is there a lot of investment in this?
>>No, not really. It can be free, you can get all the ingredients free. Or you can invest. There's an initial investment. You've got to build your boxes and you've got to get perfect soil.
>>Okay, Mel. Here we are in the garden. What's the first thing we need to do?
>>Well the first thing we want to actually locate are our new garden, our square-foot garden. And there's a couple things you want to remember. First of all, it needs lots of sun. Good ol' beautiful sun. We need about 6-8 hours of sun every day. The other thing is, we don't want to be in the trees. See all the shadows there? And there are roots there too. So we want to stay away from trees and shrubberies.
>>Okay, so somewhere where there's lots of sun, do we need to be close to the house, probably?
>>That's a good advantage; because the garden's so small with square-foot gardening you can be close to the house. Now if it's close to the house you're going to see your garden more often. You're going to go to it more often. You're going to take better care of it. And what's going to happen? You're going to have a better garden, right?
>>How do we arrange our garden?
>>Well, we arrange it in squares. I want you to think of squares. Instead of long rows and traditional gardening, we're thinking of 4x4 squares. You walk all around them. You build your square, and we're going to ignore the existing ground and build up above. So we need boxes. Bottomless boxes. I've got one right here, and I'm going to show you that. But we decided that we could be right here in the grass. If so, we'd have to take all this grass out. Dig it out because it will come up through. But we're going to locate our box over here where this dirt is. Now you see a few weeds there. We've gone

through and dug most of them out. But the next thing you have to put down is a barrier for those weeds. And you can use cardboard if you don't want to spend any money. Or you can go buy a good landscape cloth. And I've got one right here. Let's put that down. And we'll put it right in this corner.
>>And then the box goes straight on top of this? Is that what we do?
>>Exactly, yep. This will keep all the weeds from coming up.
>>Now this has to be the same size as the box.
>>Well, it can be a little bigger. Just so nothing gets around the corner.
>>Okay.
>>When it's about 4x4. Now let's carry our box over there.
>>Now tell me about this wood. Is this the right size?
>>Well this is 2x6 lumber. You can buy it at any lumber store. Pull that, and get that pulled over. And what I've used, free wood, used wood. I got this at a construction site. I asked the manager of construction. Can we have some old wood there? He said, I've got plenty thrown out, it's all by the dumpster. I found this, built it. Notice we put a couple…three screws in every corner.
>>Okay, now does it have to be six inches?
>>No, it doesn't have to be. It could be more if you want. But it doesn't have to be. Any taller than six inches.
>>How about smaller?
>>No. We need six inches to grow our plants.
>>At least six inches, but it can be bigger if you like.
>>Yep. Now we're going to fill this with a perfect soil mix. And you can buy it or you can make it. If you have to buy it, here's the formula for the soil mix. Remember it's a perfect mix, it's got everything in it you want. We don't have to worry about improving or adjusting soil. Can you imagine how long it'd take to prove that soil? It'd take years and years and years and all that kind of hard work. We're going to start first year with perfect soil!
>>Sounds good to me.
>>Okay. Here's the formula: one-third peat moss. One-third vermiculite, and one-third compost.
>>Now can I buy all these at the local garden center?
>>Actually, you can! You just go to any garden center, they'll have them all. The nice thing is if you want to save money, you can make your own compost and it will be better than the one you buy.
>>How do I make my own compost?
>>Well, you start priming up all kinds of plant material that was once growing. Like weeds, grass clippings if they're dried. All the waste from your kitchen—orange peels and…
>>So anything organic from the kitchen I can take out, put it in a heap and then just turns into compost.
>>And you put in some manure and some weeds. As many different things as you can get. The more, the better! And it will start heating up and decomposing.
>>And how long does that take?
>>Mother nature takes over a year, but you can do it in about a month.
>>Really?

>>But you first have to chop it all up (that's a lot of energy), then you have to mix it quite often (that's a lot of energy). So you should mix it at least once a week, or once a month, or once a year.
>>Now why do I need compost in this stuff?
>>Well, compost has all the nutrients in it. And beautiful, natural soil. And with that compost, you don't need any fertilizer.
>>You don't need *any*?
>>None! No.
>>Really?
>>It's all in the compost. So it's put together…
>>So even, like, next year I wouldn't have to add any fertilizer?
>>No, I'll show you later as we replant each square foot, we're going to add just a little bit of compost for it. But if you have to buy it, you don't have it the first year. Then you go to the nursery and they'll say we've got lots of compost, there's a bag, there's a bag, there's a bag. That one's 99 cents, that one's $4.50. Now which one of those would you buy?
>>I would buy the 99 cents one!
>>Then you get…we need six bags. How many would you buy of those?
>>I'm going to buy six 99 cents bags.
>>Wrong! That's a wrong thing to do. The reason is, that's a waste of product from some industry. That happens to be steer manure. And then that happens to be from the wood industry, and that happens to be from the mushroom industry. So by themselves, they're not good. They won't work in your square foot garden. But if you buy one bag of this, one bag of that, one bag of that, and one bag of that…you're going to have a perfect compost. And you mix that with your vermiculite and your peat moss, and you'll have the perfect soil. That's what we're going to do.
>>Wow, should we put some soil in our box and see how it goes?
>>Remember, take the weeds out, dig the grass out, put a ground cover down or cardboard so nothing comes through it. Put your box down. Build your boxes 4x4 out of any kind of lumber, you can go and buy it or you can go find free lumber. So let's fill it up now.
>>Okay, great!

>>So now we have our soil.
>>Okay, we've put it all in there. Remember, we only have six inches, but feel that soil. Look at that, isn't that beautiful?
>>It's nice stuff. Now what's this white stuff?
>>That's vermiculite. And then these pieces are the peat moss. And you break them up like that, and you level it all out, and then we're going to put a grid on top of this. I brought a couple different kinds of grids. First there's a fancy one, this is plastic (or vinyl).
>>This looks like a trellis, something you'd put on the side of your house.
>>Yes, it's very similar!
>>And you bought his one, right?
>>Yes, I bought this one. If you want something more natural, then I've bought a wood one. Let's look at that one.

>>Okay. And did you buy this one?
>>I bought this one. It's a kit. Or, I'm going to show you how to make your own. See, you just lay that on. That identifies every single square foot. But if you don't want to spend any money at all, you can get Venetian blinds like these old ones. You go to a thrift shop, you lay them down, drill a hole, put a little bulb in there. Or you get some pieces of wood. This is just scrap wood that I found at a construction site. And you can see you could make those up and the cost.
>>Is this the same construction site you got this one from?
>>No, it's a different one. You have to travel around a little bit. You go from one dumpster to another, you talk to different people…
>>So once we've got our grid in, we're ready to plant, right?
>>We've got individual square feet now. So, we're going to, I'm going to show you how to space your plants, and we're going to put a different crop in every single square foot. And I'll explain why as we go along. First, let me get my flash cards. We use these in teaching. And this is the spacing for all plants. One per square foot. That would be a large plant, like cabbage. Four per square foot.
>>So basically I'm going to just plant one right there?
>>Right in the middle, exactly. Yep. And if you're going to do four…then you go like this, zip-zap and there are your four spaces.
>>Okay, we can do that.
>>Good. Okay. Now there are 9 per square foot. And you do that with two fingers like that. There you are.
>>So once we've got these, we know what we're going to put in.
>>Yes, then there's 16. Now you have to know, or you look up how many plants fit in a square foot. So it's either 1, 4, 9 or 16.
>>And we can make this different for every different square?
>>I'll show you how you plant it. We'll just put a pretty flower there, sure. Space these around different places. And we're going to have a variety of plants. Notice we have herbs, and we have vegetables, and we have flowers. There's our 16 per square foot. We have put in some carrots. Do you like carrots?
>>I love carrots!
>>And there's some bush beans. Do you like green bush beans or do you like yellow?
>>Uh, yellow.
>>Okay, then we'll put yellow over here. And I like green so I'll put some green over there. Now notice how pretty our garden is. It looks like a patchwork quilt. And we're limiting the number that we plant.
>>Now tell me about how to plant seeds into this soil.
>>Well, remember, you can put in one for 9 or 16. That happens to be the square of 1, 2, 3 and 4. So it's easier to remember. Where would one go?
>>One's going to go right in the middle.
>>Right in the middle. Okay, where would four go? How could you divide that up in half each way? You go zip, zap, and there's four perfect spaces. 1, 2, 3, 4.
>>Easy!
>>We're going to do nine. We're going to take two fingers like this. And you do it in your corner there. Zip, zap.
>>You just, go right here…like that?

>>Yep! And there's 9 perfect spaces. And we do 16 like this. You just go zip, zap again. Take two fingers, spread them apart, go bing, bing, bing, bing!
>>Okay. So should we plant some seeds?
>>Sure! Show me your…
>>Now these are radishes, right?
>>These are radishes.
>>So what do we need for radish?
>>16 per square foot.
>>16…so I'm going to go…?
>>Zip, zap…bing, bing, bing, bing! That's it. And notice, these two are the same as these two. And these the same as these two. They're all spaced perfectly, see?
>>Right.
>>Now we're going to take the seeds, put them in the palm of one hand; take a pinch of seeds like this, 2-3. See, there are two, there's three right there. And we're going to put 2-3 in each hole.
>>Why two?
>>Well, one may not sprout, so we're going to put two. And one extra. But we're not planting a whole packet of seeds like these two in gardening. As soon as you fill all your holes with a pinch of seeds, you just rub over like that, water that square, and you just finished planting!
>>Is that going to be a problem if two come up in one hole?
>>Yep. We've got to get rid of one of them. And we're going to take one of our tools, a pair of scissors, and we're going to snip off the extra one. And where there's no thinning to this.
>>So you just put them in, cover it up, do you need to water it too?
>>Yes. And an easy way to water, don't get your hose out. You just take the bucket and with some warm water, just sprinkle it over like that. Cover that cup with your hand, and you sprinkle all that water and get it nice and wet and you're all finished! And how much did that cup cost you?
>>Two cents.
>>That one was free! You used it first. And that's all there is to the whole garden.
>>And then we just watch it grow.
>>We watch it grow. Notice all the different things that we have planted, and we just keep planting and re-planting. That's how easy it is.
>>Thank you!

>>Karen Bastow has worked with Mel Bartholomew in the square-foot gardening foundation for years. And has been using the method at home with great success.
>>I became associated with the Square Foot Gardening Foundation about three years ago, and we could immediately see the beauty and simplicity of this method and decided it was time to change. I have gardened my entire life and when we saw this method, it just made so much sense to us, that there's less work, less worry, and our family just has fun doing this!

>>This is a beautiful garden, it really is!

>>Thank you, James! It takes so little work. We just come out and enjoy it everyday. And eat from it everyday.
>>Okay, notice how much room we have to kneel down and work in the garden. Nice, wide aisles.
>>And you could bring a chair in here or something.
>>You could, absolutely! Yeah. Now, here's a square that's all finished, it's ready to be planted. So I want to show you, here's our compost. We take a trowel-full, put it in there and spread it out, and then we just take our trowel and dig it up. Churn it up like that.
>>Now you need to do this every time after you've harvested?
>>Yep, after you harvest. And what you're doing is you're replenishing in the soil. And as you replenish that soil, it's now ready for another crop and we plant there. Seeds or transplants. Now as far as harvesting, look at this lettuce. It's got so many leaves there; Karen's going to take off a few for lunch. And you don't have to wait until the whole thing becomes a large head. You can start cutting the side a little bit.
>>Now tell me what this is, before we go around here, what is this?
>>Well it's a vertical frame. And we're growing any vine crop on a vertical frame. We have nylon netting and anything that's a vine that used to spread all over, starting with tomatoes, squash, pumpkins, watermelon, everything will grow straight up. It's a vertical gardening.
>>What is this here, squash?
>>This is squash. Zucchini is up…
>>Zucchini! And it's just ready to come up.
>>And it's tough to get it to climb, but Karen's going to do it.
>>And if it doesn't climb, it spreads out?
>>Yes, and we don't want it to spread out, it just takes up too much. We want to be just like an apartment building—straight up. Now over here, I see a weed there. Do you see that weed?
>>Look at that!
>>There's one right there. And notice it kind of pops up, see? And that's how easy it is. And notice something else here. Because the soil is so soft, all the root came up. Most weeding done in a garden, it breaks off right there and the root stays and it grows again. Now right over here, we've got some of these planted.
>>Bush beans?
>>These are bush beans. 9 per square foot, and look at that! They're almost…they're all lined up like soldiers, almost. Except there are a couple extra ones that sprouted. Remember, you asked me what if all three sprout? Well you just cut them off. Take your scissors and cut that one off like that, and you're all finished. Now this is only two feet wide, just to give you a different variety. And what we did here, we planted bulbs down deep, spring bulbs. And all this was beautiful tulips and narcissus and all kinds of spring bulbs.
>>Now when you say down deep, do you mean six inches?
>>Well, down at the bottom of the six inches. Put them at the bottom, cover them up. The beauty of that is, as these finish, you know, spring bulbs, they finish and turn brown and then they die and they rest until next fall, when you can plant them again. And what we're going to do is plant things amongst these. And notice Karen's already put in squash in here.

>>So we have crops in the box at the same?
>>At the same time, yeah. Now remember back there, the broccoli, we're going to take the broccoli out as soon as its finished, and we're going to put something else in there, and in the summer, something else, and we're going to get at least three, maybe four crops. Here, we already have two crops going. So we might get easily get four crops in this one box. But notice the size of it. See? It's different. The whole garden looks so nice because you can vary the size of your boxes.
>>So as long as they're not wider than four, they can be any size they like?
>>Exactly, because you can't reach in.

>>Are there any other barriers to getting into square-foot gardening?
>>Well, the only barrier's mental. Now when I talk with old-timers, expert gardeners, they say "it can't be that easy!" Gardening is a lot of hard work! And I said, it shouldn't be hard work, it should be fun! Now how many boxes do you need? Depends on how big your family is, how much you want to garden. But one 4x4 will feed you a salad every single day for the whole growing season. If you want supper vegetables and you have one more 4x4. And if you want something extra and a lot of vertical, tomatoes and stuff like that—or you want to can and freeze it, then one more.
>>You can make dinner everyday?
>>Yeah, everyday. Through the whole garden season. With just two boxes per person.
>>Now are there any other myths or misconceptions about square-foot gardening?
>>Well, I've heard some people say, well its kind of pricy to start with. But then, anything is! You have to buy your wood and you buy your soil. After awhile, we hope you'll start making your own compost. But, that's an initial investment. For example, the wood for one box might cost, oh, about $10-15. Okay? And the soil would cost about $20-25. So you have…
>>You can set up the whole bed for about $35?
>>Well maybe $40. Let's say $40. But, that's good for the rest of your life. You never have to replace that growing soil.
>>The other big thing, now, you didn't buy any tools, right? You don't need rakes or shovels or pitchforks. You don't need any of that stuff. You need a little trowel, a $1 trowel. And the other thing you need is scissors, and that's for harvesting and pruning and clipping up and everything. So for $3 or $4 you can have all the tools you need.
>>Sounds really cheap. Can this only be used here?
>>No, actually we're teaching square-foot gardening all over the world. In fact, we've converted into square-meter gardening. And we have a square-meter garden and we use pure compost in all other countries. Because they usually don't have—or can't afford—the peat moss and the vermiculite.
>>And does that work just as well?
>>It does, because that's where all the strength of the soil is and that's where all the nutrients are. The other nice thing is, when you make compost, you're taking stuff that's been thrown away. And you're composting it into a nice soil-like material. Well that means you're cleaning up the environment while you're doing that. So you have a big advantage there of improving the environment in whatever country you're in, at the same time have a perfect soil for growing. Now this is so different from farming. You know,

single-row gardening is nothing but a hand-me-down from farming. When you think about farms, why do they need the big rows?
>>Because these have horses…
>>Exactly, a mule or a horse. They have big hooves and they got to…but we don't in our garden, do we? How big are your feet? You don't need that much room. And that was what's wrong with single-row gardening. It just kept imitating everything about farming. And we don't need that in home gardens. There's a much better way.
>>So you've been doing this for a few years now, what developments have you passed since you've started?
>>Now our foundation is primarily doing humanitarian work. We're working with many other NGO's (non-government agencies). Anyone that sends out volunteers to another country to help them, and we want to train them how to do square-meter gardening, and then they'll take it to all these other countries. Its perfect for any country you can think of, because usually, they're all tropical countries, right? So they have lots of material for composting. And if we can get, we're trying to track the woman of the family, to build one square meter garden. Start composting and play at that, divide it up into square feet, which will give her nine square feet, she'll have 9 different crops to start feeding her children. That will improve the nutrition of the children, and we think that's a much better idea than…
>>Which is good too because you don't have to start with a whole garden, you can just do 4x4.
>>Exactly. Or just a square meter.
>>My wife would be really pleased to hear about the gardening one, because she teaches second grade.
>>Oh great, okay. Well kids love gardening, but they don't like to weed! So square-foot gardening is just for the whole family.
>>Well do you have any final thoughts or anything else?
>>I'd just like to encourage more people to give it a try. And if they do, we've never had anyone say, this doesn't work, I'm not going to do it anymore. Everyone is so enthused, you wouldn't believe the letters we get. But I think the main thing is this can help so many people all over the world!

>>Its easier than I thought! But before we go, let's just review a few of the simple things we can do to make sure we cultivate a successful square-foot garden. First, its always better to make your own compost. But if you buy your compost, remember to get a blended compost, without any seeds or other organic material that might lead to weeds. Next, be sure to make a permanent square-foot grid for the top of each box. That way you'll always know how many vegetables you can plant in each box. Also remember to water from the bucket that's been warmed by the sun. Warm water can actually help the plants grow faster and stronger. And finally, remember there's no need to use fertilizers if you start with that perfect soil that has all the nutrients already inside. And that's all the time we have for today, but for more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. And remember, everything's better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to grow barrier-free gardens. What exactly do we mean by barrier-free gardens? Well we'll check in with horticultural therapist Jeanne Robert at the Chicago Botanical Gardens. To find out, and to learn how to build, plant and maintain all sorts of container gardens, that allow folks of all abilities to enjoy the pleasures of vegetable gardening. Be sure to check it out.

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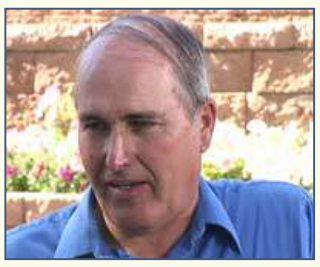
How to Cultivate Fruit and Nut Trees

On this episode of HomeGrown our expert Larry Sagers will help you understand the basics and beyond of fruit tree growth and success. He will talk about what you need to know about watering, fertilizing, pruning, and pest control to have the best fruit crop ever.



Featured Expert:

Larry Sagers, our expert on this episode, is a Utah State University extension horticulture specialist, a radio host, and a newspaper columnist. Contact Larry at lsagers@ext.usu.edu

Click on a topic below to view additional information.

Planning and Selecting Your Fruit Trees

Selecting a Site for Your Fruit Trees

What to look for when you are buying a tree.

How to Plant Your Tree

Watering Recommendations & Fertilizing

Pruning

Pest Control

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How to Grow Vine Vegetables

Whether you're an avid gardener or just starting out, learn everything you need to know about vine vegetables like zucchini and cucumbers, and how to take nutritious legumes from seed to your table.

Featured Expert:

Dr. Frank Williams, BYU Professor of Plant and Animal Science.

Growing Vine Vegetables

Examples of vine vegetables are:

Zucchini, butternut squash, acorn squash, pumpkin, Crookneck squash, Acorn squash, Banana squash, Kabocha, Bottle Gourds, Chayote, Winter melon, Chinese bitter melons, Cantaloupes, Watermelon, Cucumber

Click on a topic below to view additional information.

Squash

Cucumbers

Melons

Legumes

Corn

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How to Grow Greens and Salads

Whether you're an avid gardener or just starting out, learn everything you need to know about leafy green vegetables like chard and spinach, and how to take salad vegetables from seed to your table.

Featured Expert:

Dr. Frank Williams, professor of plant and animal sciences at BYU.

Click on a topic below to view additional information.

Green Vegetables

Spinach

Swiss Chard

Other Greens

Salad Vegetables

Lettuce

Celery

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How to Grow Fleshy-Fruited Vegetables and Cole Crops

Whether you're an avid gardener or just starting out, learn everything you need to know about fleshy-fruited vegetables like tomatoes and peppers, and how to take nutritious cole crop vegetables from seed to your table.

Featured Expert:

Dr. Frank Williams, professor of plant and animal sciences at BYU.

Click on a topic below to view additional information.

Fleshy-fruited Vegetables

Tomato

Peppers

Eggplant

Cole Crops

Cabbage

Cauliflower and Broccoli

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How to Irrigate the Garden

Some areas of the world can survive on natural rainfall, but for most of us we have to give nature a hand with a little well-planned irrigation. Watch as we demonstrate a variety of water-saving irrigation methods along with some ways to improve your soil so that it'll retain more water.

Featured Expert:

Dr. Frank Williams, BYU Professor of Plant and Animal Science.

Click on a topic below to view additional information.

Soil

Watering Methods

Watering Time

Fertilizing

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How to Grow Root and Bulb Vegetables

Whether you're an avid gardener or just starting out, learn everything you need to know about root vegetables like potatoes and carrots, and how to take those tasty bulb vegetables like onions and garlic from seed to your table.

Featured Expert:

Dr. Frank Williams, BYU Professor of Plant and Animal Science.

Click on a topic below below to view additional information.

Root and Root-like Vegetables

- **Potato**
- **Sweet Potatoes**

Root Crop Vegetables

- **Carrots**
- **Other Root Crops**

Bulb Vegetables

- **Onion**
- **Garlic**
- **Other Bulb Vegetables**

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How to Control Weeds, Pests, and Diseases

There are some things every gardener hates -- weeds, diseases and pests. Learn how to recognize a problem, diagnose it, and where to go for help. Also, watch for organic and inorganic solutions to common problems.

Featured Expert:

Dr. Brad Geary, professor of plant and animal sciences at Brigham Young University.

Featured Expert:

Adrian Hinton is a Utah State University Extension Agent. Utah County residents can contact him at adrianh@ext.usu.edu. If you live outside Utah County contact your local extension agent

Featured Expert:

Pat Fugal is a Utah State University Extension Agent. Utah County residents can contact her at bettyd@ext.usu.edu.

If you live outside Utah County contact your local extension agent.

Special Guest:

Cecilia Fisher is an avid home gardener. Cecilia has been gardening for a few years. She grows vegetables, fruits and flowers.

Click on a topic below to view additional information.

Weeds

Weed Management Methods

Herbicides

Pest Control

Books

Disease

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This presentation of HomeGrown is made possible in part by a generous grant from Angel Partners. Angel Partners: Committed to the programs, services and technologies that support family values and lifelong learning.

>>There's nothing worse than walking out to your garden bright and early in the morning, only to find that snails have eaten all of your prize strawberries. Or discover that the weeds have seemingly grown up overnight! Well on today's show, we're talking about all those things gardeners hate. Weeds, diseases and pests! We'll also learn how to recognize a problem, how to diagnose it, and where to go for help. We'll also discuss organic and inorganic solutions for the most common problems. Hi, I'm Rebecca Cressman, and you're watching HomeGrown.

>>Welcome to HomeGrown, the show that brings you all the dirt on vegetable gardening. Today we're talking about how to control weeds, pests and diseases in our vegetable gardens. With me today at BYU's beautiful Terrace Garden is Dr. Brad Geary, professor of plant and animal sciences at Brigham Young University. Thanks for joining us!
>>Thank you for inviting me.
>>Well let's first talk about weeds. What technically is a weed?
>>A weed is anything that's not desirable, it's a plant that's out of place or is causing some kind of distraction or problem.
>>Are the main characteristics of a weed, the kind of designs, besides the ones where we're like "we don't like this one; we're getting rid of it."
>>A weed is something that competes very well with your desirable plants. It can germinate quickly, come out of the ground very fast. So it gets to the nutrients, sunlight and water, a lot quicker than your desirable plants. Your garden plants or your flowers, or your trees or your shrubs.
>>I was thinking of the Morning Glory. Because in no time, that thing is always growing where I don't want it to grow, when I'm wanting everything else to grow with it. You have different tools that you use for weeding, are these those that are the typical weeding tools?
>>Yeah. What we have here are just different tools you can use. People like to use different types, whatever fits people the best. This is kind of just a raking tool that disturbs the soil. Better for small weeds, weed seedlings, can pull out the roots very quickly. Something like this can be used on a weed that has a deep root, where you're trying to get down and pull that root out like a dandelion. So you can run it down next to the root down in the ground a little ways. Pop that out.
>>So you can actually take this down like 4-5 inches before you pop the root out? So this would be for those that are just establishing, you see maybe a head of an inch or so high.
>>We'll break up the roots well; make it so they can't get any more water or nutrients. And maybe for your larger weeds, you can use a small digging trowel like this. Most of the time people use these for putting in their plants or digging small holes, but you can dig out some of your larger ones with these as well.
>>What about hoes? Because, you know, you go back in time and that's what everybody used to get rid of the weeds. Are people still using the old fashioned hoe?

>>Oh yeah, definitely. The hoe and these tools require people to bend over a lot and probably one of the most common tools is your hand. And going down and pulling the weed, that's what a lot of people use. It's easy, it's very specific. You know, you're getting the weed. Hoes, or a tool that has a long handle, so that you can stand up while you're working with it. You don't have to bend over and maybe go through some of the aches and pains that you do with some of these. They are getting other tools that have long handles. Just modifications of the hoe. Some of them are called weed eaters, where they're more of a triangle shape. And you run that along the circles of the ground, a couple of roots and the top foliage from the weed. And then there are other ones that have long handles that you can stick into the ground, maybe something like this that has three or four prongs. It goes around the root. You twist it and pull up. So there are a lot of different tools. It's just what people get comfortable with and what they like to use.
>>You were talking about pulling up the roots. How important, when we're weeding, what are we needing to do in order to make sure we get that out and it's not going to come back?
>>Okay, a lot of weeds are really a nuisance. You remind me that we were talking about. If you leave those roots in there, they can send up another shoot, re-vegetate, they'll come up. So a lot of times, or with dandelions, even, it's very good to get those roots out so that they don't come back. And when you pull a weed, you want to remove the weed completely from your garden area or your grass, wherever you're pulling it from. And move it, maybe throw away in a trash can or something like that, so it doesn't re-grow. Some plant parts, you can leave there and they won't put down roots again. A lot of our really pesky weeds will re-root and come back. So you want to get them out of there as much as possible.
>>One of the biggest challenges I have when I'm working in the garden is I can't really tell. And this probably goes to the way I'm planting, but I can't really tell the difference between what looks to be like the beginning of one of my desirable plants and the beginning of a weed. And you focus on it, because they look similar. Is there a way to actually identify the difference between the two?
>>The best way is to become familiar with your plants. What you're growing, whether you look on the seed packages. They usually have a picture. Whether it's a cucumber or a pumpkin or a corn plant, you can get a general idea of what the plant might look like. Another thing is to look on the internet. And look up seedlings. Different plant shapes, the leaf shape. If you're really having a problem, let them grow up a little bit so that they develop more. You can tell the difference between the leaf shapes and sizes. And mark them in your garden or in your flower bed. Mark them if you're planting in a straight row, particularly in your garden. A stake with a sign or something written on it.
>>Popsicle stick?
>>Yeah, exactly. Anything can work. And then just follow that straight line, and that's probably one of the best things to do.
>>You talked about these being helpful in smaller gardens. What if the weeds are out of control? We have a good, big-sized garden and we need to get into spring. What should we know about spring in terms of killing weeds that way, and when is the best time to spray?
>>Okay, the best time to spray is definitely when the weeds are young. When they're in a very small stage, seedlings, they are killed the easiest. They take up the chemicals the

quickest, and they don't have a good, solid root base, so they die very quickly. The chemical can get to them and kill them. So spray when weeds are young. If they mature, most weeds, you may only get a 50 percent kill, maybe at best. So you want to spray young.
>>And when we spray, it won't risk the livelihood of the other vegetables or flowers that we're hoping for?
>>Okay, you have to be very careful. Some herbicides are selective and some are non-selective. For example, this particular one here, its active ingredient is glyphosate. It's a non-selective herbicide. Where if you spray this on any plant, any green part of a plant, it will kill it. Some of these others will be selective, and they will be selective toward, typically, a grass plant or a broadleaf plant. And they'll kill just the broadleaf, so you can spray them on your turf and your grass and kill all the broadleaves, but not necessarily touch your grass.
>>And of course they'll, ideally, on the label, have that information for us?
>>Oh yes, every pesticide, herbicide that you use has a label, they're required by law to have those on there. They talk about how to use it, how to apply it, and if you happen to get some on you, there's always safety and emergency preparedness information.
>>There's a term that we hear a lot about when we're gardening: pre-emergent and post-emergent. What do those terms mean?
>>Pre-emergent is an herbicide that you put down before the plants come up. Its purpose is to go after the seeds, stop them from actually emerging from the ground. Post-emergent is one that comes up, you put it on after the weed has come up out of the ground and you can see the green foliage. Some of the pre-emergent herbicides that we have, some of them are granular, like this here. And you can just go and spread that in your garden.
>>And we're using a scoop, because it's not a good idea to have our bare hands on this, right?
>>No, you should never touch these pesticides with any kind of bare skin, because you can take up the chemicals through your skin.
>>So, for example, if we have a shrubbery that we are planting and we didn't want any weeds around that shrub, we would place this throughout the dirt area to prevent weeds from coming up?
>>Yeah. What you want to do is sprinkle this in the dirt area. And mix it in a little bit either with a rake or a hoe or that little handle that we just had. Or you can water it in. Put enough water that it moves it down within the top half inch or so of the soil.
>>How often would we use something like this that prevents…
>>This will last three to four months. So it's excellent. This is very good to put out in the springtime. It will get anything that has a seed, though. As the seed radical emerges, it will kill it. So if you put your garden plants or anything down that will kill it, but it's an excellent tool to use.
>>And you call that a pre-emergent. I know there's also post-emergents?
>>Post-emergents would be something like this non-selective herbicide that you spray on the green foliage. And it…
>>This kills everything?
>>Yeah, that one will kill everything. You have your selective ones that you can go out and spray your grasses or your broadleaves again.

>>Now you have a liquid concentrate that we brought here from the palace. And I'm looking for that.
>>Liquid concentrate. This one happens to be a selective herbicide, and it goes after just the broadleaf leaves. So I would apply this one just specifically on my grasses.
>>And this is a small container, but it's pretty powerful, huh?
>>Yeah, you have to dilute it. You have to mix it in the sprayers. And with something like the post-emergents, you can put them in different sprayers. You have a hand sprayer if you want to spot spray. So if you want to get all the dandelions and move on, you can go out and spray those instead of spraying the whole yard. So you can spot spray those. Or if you want to go after that field mine, we spot spray something like that.
>>I definitely do. One time I put a tarp down and I lifted that tarp up and there was all kinds of—you call them field vine, rather than morning glory?
>>Yeah, field vine weed. Is the technical term. Morning glory actually can be an ornamental plant. Just botanical terms.
>>Well, we talked a little about the pre-emergent being put on every 3-4 months. Those post-emergents, where we're actually targeting the weed and killing it, how often do we need to do that?
>>Uh, most of these will last 2-3 weeks, but if you have new weeds come up out of the ground after you've applied, they won't be affected by these post-emergent herbicides. So you need to reapply. Just depends how many weeds you have coming up and how often you feel like you need to spray what you're comfortable with. Typically, you're looking to about every 3-4 weeks you should spray. If you want your garden and flower beds really clean, I'd spray them more often.
>>Now, in our neighborhood, there's only a couple of families that have these, and then it's shared by everyone. So talk to us a little bit about these.
>>These are a little bit more, if you have more area to spray, or more plants, again this could be a spot spray or you can use this one as a general broadcast spray. Meaning you want to spray it all over your yard—or flower bed. It's pressurized, so you have the handle and you pump it, it lifts up and you pump down to create pressure to spray out. A good one for small areas, the other kind is a backpack sprayer. And you can…
>>And this is if you have an acre or so…huh?
>>Well, maybe not quite that much, but yeah, it would work. Definitely, it would work. You got your straps that go on your back and your pump to create pressure inside your tank. And then again, it's very good for spot spraying, if you want to just broad cast an area and you want to spray it.
>>Will it give you a fine mist or a targeted stream?
>>You can adjust the nozzle so it gives you a very fine mist or a cone type. Or you can get others on there that create triangle type patterns or fan-type…
>>Can you use these for both the pre-emergent and the post-emergent pesticides?
>>There are some pre-emergent herbicides that are liquid, and yeah, you can use this. If you do use the liquid, you want to be sure to water it very soon after you apply it or work it in the ground with some kind of tillage you put in it, raking it up or something like that.
>>And when I said pesticide, I mean to say "herbicide," right? Because we're targeting our weeds right now.
>>That is correct.
>>Now you've got some equipment here for the feet.

>>Any time you apply any kind of pesticide and insecticide or herbicide or fungicide or bacteria-cide, you need to put on protective clothing.
>>These are big shoes to fill!
>>Yes. Very big. Way bigger than my feet. Some of these are built to put the shoes that you're wearing right into the boots. So that's why they are…
>>And they are really handy, especially if you don't like washing off mud off your shoes, because you can leave it on here or rinse these off later.
>>And you always want to rinse your stuff off after you use it. So rubber is the best. It doesn't allow the chemicals to get in and get on you very quickly. You can wash it off quickly. You always want to protect yourself. They have suits—either coveralls or water-resistant or chemical-resistant suits you can wear. And you always want to wear some kind of eye protection. And depending on what the label says, you may need to wear a respirator or some other kind of device to protect your face or shield.
>>And they have disposable—I've seen—smaller paper ones. Are they good enough for us to wear?
>>For most of the chemicals that require a respirator, no. You need to get something with specific filters that can filter out very small particles…mists…
>>So we have to watch and take a look at the type of herbicide that we're using to determine that.
>>Yes, definitely. Most of your homeowner stuff, things that you pick up at the lawn and garden store, are relatively safe. And you don't have to get a lot of this protective gear to suit up.
>>I like what you said, though. You don't want to track it into your house, so you don't want to be wearing the same pairs of shoes outside that you're spraying on your grass back into the house.
>>No, all clothing needs to be kept separate from other clothing that you're going to wear or use. You don't want to have your children climb all over you or play with them after you've sprayed and you've got it on your clothes. You want to wash it separately in the washer and just keep it away from your normal, everyday clothes.
>>Well before we move onto pests, are there any other tips that we need to be aware of when we're using herbicides or any pointers for us?
>>Just be consistent with them, use them on a timely basis. The biggest thing is to identify the weed properly. If it's a broadleaf weed, make sure you spray something that will kill the broadleaf weeds. They're excellent tools; they work well in an integrated pest-management program. They work well with pulling them by hands or using your hoe. Putting the chemicals out. The biggest thing is to read the label. That's what it's there for. They're always on the package.
>>Okay, now we're going to talk a little about pesticides. And I learned in one of our shows here on HomeGrown that we can use ladybugs and praying mantises to actually help protect our garden while it's growing. So, with that in mind, as we're going out to try to kill pests that might damage our plants, how can we tell the good guys from the bad guys?
>>Unfortunately with your insecticides, they're not as selective. You can't just say, "okay, I want to kill all the wasps, or I want to kill all the aphids in my garden." A lot of them, some of them may be able to do that, but most of your insecticides are going to be very non-selective. So if you spray them, they're going to kill everything out there. So if

you have a lot of beneficials and you want to keep your garden or your flowerbed organic, you need to probably not apply some of the chemical insecticides.
>>You mentioned aphids, but what are some of those bad guys that we need to be looking for, so that when we buy a pesticide, we're getting one that can target those? Aphids…what else?
>>Every insecticide that you use will list on the label exactly what it kills. It will go after your aphids, spider mites, (which aren't considered a true insect) A spider mite is an arachnid. It has eight legs, verses an insect has six legs.
>>And what do they attack, the spider mites?
>>Spider mites go after almost all plants. You'll typically see them really bloom in the hot months of the year. End of July, August for our environment. And if you have applied an insecticide, they will typically, the populations will go up because you've killed all the natural predators like the ladybugs and things that eat them and go after the wasps.
>>And snails, I guess, something we have to watch for?
>>Snails, again. Snails you can use some of your baits here.
>>Baits?
>>A chemical bait.
>>Oh, so this will actually attract a snail?
>>What you need to do with your baits is you spread it around the plants that are being damaged. And the way to identify a snail or a slug damage, you tend to see more damage in the morning after you've gone through the evening.
>>They like that moist dew.
>>They like it dark. So you're not going to see them during the day. So you spread it around the plants, and as they go to the plant, or they're attracted to it, they'll eat it first and then it kills them. But there are organic means of killing snails. You can, there's a lot of home remedies.
>>What about that water jug? You've got something down here that seems to be a water trap for them? Because they do like moisture. Do we have one in there now?
>>We don't have one in there, no. What you do with traps like these, you bury them down in the ground, about soil level with the lid of your trap. And the idea is you want the snails or slugs to go in here. And they drown. And the way they go in there, they're not going to go in there, they're not going to in there with just water there. But bait it, so again they can smell it. They identify it as food so they want to go down in there.
>>So you add maybe some of this type of bait?
>>That particular one dissolves in water. What you would want to do, fermenting fruit, rotten fruit attracts them. You can also mix water with sugar and yeast, and that attracts them. The smell of the yeast will definitely attract them. They'll go in there and they'll drown.
>>And I imagine you want to warn the kids to stay away. Because I can imagine a toddler thinking, "Hey, it's stew." Let's take a look at that! What about the other solutions for pests, if we want to get rid of them?
>>Particularly talking insects or snails, or slugs? All of them. Insects, you can buy some of these beneficial organisms like the ladybugs, you can buy them in a home and garden stores, and you can release them and put them out there. They need food sources just like everything else. So if what they're eating, if they're eating the aphids and the population

is low, then the ladybugs will go somewhere else. So provide a food source, habitat, plants, dried or dead plant material, bark, mulch, surround your flower bed, stuff like that, definitely help out.
>>And how do the pesticides work? It seems to me that ideally, you would be able to put an herbicide down or a pesticide. But they have two different functions. So what is the difference? How are they both functioning that we have to use them both separately?
>>Yeah, the chemicals deal with the metabolic activity of the plant or the insect. Okay, now insecticides are particularly dangerous because a lot of their cellular activities are very similar to ours. So they're going to be very poisonous to us as well. So you have to be very careful applying insecticides. Herbicides, a little less so, but they're definitely going to be poisonous, so you have to be careful. But, the difference between the plant cell metabolism and an insect cell metabolism, that's how you get the difference between these different chemicals and how they infect them. For instance, on some of the insecticides, they're going to be neurotoxins, so they go after the nervous system.
>>Now, let's say we go out to the garden and we're seeing some signs of damage. How do we come back and go, "okay, you know what, looks like we've got a mite or looks like we've got snail problems. If we don't obviously see the snail tracks. How do we determine who's our enemy?
>>Okay, here's a leaf where there's been some physical damage that happened to the leaf. You can tell there's a hole in it. Some of the leaf margins have been eaten away. This helps you identify your particular plant past and insect, more or less. If there's physical damage like this, then you have an insect that has chewing mouth parts, like a snail or a slug. Or a grasshopper, that's going to physically come in here and take a bite out or rip and tear.
>>I didn't even know the snail had chewing mouth parts.
>>They'll eat away a leaf or your strawberries or whatever that you have. Aphids, spider mites, they're small. Aphids have a piercing, sucking, style or mouthpiece to it. It actually injects like a needle into the plant. Goes in and then starts sucking up juices. That will cause a curling of the leaf, or little brown spots, a stripping affect on the leaf. Same with the spider mite. They bite, they kill cell by cell, getting their nutrients out of that plant. So you're going to see a bronzing, a browning effect on the leaf of spider mites. The other thing is you can turn them over and usually, they don't like direct sunlight, so they're going to be on the underside of the leaves, typically, or lower down in the plant canopy. Turn them over, and you can see the aphids, they're big enough to see. Mites are really, really hard to see unless they are in high population. And then you can see a little webbing and maybe some of them moving.
>>And you know, that's kind of hard for the average person to maybe remember, recognize. You have some books that you brought that might be helpful for those of us who want to build something in our libraries; we can go back and look it up.
>>There are a lot of great books out there. Put out by different companies. You can go to your local home and garden store. And they have a lot of books there.
>>The edible garden, for example.
>>Yes, and a complete guide to vegetables, fruits and herbs. Ortho puts out—this is made by Ortho—Ortho puts out problem solving books for gardens. Some garden stores have them where you can actually go in, they have a copy you can thumb through and

look and see. And what the problem is, according to the symptoms you're seeing on your plant.
>>So if you buy a book, you want to make sure that it has a section on pests to kind of help you in that diagnosis?
>>Be specific.
>>Great. Talking about identifying pests, one resource that is available in the United States to identify pest diseases and weeds is the university extension service. We caught up with Cecilia Fisher, she's an enthusiastic gardener, but decided to give her local extension service a try in order to identify the sources of her gardening woes.

>>Well, I really enjoy gardening. It's something fun. But I find that I lack a lot of knowledge in knowing how to handle a lot of things in my garden. Well this year I had a really interesting situation with something is really bothering my strawberries. S something is eating my strawberries! And sometimes in the morning, I find that there's just half of it or a big hole in my strawberries. There is a weed that's creeping. And when I pull, I can never pull the root, and it coils around plants and before you blink your eyes, they're totally wrapped around. You cannot pull it, otherwise you destroy the plants. So, I would love to have something that would kill those weeds and not affect the berries. I have four apple trees. And there is something on those. The leaves are curling and there is something going on there. I'm really excited about the extension services and what they can provide as a form of help to me this year.

>>Trish speaking.
>>Oh hi, Trish. I have some questions about my garden. Can you help me with it?
>>Yes. Would you be able to bring in a sample of your problem so we can diagnose it?
>>Something is eating my strawberries. And also my green bean leaves. So can you help me? What do you think I should do?
>>All you have to do is take a piece of your affected plant, put it in a plastic bag. You do need to remember if you bring in insects, they should be in a container where they cannot escape, and if you bring them to our office, we can fill out a form and we can analyze it for you.
>>Okay, great, great. I do have some weeds that I'm concerned about as well, and I don't know how to recognize them.
>>Uh, weeds are fine too. Just bring them in their own separate sack, and then we'll identify it for you and tell you how to control them.
>>I'll bring those in tomorrow then, thank you so much!
>>You bet, bye.
>>Bye-bye.

>>I have some problems with something eating my strawberries. I also have a bug I found in my apple tree, some of my leaves are from apple trees; some vegetable leaves are being eaten. And some weeds. I've got them all! So I need some help.
>>I'm going to need you to fill this in for me.
>>Okay, perfect.
>>There you go, all done.

>>Okay, looks like you're all ready. If you want to take these and your sample and go on in the back, Adrienne and Pat will be able to help you.
>>Great, thank you so much! Appreciate it.
>>Hello, hi. How are you?
>>Got quite a basketful, huh?
>>I do, I have some problems and I'm eager to solve them.

>>This little guy is the pupa of a ladybug.
>>Really?
>>Well maybe ladybugs look like little alligators. Have you ever seen one?
>>You crawl around?
>>A baby ladybug can eat 100-200 aphids a day. An adult eats about 50. So you need to know what a baby ladybug looks like so you don't kill them. So if you uncurl this, you'll see lots of aphids. They are so tiny.
>>So that's what those ladybugs are.
>>But the ladybugs can crawl inside where your spray can't get.

>>Now that we have identified this, what can I do to eliminate them?
>>The best thing is, since it's a perennial plant, it means it grows year after year. And so we need to spray, we don't want it to ever go to seed or wilt the flower. So you need to harvest it or pick the flowers off or mow it during the season, but in the fall…
>>…Gather it all up, or put a covering over your berries, and then have that laying on top of a piece of cardboard or something else when you go to spray it.

>>The extension service people were so wonderful in the sense that they gave me solutions. I was very concerned about the environment and some of the chemical things that I would be using. And so they gave me options for both, and I know I would have to use some chemical things, but I think the options were great, so they were very concerned about that issue as well. And I think that they gave me a lot of wonderful solutions that will really make me feel like a better gardener and more excited about doing so.

>>Now before we go, let's just review a few of the simple things we can do when it comes to protecting our garden from weeds, diseases and pests. First, be persistent. Sometimes a pest control just bothers a pest, and it doesn't kill it. As soon as you stop treating your garden, the pests will return, so keep at it.
>>Always be out there identifying what's wrong.
>>Also, take time to look at your garden regularly. That way you'll be able to treat a problem early before it gets out of hand, making your life a lot easier. Also, just don't stick to one solution, vary your approach, mixing organic and inorganic solutions for the most effective results, and you have given some great ideas! And finally, don't stress your plants out. Make sure they're well-fed, watered and are planted where they need to be. This way they'll stay stronger and more successfully survive those diseases, pests and weeds. And that's about all the time we have for today. For more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. Thanks to Brad, and thank you for watching and remember, everything's better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to grow root and bulb vegetables. Whether you're an avid gardener or just starting out, we'll discuss everything we need to know about root vegetables like potatoes and carrots, and how to take those tasty bulb vegetables like onions and garlic from seed to your table. Be sure to tune in!

This presentation of HomeGrown is made possible in part by a generous grant from Angel Partners. Angel Partners: Committed to the programs, services and technologies that support family values and lifelong learning.

How to Work with Soil

Whether you're an avid gardener or just starting out, learn all the basics of how to care for soil in vegetable gardens. Learn how to tell what type of soil you have, how to amend it, and even how to make your own perfect soil.

Featured Expert:

Larry Sagers, Utah State University extension horticulture specialist, and radio host and newspaper columnist. Contact Larry at lsagers@ext.usu.edu

Featured Expert:

Adrian Hinton is a Utah State University Extension Agent. Utah County residents can contact him at adrianh@ext.usu.edu. If you live outside Utah County contact your local extension agent.

Special Guest:

Danelle Bates, a new homeowner planning her garden.

Click on a topic below to view additional information.

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Composting

Mulch

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Soil Testing

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How to Use Culinary Herbs

Bonjour Paris! We'll take a trip Paris, France and learn how to buy, store and most importantly, cook with fresh herbs. Learn from a gourmet chef how to turn everyday cooking into a gourmet treat by simply adding the freshest of herbs.

Featured Expert:

Samira Hradsky, Gourmet Chef and Cooking Instructor. Contact Samira at hradsky@noos.fr

After earning her MA and Doctorate degrees in Education and Human Development from George Washington University, Samira Harfoush Hradsky worked for many years in the government sector. Ten years ago, she decided to create her cooking school, "Food Unites the World." Having lived in many places in the world, including the UK, Middle East, Europe, Africa, and the USA, she has melded the culinary education of her mother and grandmother. Samira has attended classes at the Cordon Bleu, as well as other culinary schools.

"I not only want to inspire people to want to cook but also to cook better. I have always believed that no matter how different our ethnic backgrounds, beliefs, views and values, we can all sit around a dinner table and unite in sharing a meal that includes different tastes and types of food from all over the globe."

After learning about the interesting and varied uses of herbs, learn about How To Grow Herbs from our website.

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QUESTIONS OR COMMENTS?

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How to Do Square-Foot Gardening

Learn how to start your own square-foot garden from Mel Bartholomew, who first introduced the technique over twenty years ago. Mel has literally traveled the globe teaching this revolutionary gardening system to millions of gardeners.

Featured Expert:

Mel Bartholomew

Mel Bartholomew a former engineer and efficiency expert didn't start gardening until he was in his middle-age. After years of using the traditional single row method he felt he was wasting too much of his valuable time and energy. So he decided to apply his skills of finding a more efficient way of gardening and ended up creating the Square Foot Gardening method.

Contact Mel at info@squarefootgardening.com

Featured Expert:

Karen Bastow

Karen Bastow of Liberty, Utah shares how she has successfully implemented the technique of Square Foot Gardening as taught by its creator Mel Bartholomew.

Contact Karen at info@squarefootgardening.com

Click on a topic below to view additional information.

Square Foot Gardening

Vertical Structures

Square Foot Gardening Website

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- Old Testament
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How to Plan and Plant a Garden

Learn how to plan and plant a vegetable garden from selecting just the right vegetables to starting your own transplants indoors. Also, get some special tips on planning so you can cultivate your best garden yet.

Featured Expert:

Frank Williams

Professor of Plant & Animal Science, Brigham Young University

Featured Guest:

John Foss

John Foss only moved into his Bungalow 3 years ago but he immediately drew a plan for the garden. Though space is limited the garden has won a second prize for "best created garden."

Featured Guest:

Graham Henson

Graham Henson practices succession planting to maximize the space in his English backyard. Some of his vegetables, the tomatoes, potatoes, and carrots, are grown in buckets.

Click on a topic below to view additional information.

Planning A Vegetable Garden

What Do You Want To Grow?

Factors In Planning

Sketch A Plan

Planting The Garden

Cool and Warm Seasons Crops

Transplants

Crop Rotation and Succession Planting

Gardening Journals

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How to Do Hydroponics

Did you know you can grow vegetables without soil? It's called Hydroponics and it's becoming more and more popular. In fact, it's making it possible for homeowners who don't have a garden or even soil to grow almost any vegetable right at home.

In principle, all kinds of plants such as tomato, melon, strawberries, peppers, cucumbers, lettuce, basil, cilantro, parsley, onion and garlic and even the root vegetables such as the potato can be grown hydroponically. Our show features water culture, aggregate, and continuous flow systems.

Featured Expert:

Alfredo Rodriguez Delfin, Professor of Biology,

Universidad Nacional Agraria La Molina, Lima, Peru.

Contact professor Delfin at delfin@lamolina.edu.pe

Featured Guest:

Cleofe Quispe, President of FEPOMUVES

Featured Guest:

Ester Florez, Assistant

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Container Gardening

What exactly is a barrier-free garden? To find out, watch as we check-in with horticultural therapist, Gene Rothert, at the Chicago Botanic Garden. He'll show us how to build, plant, and maintain all sorts of container gardens which allow any amateur or avid gardener to enjoy the pleasures of vegetable gardening.

Featured Expert:

Gene Rothert

Gene Rothert of Chicago, Illinois is a gardening expert, consultant, speaker, and writer on barrier-free gardens and horticultural therapy. He has worked at the Chicago Botanic Garden for 27 years focusing on horticultural therapy and managing the 11,000 square foot Buehler Enabling Garden, a garden for people of all abilities. Contact Gene at grothert@chicagobotanic.org

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Enabling Garden

Types of Containers

Container Gardening

Tips from Gene Rothert on Container Gardening

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This presentation of HomeGrown is made possible in part by a generous grant from Angel Partners. Angel Partners: Committed to the programs, services and technologies that support family values and lifelong learning.

>>Next on HomeGrown we'll learn how to grow fruit and nut trees. Whether you're an experienced fruit grower or just starting out, we'll explain all the basics on how to plant, prune, and harvest those fruit and nut trees. So stay tuned.

>>Welcome to HomeGrown. I'm Rebecca Cressman, and today we're talking about how to grow fruit and nut trees. With me today here at BYU's beautiful terrace garden is Larry Sager, a Utah State University Extension Horticulture Specialist, a radio host, and newspaper columnist. Thanks for being here with us. First of all, we're going to talk about fruit trees. What kind of decisions and criteria do we need to have at the top of our mind, when we decide what kind of trees to put in our yard?

>>Larry: Well we need to decide what's going to grow and grow well in your area. And you might think that's a fairly simple thing, but we're here in Provo, Utah, traditional fruit growing area for Utah but you go a few miles to the east of here and you could not grow the same kind of fruits. You can't grow any of the peaches or nectarines or anything else like we might grow here. So you need to find out what's going to grow and do well in your area. One of the problems is a lot of times the trees will grow, and they'll be perfectly hearty but we're growing these for fruits. Nut trees, for example, here in northern Utah, if we wanted to grow pecans, yes the trees will grow very well, but you probably will not get any pecans off of there. So you probably would want to select another tree that's going to grow and survive and produce a lot of nuts or fruit in your area.

>>Rebecca: Where do we go—resource wise—to find out what kind of trees we can actually grow, depending on the climate that we live in?

>>Larry: At first, check with your local extension service office. There's one of those in just about every county of every state in the nation. If that doesn't work, talk to your local friends and neighbors. See what they're growing. Look at some of the good local nurseries and find out what they have in stock and what people are buying and having good success with. And if you've got commercial growers in your area, stop by their fruit stands and taste some of their fruit and find out what varieties they're growing, because that's the ones you can likely grow in your yard and have success there also.

>>Rebecca: I like that kind of research. To test the fruit first!

>>Larry: Well fruit is a long-term commitment. In a vegetable garden, it can be in there. If we don't like it, we can put something in that's totally different next year. But you can't do that with fruit. Some fruit trees, it will take you cherries and things, it may take you 8-10 years to get that tree into good production, and you don't want to start over after you've decided "oh, I didn't really want that."

>>Rebecca: One other thing to think about is the heartiness zones. Let's talk a little bit about that. We'll see them in magazines, we see them in some of the catalogues. What exactly are heartiness zones?

>>Larry: Heartiness zones, cold heartiness zones are zones that are put together by the USDA, and those are based on minimum winter temperatures. So, if you say you're a zone 5, that has a corresponding winter minimum temperature. So look at your heartiness zones, but realize there are microclimates and there are some other things that are going to affect whether or not you're going to be able to grow fruit trees in that area. But that's a good place to start.

>>Rebecca: You know, we've all heard of the tale, or many of us have heard of the folk tale of Johnny Appleseed. But in reality, we don't actually plant seeds anymore to get trees, and why is that?

>>Larry: You don't plant seeds, because if we look at these apples here, we've got a red delicious here. A golden delicious here. And we've got a granny smith here. If we took and cut this open, this is a palm fruit, so we cut it open and we look inside and there's going to be a number of different seeds in there. Actually, if we planted those, we may get a different kind of tree from each one of those seeds. And the reason is that this fruit—all of these fruits—are the product of cross-fertilization. This has two kinds of tissue. The vegetative tissue is what gives us the red color, and this red delicious taste that you're going to enjoy and you've eaten many, many times. But the reproductive tissue is in the seed, and that's a product of cross-fertilization. All of us are products of cross-fertilization. You might resemble your mother or father, but you're not an exact genetic duplicate. To get this to be an exact genetic duplicate, that tree has to be propagated, vegetatively, and that's done by budding and grafting. So no commercial growers grow their plants from seed and you shouldn't either. Because you don't know what you're going to get. Your chances of getting an apple that looks just like this with all the same characteristics are about a million to one.

>>Rebecca: Wow, that's a new idea for me. And each of these seeds could potentially create some other different type of harvest?

>>Larry: Some other kind of tree. And you know? The golden delicious, that was discovered by Paul Stark Sr. At least, he purchased the rights to it. A beautiful golden apple that was growing in the hills, and he bought the rights to that tree, I think he paid about $25,000 for the rights to that tree. But from that one apple tree have come every other golden delicious apple in the world. Granny Smith? This was granny smith's apple. Granny Smith.

>>Rebecca: There's an authentic granny?

>>Larry: Yes. And that's what everybody called it. And of course, that's one of the most popular apple varieties we'll want.

>>Rebecca: Especially for baking. How about deciding where to plant the tree in our yard?

>>Larry: You need to pay really close attention to that. And again, here in Utah, all of our really good orchards were established along the benchlands of the Old Lake Bonneville. So this area that was not quite up in the mountains but not down in the flat parts of the valleys. Now there are two reasons for that. Number one is climate. Fruit trees will freeze. Obviously, the most limiting factor that you have on whether or not you can grow a fruit tree or not in your yard is when are those spring frosts going to occur? And if they occur after your fruit tree is in bloom, you'll lose all your fruit. So the idea is to find a spot where those trees will warm up gradually, the fruit blossoms will come out, then they'll get pollinated without freezing. Because if they freeze, you've lost the crop. The cold air comes out of the mountains but it goes across the benchlands and collects in the coldest or the lowest spots in the valley. So right here, near Brigham Young University, we're in a little bit more temperate zone here. There were orchards here before they had the University here. But you go down off the hill, and if you get down by Utah Lake here, it's much colder than it is right up here on campus.

>>Rebecca: I had experience with that when I moved a couple hours north and found that I was having a hard time getting anything growing there. We have lots of examples of plums here and you've got one that's actually gorgeous here too. This is a different type of fruit. You mentioned this is the…

>>Larry: Palm fruit.

>>Rebecca:…palm fruit?

>>Larry: Palm fruits will have—pears and apples are palm fruits, these are called "stone" fruits. And stone fruits will have a single pit or a "stone" in them. And so cherries, plums, nectarines, peaches, all of those have a single stone on the inside, so you open them up and there's one seed there, and that seed—of course—is what's going to reproduce a new tree. But again, we don't want to grow it from a seed, because it will not come true to type. We can plant that and we might get a hard, yellow plum that was not even tasty at all from planting that seed.

>>Rebecca: Okay, now in terms of getting ready to plant, we talked about maybe trying to find a site that gives us that just-the-right temperature and climate. What about the depth? How should we prepare the soil?

>>Larry: Well we need to look at the soil before you plant your trees. Because if you've got heavy clay soils that don't drain well, you're not going to have good success in growing your fruit trees. I tell people to dig a hole. Fill it up with water, let it all drain out, then fill it up again. And, of course, cover it up so a child doesn't fall in that or anything. But if you go out after 24 hours and there's still water in that hole, you've got some drainage issues that you've got to address. And if you don't fix that, you'll likely lose your trees to root rot. So another thing, you know, we tend to want to grow fruit

trees in our lawn. Well we water our lawns too much and often times, people have sprinklers come on every day and things. That's not right for fruit trees. We want to have the fruit trees be watered deeply and infrequently. So put them in an area where you can keep them growing well without this frequent irrigation. Because there's root rot diseases, crown-rot diseases, and all kinds of other problems that come when fruit trees are watered too frequently.

>>Rebecca: Well, what about if we're…you know, we typically will buy a tree maybe with a bucket about this size. About how big of a hole do we need to dig? And I know you talked about "big enough that you have to watch with children" but what should we be planning on digging, size-wise?

>>Larry: Well it used to be that people said "don't plant a $10 tree in a $1 hole," but with inflation it's $100 tree and a $10 hole. But the thoughts now, as they've done more and more research, is to don't dig that hole real deep. Because if you plant that, and you've loosened the soil up underneath, that tree will settle, and then the water will collect around your tree. That will cause it to rot at the base or the collar, and you'll probably lose that tree and, of course, we want to keep these trees healthy. So plant it on undisturbed soil. In other words, dig it the same depth as the root bulb, but dig it much wider, three or four times the width of the root ball, loosen all that soil up so that those roots will spread out into the natural or native soil, and you'll get good growth on that tree.

>>Rebecca: And we have a pear tree right behind here. Let's bring that up. We'll move this aside. And maybe give an example of what to look for when you're buying a fruit tree.

>>Larry: Of course, one of the things that we look for when we are buying a tree, we buy a grafted tree. And right here, it said you don't plant this from a seed. Now this part may be planted from a seed, or it may be done with a size-controlling root stock. This is what controls the size of the tree, is this little part right here.

>>Rebecca: That straight…

>>Larry: This little part right here, the root stock controls the size of the tree, and you can buy a dwarfing or a semi-dwarfing root stock, and that's what's going to make this difference between this tree being 40 feet tall or this tree being 12 feet tall is the underneath part. Now this part here is what's going to determine the kind of tree that you have. So if you want this kind of pear, then you have to go buy a tree with a tag that said is it a Bartlett pear? So actually all fruit trees are two different trees hooked together. Root stock on the bottom, size variety, or fruit variety, on the top.

>>Rebecca: I didn't know that. Now you talked about dwarf. Do you recommend that if we want to get a fruit harvest, that we actually buy dwarf versus the standard type of fruit tree?

>>Larry: For a homeowner, a full-size apple will get about 40 feet high. That's far bigger than you want. Because I tell people to always prune from the same ladder they pick their fruit from. And that way you're not going to have fruit up there 30 or 40 feet in the air that you can't get to. For your apples, you probably want either a dwarf or a semi-dwarf root stock. For things like peaches and things, they're not really big trees, and you prune them heavily, so you can get by with a standard root stock on your peaches. A lot of the cherries and things that are coming out with some new root stocks. But some of those are not as compatible and so you have to make a decision if you're worried a little bit about it, or you may just want to grow a great big tree just to hang the swing in and things, but you have to worry about pest control and other things that we'll talk about in a minute. Now, since this is the dwarfing part, and this is the fruiting part, we have to keep this graft union above ground. Because if we plant it to this point, not only might we rot this, and that would kill our tree, but this part will root, and remember this is a standard, full-size tree, so we will lose the advantage of your dwarfing and this would become a full-size tree. So you have to keep that grafting up out of the ground, three or four inches about like it is right here on the tree, and that way it won't root and you'll end up with a dwarf or whatever size tree you wanted.

>>Rebecca: Well one of the most intimidating parts I have is actually getting to the planting process. I like to pick out the fruit tree, but getting it in. You talked about testig the water, digging a hole, testing the water drainage of the area, making sure the hole is wide enough. What next to make sure that successfully getting it from here to your garden is actually going to be the healthiest way for your tree?

>>Larry: Well, if this is a well-established tree, we can actually just slip that out of the pot. Just lift that down, and that'll be all held together. Now in the spring you may not be able to do that. Because it might be a bare root tree. And there's nothing wrong with bear root trees, you just have to hammer them so that you take them, buy them at the store, take them home and get them planted. They can't sit around in a pot or sit around in their little plastic bag around their roots for more than just a few days.

>>Rebecca: I noticed that, they're really hard to kind of keep alive unless you get them in.

>>Larry: Dig your hole, go buy the tree, come home and plant it. Don't wait for a week.

>>Rebecca: What else? Once we get it in. You talked about the dirt level. Where should it be placed? Once we get it in that hole, we should place it so that the top of the root ball is below or above the rest of it?

>>Larry: You'll find where the roots come out here, and this is actually buried just a little bit too deep. But we've got some mulch there. We can just pull that away and where you start seeing these first roots, these lateral roots coming off, that's the base of the tree, that's where you want to plant it. Now, if you have poorly drained soils, and you mentioned your soils aren't real good in terms of drainage, you can actually burn those up or raise those up a few inches just so that the water slopes away, never so the water

collects. We don't ever put saucers around our trees so that they collect water because that's what's going to cause the root crawler rock problems.

>>Rebecca: So when we get it here in the bucket, it actually might be deeper in here than we want once we've planted in our yard. Interesting.

>>Larry: See, this is just mulch on top. You can just scrape that off and just let it sit around the tree.

>>Rebecca: What are some of the signs of over-watering?

>>Larry: Over-watering, unfortunately, the signs for over-watering exactly the same as under-watering. Because if it's over-watered, what happens, again, oxygen is not getting down there because you've got water and no air getting down there, and so all of the little absorbing roots die. So, the tree looks like it needs water, and so our natural inclination—you know, we're getting a little scorched on the edges of some of these leaves and things, and we look at those and we say "Oops, getting a little too brown, we're getting problems here, I better give that tree more water." So we go out and put more water on. You know, this is the very best water gauge that you can have. Go out there, scrape off the topsoil, and then grab a handful of that soil and squeeze it. If that leaves a film of moisture on your hand, there's still water there that the plant can absorb. If that's not leaving a film of moisture, then it's dry and you need to give more water on there. That's particularly important when you plant a bare-root or a dormant tree in the spring. People want those leaves to come out really fast and so they'll water it 2-3 times a day. Big mistake! Particularly if you've got poorly drained soils.

>>Rebecca: Okay, let's also talk about fertilization. Because I remember hearing about root shock when you plant things, I don't know if that's said to be with trees. But what type of fertilizer should we be using from the beginning once we get it in the ground, and then maybe taking care of it for the first few months?

>>Larry: Actually, you can see a few little fertilizer pellets, the little green ones in here that they put on this tree. But for the most part, trees don't need a lot of fertilizer for the first 2-3 years. Sometimes you'll put a little bit of starter fertilizer on there and things. But the most important thing for that tree is to start a new root system so that it can start pulling up the nutrients and producing the fruit. But you don't need to worry a lot about fertilizers. If you put a little bit of fertilizer on, use a dilute fertilizer, transplant solution—much like you'd use on your vegetables or something like that. Don't ever mix dry powdered fertilizer in with your backfill, because fertilizers are salts and that can burn those new, developing roots.

>>Rebecca: Good to know. Also, speaking of the roots, I've been told that you actually want your trees to have roots as deep as possible. I don't know whether that's the way to go still with fruit trees. If it is, how do we do that?

>>Larry: Water them deeply and infrequently. But in reality, most of the absorbing roots have to be up near the soil surface. And so if you water them, that'll help the roots go down farther, develop a good, stable root system so it doesn't tip over in the wind or anything. But still, the absorbing roots. Those that are going to take in the water and the oxygen are probably going to be up near the surface.

>>Rebecca: Now, should we be watering, let's say we're targeting our watering. Should we be targeting it right around the base of the tree, or thinking about the roots and actually hitting a lot more wider in the circumference of the root system?

>>Larry: For the first couple of years, you have to make sure you soak up this root ball. But after that, you actually want that out around the drip line of the tree. So if your tree is 10 feet wide, that water out around the drip line 10 feet away is where you really need it.

>>Rebecca: Alright, let's put this down. Alright, so reviewing what you just said, what we want to do to make sure that we successfully plant those trees is go out into the yard, find a good site…

>>Larry: Find a good spot, and there's one other thing we need to talk about in terms of that. If you can keep those trees out of the wind and out of these frost pockets. Because remember, the cold air drains and if you've got a little pocket that's surrounded on three sides by a fence, that's just like liquid. That cold air flowing in there and it will actually fill up and then flow over the top of the fence. So avoid those little frost pockets. A lot of people want to plant them on the south side, thinking it's going to be warmer. That usually brings them out earlier, so it's actually more risky to put them right on the south side of your buildings.

>>Rebecca: So if you're looking at an ideal side of the house…?

>>Larry: Full sun, east, and it can be on the south side, just not right up against the building where it's going to heat up excessively.

>>Rebecca: Okay, let's go best-case scenario. We have successfully planted our tree. It is growing like a wildflower, well, like an apple tree. And producing well. What should we be doing in terms of pruning? And you hate to do that because you think you want all the fruit that the tree could give you, but there's a key to that.

>>Larry: You don't. Fruit trees actually will—on a peach tree—if you've got 10 percent of the blossoms to set, you'd have a full crop of really nice, good peaches. So they overproduce. Now these are hedge clippers. Forget them for fruit trees. They're to prune hedges. What you want is a good pair of lopping shears, something that's going to cut well, and probably a good pair of hand-shears. If you're going to prune large or older trees, you want to buy a good tree-pruning saw. And that would have very coarse teeth and it will have a wide set on those teeth. In other words, they're spread out a little bit farther so you can cut through green wood. They always cut on the pull stroke, not the push stroke, so never take your power saw out, never take your carpenter saw out and

things and try it. Go buy a good pair of tools. And a good pair of tools will last you the rest of your life if you take care of them. Don't cut rocks and wire, and don't leave them out and get rusty.

>>Rebecca: You talked about 10 percent of the peach blossoms being our ideal harvest size for that peach tree. What is the idea behind pruning? Why is it so important that we go out and we glean and we trim the branches off?

>>Larry: Because you have to grow new wood to produce fruit. Peaches, and again, each tree bears on a different age of fruit. For example, peaches bear on the fruit that grows last year. So if you don't prune them heavily, you won't get a new crop of wood, therefore the following year, you won't get a good crop of peaches. So you've got to come in and prune those trees heavily every single year. If you ignore it, it's going to affect your yield and it's also going to affect your quality. Pears and apples bear on 2-year-old wood. So you want to be sure that you have enough of that 2-year-old wood there that you are always having a little bit more new wood grow, but you're always having some wood left there that's going to produce your fruit.

>>Rebecca: Even though this is a young tree, let's bring it over and give us an example. It's often confusing. I've seen people do it kind of like a bowl-shape before. What do you recommend when we're pruning?

>>Larry: Okay, there's two kinds of shapes of trees that you would do. One would be called an open-center or a vase shape. And that's the bowl shape that you're talking about. That's very well-adapted to the plums, nectarines, peaches, apricots and—to a lesser extent—some of the cherries. Then we have what's called the central leader system where we actually keep a central trunk or a central leader going up and then have branches coming off in whirls, going out at about the four points of the compass. Now since this is a pear, I'm going to demonstrate a little bit about how we would do a central leader. Now we can't go into real detail pruning, but I want people to remember a couple of different ideas. Number 1 is to clean the tree up the second it's to let the light in. And that last one is very important, because if you've got a beautiful apple and it's hanging on the tree, (obviously this is a pear tree), but it's got to have some light to color up. If it's in deep shade, you're going to have a light-colored red delicious apple or a poorly colored yellow delicious apple. So you've got to have the light getting in where the fruit needs to be. So when we first plant our tree and I'm just going to turn this just a little bit so that people can see—we bought this tree here and there's a broken branch. Obviously that branch is never going to be good again, so that's part of the clean-up process. We're just going to come in and snip that off so that we can clean that up.

>>Rebecca: And just as close to the twig as you can?

>>Larry: As close as we can. We actually have what's called a collar there, but that one was broken clear back into the wood, so we cut that one as close as we can. Now our idea is that we want a branch going out about the four points of the compass. So if we look, we've got one going about to the east, about to the north, about to the west, and

about to the south. So that's a pretty good tier here. Then we come up, but we talk about cleaning the tree up. We've got two leaders growing on this tree. And they're just both about the same height, they're both about the same diameter.

>>Rebecca: And name them Cain and Abel.

>>Larry: Well, which one are you going to take out?

>>Rebecca: Cain.

>>Larry: And in this case, I'm going to choose to take this one out right here. So I'm going to cut that one out. Now, once I've done that, that's the right branch. And I've taught thousands of people how to prune trees, but I don't teach any classes on putting them back. So once it's off, it's off. Don't even look back, say "That was the right branch!" And of course on this one, we would come up here and about 2-3 feet above that one, we would probably head this off again, develop a second tier of branches and maybe go to one more tree. So when this tree is fully-developed, it will look a little bit like a Christmas tree or a pyramidal shape, as opposed to the vase shape that we would do on our peaches.

>>Rebecca: Now is there a bit of a diagonal cut? We kind of kissed right up to the branch, and then was it a diagonal cut, or just does it matter? Make sure to trim as close to the branch as you can?

>>Larry: We want to get that as close…and those pruners were just a little large. We could have just got slightly closer, but we don't want to be cutting into the trunk tissue. And if this were a peach tree, we would get, again, our branches going at about the four points of the compass, and then you'd cut this out right here. And that's when people pass out, when you cut about half the tree off and chuck it away. But that's what you have to do. You have to prune and you also have to thin. Again, 10 percent of the buds is all that's required to get you a full crop of fruit.

>>Rebecca: What is the difference between thinning and heading back?

>>Larry: Thinning is where you actually remove the fruits. You would go along and you want your peaches about six inches apart. If you're going to grow a three inch peach, and you have one side-by-side, they can't be any closer than six inches or they're going to be rubbing on one another. So if you're going to grow a great, big, beautiful peach like this, you can't have another one trying to grow right next to it.

>>Rebecca: So you pull the blossoms?

>>Larry: You actually thin them off after what we call a June drop. That's when we see which ones got pollinated, which ones the beads took care of for us, and then after that, some of them will drop naturally, and then you go back in and thin them. Don't wait

until the end of the season, because if your fruit is big, you won't get any benefit from thinning at that point.

>>Rebecca: Alright, what about the different boars and the different pests that we need to watch for?

>>Larry: That's one of the main issues that I think people should look at before they start selecting which trees they're going to grow. It is becoming increasingly difficult to grow fruit, simply because of all the pests that we now have in the area. Cherries are a good example. Many of our viewers would—if they had grown up like I did. With a big cherry tree in the backyard, never sprayed it. We could climb up there anytime and eat our fill of cherries. Well, you can't do that anymore. Because in the early 1980's, the cherry fruit fly came to Utah and so now virtually 100% of our cherries will have worms in unless you start a very rigorous spray program. And in some cases you're talking about spraying twice a week, and you may start on memorial day and finish on labor day. Well, get a life. Nobody wants to spray that often, and so look for trees that you don't have to spray as much. And again, in the Utah County area, the peaches and the plums would take a lot less spraying than the apples and the pears and the cherries. And if you're not going to take care of the trees, don't plant them. Because it just becomes a breeding site which affects the commercial orchard industry and people's trees who are trying to keep the pests out of their trees.

>>Rebecca: And we can go back to the extension service and all the local counties and get some specific information from them as well, in terms of which type of trees need to be sprayed.

>>Larry: And actually, Utah State University has a great website that you can get on, and they'll actually email you a weekly update of what needs to be sprayed and when you need to spray it and things.

>>Rebecca: Thank you so much. So just to review, there are a few simple things we can do to ensure we cultivate our best fruit and our trees. First, be sure to select a tree that's right for you. Considering your climate, the fruit you like, and the amount of time and money you want to invest in the tree. And next, be sure not to plant your fruit and nut trees in a frost pocket or in a windy area. You're warning us that will totally wipe it out.

>>Larry: If you're not going to get fruit, there's no point in growing that tree.

>>Rebecca: Also, remember to prune your fruit trees every year to let the light in and to get a better yield. And finally, if you like to start enjoying the fruit sooner than later, consider planting a dwarf plant tree.

>>Larry: A dwarf or a semi-dwarf.

>>Rebecca: I'm thinking of that apple tree right now. That's about all the time we have for today. For more information on this and other episodes of HomeGrown, or to order a

copy of the series, be sure to log onto www.homegrown.byubroadcasting.org. Thanks to Larry and thanks for watching and remember, everything's better "HomeGrown." Goodbye.

>>On an upcoming episode of HomeGrown, we're going to learn how to grow vine vegetables and legumes. Whether you're an avid gardener or just starting out, we'll discuss everything you need to know about vine vegetables like zucchini and cucumber, and how to take those scrumptious and nutritious legumes from seed to your table. Be sure to tune in.

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>>Welcome to HomeGrown, I'm Rebecca Cressman, and today we're talking about vine vegetables like zucchini and squash, and legumes, like green beans! Joining me today is Dr. Frank Williams, BYU professor of plant and animal science. Thanks for joining us. And this is the BYU terrace garden, just beautiful. Well, let's first talk about vine vegetables.

>>All right.

>>What are they?

>>Anything that grows on a vine, I guess. What we would look at is most of the time when we look at vine crops we're talking about squash, cucumbers, watermelon, cantaloupe, or the melon. As we would call them, we have a lot of those. Now when we're talking about squash, there are two different kinds there's a winter squash and a summer squash. And we have to be aware of which one we're going to grow because it depends on how we're going to harvest them, depending on which kind we have.

>>Well let's talk specifically about it. Do we have an example of one of the squashes?

>>Well we have an example of both of them, kind of.

>>What is this one called?

>>This is a Hubbard, or butternut. And we have here an acorn…

>>And which one would you say is summer and which one would you say is winter?

>>Summer squash is, of course, the zucchini.

>>Long live the zucchini.

>>Yes. We have this one—we harvest it and we actually want to harvest it as a small size. This is about as big as you want to let it get. Because the quality goes down very rapidly. So they're eaten very early in an immature stage. When we look at the winter squashes, they're harvested after they have matured and for storage. We have to have them on the vine for a lot longer time.

>>Now melons and squashes both grow on the vine. So how would you distinguish them technically, one from the other?

>>The squashes are going to be ones that we consume usually cooked. While most people don't eat them raw, they have less juice, they're very firm in that. We do the summer squash we will cook and eat cooked—and some people do eat them fresh—but the melons, that's a whole different thing. There we're eating the fruit that we like as usually a dessert. And they have a much nicer flavor and tender, without being cooked.

>>There are so many to choose from, how can we choose which ones will be best for our own backyard?

>>The ideal thing is what do we like? Because these are small, we can grow some that are hubbard squash, that are huge. They get tremendously large. And so it depends how exactly we want to consume them. This particular type, we cut just a small piece as we eat them right off the skin. They vary—one for a meal. Where some of these bigger squashes, we're going to have them for several meals, that's going to depend what we like.

>>Is this very similar the zucchini where they grow as big as you let them grow?

>>Well this one will get to a certain size and stop. This one will grow to a certain size, but usually it's too big when it's that size for us to eat. So we don't like it.

>>So would you consider the squash a warm or a cool season crop?

>>Warm season crop. These are all grown in warm temperatures. They like warm soils, they like hot days, a lot of sunlight, so they are a warm season crop.

>>What would be the best way to prep, or get the soil ready before you plant?

>>They like a nice, loamy soil. So it's got to have some organic matter in it. They like it well-worked so that the water will go in. And so usually we're going to prepare it in the fall. Adding organic matter, working into it. Making sure we don't get it too compacted.

>>How about fertilizing?

>>They like a lot of fertilizer. So we're going to put extra amount of fertilizer. Where we're going to put these crops, we'll put an extra amount of fertilizer. But usually we put the one pound in the spring. And then we'll side dress them several times during the year.

>>And side dressing is an additional fertilizer?

>>Fertilizer on the side to the plant. Just to the side. Buried and then watered.

>>Okay, terrific. Now if we want to plant a *few* different squash plants in the garden how close should we plant them—spacing-wise?

>>They have to be fairly far apart, because they're going to spread out. They like a lot of room, even the zucchini. Which can't spread as much as the others, but it likes a lot of room.

>>Big leaves.

>>Big leaves.

>>How much sunlight do they need?

>>They like a lot of sunlight, so they have to have 8-10 hours of good sunlight all the time.

>>Alright, now if we want to actually plant the squash in our garden, is it different from the furrows that we use for others?

>>No, just plant them. Well we might, say, with squash what we like to do is every five feet, put a hill. By hill we mean that we just kind of pull it up a little. And we'll just plant 2-3 seeds.

>>So for example we'll have a flat soil and we'll put a mound that you put the seed in the center of the mound?

>>Put 3 or 4 seeds. So they act. And what we find is that those will act as one plant. And they'll produce the same amount as if we had just one plant. But it helps them to spread, helps them to break through the soil's surface.

>>How often should we be watering the squash so they grow as nutritious as possible?

>>Get used to the idea that if the leaves start to wilt, we want to put water on them. As soon as they wilt, we have to water. And they like a lot of water.

>>You know, often we talk about melons and trying to determine knocking on them to see if they're ready. How do we determine if the squash is ready? It's very hard.

>>Size. If it's as big as we want it, harvest it. That's the zucchini, the summer squash. On these, we let them go until the plant start to die down, had some frost, then we can go out and harvest them. Before it gets real cold, we'll go out and harvest them. Now, it' sa good idea to put them in a garage or some area where they can sit with temperatures of about 70…65-75 degrees. And what will happen is the skin hardens, then you can store them at any temperature.

>>What about frost? Is it important for us to live, I guess to grow squash well, do we have to be in a climate that has frost?

>>No, because once they're as big a size as they want, you can take them in and let them sit, and they'll harden off. The big thing is, they can't stand any frost and keep growing. So the only frost we want is at the very end, when they're getting ready to be harvested.

>>What about pests? Which ones and diseases…?

>>They have a lot of pests. They have cucumber beetle, they have all kinds of beetles, they have worms, they have aphids.

>>That surprises me because it's so thick, you wouldn't think…

>>Well it's the plant the insects get on, and it kills the plant. They have a lot of viruses. You'll notice that your plant starts to, during the summer they'll start to wilt down. All of a sudden they'll wilt and they don't come back, even though you're watering them. That's a virus. Those plants have to be pulled out and destroyed. Taken away from the yard. Don't even save them, get them away from the yard. They're full of virus. And that's one of the biggest problems. Powdery mildew is a big problem. The humid air, or they get moisture on them, they get a grey covering on them. That's powdery mildew, that's another one you have to be careful with. SO they have a lot of problems to work with.

>>What if we are seeing the worms and the bugs, what's the best way to get rid of the pests?

>>Again, if you want to try to naturally do it, you can get ladybugs, you can get preying mantises…there are different insects who will prey on them. And there are sprays. But a lot of times with virus, insect control is the best thing, because insects bring the virus.

>>And bringing new soil and new organic material, does that prevent the risk?

>>A lot of times what happens is these come in, if you're in an area where there's especially a lot of desert or area that's not incorporated, where they're growing stuff. These insects are out there growing, and when it dries down and they can't live, then they come in on your garden.

>>Oh. How about other special cautions or things to watch out for when we're growing squash?

>>One of the things, cucumbers especially, we have to be aware of is that when they start to flower, and on the cucumber…this we have a, here's what we call a slicing cucumber, it has white spines. This is no good. We don't pickle this. It's strictly fresh-eating. The picklers will have black spines and they'll be a light green color. And so, we want to pick them when they're nice and green, because they will go yellow. And that means

they're getting too ripe. But on these plants especially, the first seven flowers are all male flowers. And they will not produce fruit. I'm always getting calls, "My plant's not producing fruit. Why isn't it producing fruit? Something's wrong with it." Well be patient, after the first seven flowers, they will get the perfect flower, and then it will start producing fruit.

>>Wow, that's wonderful. There's another type of cucumber as well. What is this one called?

>>This one is a Romanian, and these are seedless, and they have a skin that's nice and soft and doesn't have the bitter taste to it. So you can eat the skin and all. And these have become very, very popular.

>>Are they warm or cool season crops?

>>These are all warm season crops. All of the vine crops are warm season.

>>You get a lot out of this one don't you?

>>Yes, an awful lot.

>>How about the soil and fertilizer needs of cucumbers?

>>They are just the same as the squash. Because they produce a lot of vine and a lot of fruit.

>>Do they need a lot of water, then?

>>A lot of water.

>>How about the spacing?

>>Uh, 3 feet apart, so that you can get a lot of spacing in there to grow them. Now again, as with a lot of other plants, we need to keep harvesting the cucumbers to keep them producing. And in fact, one of the things to do though is if you like to grow the biggest pumpkin, which is a vine crop, a squash in reality. You take all…you let one flower form, a fruit, and then you pick all the rest off. You get that great big huge one. That's how they win the contest, the biggest pumpkin.

>>I was amazed how many pumpkins I grew by not picking any flowers. I ended up with 12 or 13 off of one plant! A plant that took up the whole garden.

>>And pumpkins are nothing but a squash. They are the exact same plant.

>>Well, when we are talking about planting cucumbers, what do you recommend? Do we go directly to the soil-less seed, what do you recommend?

>>These will transplant fairly easily, but it's just as easy to put in a seed. They're up very quickly and go with them from there.

>>About how long does it take to go from seed to harvesting with the cucumbers?

>>Cucumbers will probably be about 30 days; you'll start picking a few. Then they start producing all the time.

>>And then how, you were talking about picking them before they're yellow. But is there another sign to know if they're ready to pick?

>>About a 4-6 inch long for fresh, a nice 6 inch long, is about what you want. And the same thing goes for the pickling cucumber. I say you wouldn't want them any smaller if you're going to pickle them. So many times we pick the little tiny ones very early, and pickle them.

>>And when we're talking about pests with squash, you mentioned one of the pests that has a cucumber, named the cucumber worm?

>>No, it's the cucumber beetle. And they attack everything. These are all in the same family, and so they're very closely related. And all insects attack the same.

>>And so the best way to, again, to prevent the pests from attacking your cucumbers?

>>It's always best to have them healthy. The very best thing to do is have a healthy plant, and then maintain insect control. Don't let insects build up in your garden.

>>When we're talking about some of the spacing requirements, and I talked about my pumpkin plant, it almost seems to me that I needed 3-4 feet for just one plant.

>>That's right. This is why in the garden we usually only want to put 1-2 of them, because they'll take the whole garden. So we try to put 1, 2 maybe 3 of them in the garden, because there's so much base required.

>>We have some of my favorite vine plants here. We have our cantaloupe, and our melon. We have just a few moments to talk about them. That is a *gorgeous* cantaloupe here! So how long would it take to grow one of these?

>>That's probably takes about 3 months. And now to determine how we harvest them, if you look right here on the end…

>>Let's hold that up so people can see.

>>It's called the half slip stage. So when you pick this up and tug on the vine, this vine will start to peel away.

>>But only halfway.

>>But only halfway, it's ready to go. So you can see that when they picked this it fell right off. So it's ripe.

>>So is it ready to eat right then or do you set it on the table for a few days?

>>It's ready to eat right now.

>>Smells terrific. Same thing with the honeydew melon?

>>The honeydew is, you get used to it. It's the size. They don't have quite the same characteristics of slipping off, but it's the size that you want and usually about this size is good.

>>Now watermelon I completely misstaged. It looked good to me when I was planting it. How do I know when it's ready? I even knock.

>>The surefire way is to cut it and eat it. But…

>>Mine was white, I think. It wasn't even pink.

>>What you can, the best way without cutting it is to look at where it attaches to the vine, there'll be what we call…the vine will come out and there will have we call a tendril on there. It will turn a little curly-q. When that's dry, it's ripe. And if isn't dried down, it's not ripe, so don't pick it.

>>Well fantastic. Well let's talk a little bit about the legumes. Introduce us to some of the different types.

>>Primarily the ones that we have here are beans and peas. And, of course, the beans…what we have here for fresh eating is what we call a "snap" bean. Years ago…

>>I instinctively start pulling off the edge.

>>Years ago they used to be called a string bean, because when you pulled them—this is a modified leaf—and when you would snap it, the strings that were in the suture here would be there and you had to pull them out. So as a kid I had to pull all of those out. But today we've bred that out of them so that they snap and we call it a snap bean. We have two different types of snap beans. We have a bush and we have those that are trellised, that are vine-y. The bush bean just grows and then starts to produce and then stops growing. The bush bean grows, and as you pick it, it continues to grow. So the bush bean is what we call a determinate type plant. Stops growing, produces fruit. The vine-y bean is one that we call indeterminate. Keeps growing, keeps producing, we keep

picking. And usually, for a homeowner, the indeterminate variety is by far the very best, and where we can trellis it, and we keep harvesting it. And it doesn't take as much space.

>>I think I did a bushel in a container and tried it that way. Well let's talk about these season-wise. Are they warm or cool season crops?

>>Warm season. And as we look at the seed, we have several different kinds. There are different types. Now we have three of them that are beans, one is a lentil, but these beans…

>>These are kidney beans?

>>We call them kidney, and then we call them pinto. They actually all come from a plant that looks just like this, except we let them ripen until the seed dries down and the plant dries down. And that's one of the ways both of these and peas that we want to look at for harvest. They're too late to harvest if you start to see the bumps, the seeds.

>>I know exactly what you're talking about.

>>That's getting too late and they're going to be too stringy, they're going to be tough. So we always pick them. This is just about as late as we want to have them, because they're starting to show the bumps, the seed inside.

>>The shape, the bumps, I don't know if you can see that. In terms of soil preparation, I made a mistake and grew some beans in some organic soil. What do you recommend?

>>They don't like straight organic matter, what they like is a nice loamy sand. One that is workable, doesn't have a lot of clay in it, but we can grow them where there is a lot of clay. They still will grow.

>>How about fertilizing?

>>They still like fertilizing, but not nitrogen, because that's why you call them a legume, is because they fix nitrogen from the air. So they have what they call a little symbiotic bacteria that grows on the roots. And they produce their own nitrogen. So all they need usually is to put them in the soil, and they'll grow.

>>How about water? Do they like a lot of sunlight?

>>They like a lot of water, a lot of water.

>>So does the soil always need to be kept moist?

>>Not always. What you do is you moisten it when it dries down to about an inch to a two inch depth, then you want to water it again.

>>How about how much sunlight? Can it be in a partly cloudy…?

>>No, they like a lot of sun.

>>No shade, lots of sunshine.

>>That's right.

>>How close can we plant? You talked about the poll variety.

>>Usually the pole variety would be 12 inches apart, and what you can do is put them 12 inches apart and then what you can do is put a second two rows together, about 12 inches. And then between those two rows, put 3 feet and then some more. So 2 rows together, and a little walkway, and that's so we can get in there and pick them, because you're going to be picking all the time. We found that in growing snap beans, the greatest amount of time spent on snap beans was harvest.

>>That's a great sign. I like to spend my time harvesting. What about when you're planting it, do you recommend the mound? The same thing we were doing with the other vines?

>>No, just put them in a furrow. Plant them, cover them, and let them come up. And space them right, just start them a foot apart.

>>What about the soil? Some of them it's important for us to put them in moist soil. Do they have special requirements?

>>They don't *have* to have real moist soil. Their soil can actually be fairly dry when they're planted. The pea, though, is a different situation. And we have some little peas here. Look at these. And then I have some pea seed to show you. This is a snap pea. Sugar pod pea.

>>I see this sometimes in Asian food.

>>We eat the pod. So we like them where the pea is just starting to form. But I have here some seed.

>>I'll bring that up and just let them take a peek.

>>This is a crop that's very—and this is a cool season crop. Where the bean itself is a warm season crop.

>>What type of peas are these?

>>These are just regular peas. Regular laxton pea. Now the interesting thing about them: if you'll notice that they're all shriveled up. Before that will germinate, it has to

swell and become round. That's why we plant them so early in the spring, where the soil is full of moisture. They need a lot of moisture. And so to start them, you need to make sure the soil is very moist, or soak them for about 4-8 hours so they swell and then plant them.

>>What do you recommend if we would like to build a trellis so we can grow vine plants? What do you recommend?

>>What you do is usually use string. You can do one of two things. You can form a little tee-pee. We have three poles, run string around them, and run these up the string on the sides. And they'll almost grow without any help. Or you can run them and put a pole and run strings between them. And run them through…

>>More like a ladder.

>>Is there an advantage to either of them?

>>No. Either one of them is fine. Its how much space you have. Usually the tripod type, or that looks like a tee-pee, is very good for us in our home gardens.

>>Are either of these beans or peas ones that we let dry on the vine?

>>Well, if we want we can let them dry on the vine and harvest them and have beans then for cooking. If we wanted to, just don't pick them. So a lot of times people do that. Lima beans are the same way. You can let them grow on the vine until they're mature and dried down. And then eat them fresh, eat them as cooked beans.

>>We have next to me right here corn. And in some countries people don't eat corn; they leave it for the animals. But it's something in the United States that's quite popular. Are these a legume?

>>No, these are not a legume. People would like to make them a legume, because we grow them in a lot of third world countries. And if we could make them a legume, they'd have their own nitrogen.

>>Therefore easier to…?

>>Easier to grow. And you don't have to have fertilizer. These need a lot of fertilizer for them.

>>What type of varieties are there of corn that we should be looking or watching out for? This is beautiful, by the way.

>>I might mention this is a sweet corn. A lot of areas have field corn, which is not the same quality.

>>Is this referred to as maize or not?

>>It is maize. They're both maize. They both have the same genus and species. This one just happens—sweet corn in the United States has a soft starch. Field corn has a hard starch. And so when this dries down, it dries and shrivels and comes very, very small. Where the field corn stays very plump, looks like it's still full of water. So that's the difference. This has much better quality, even though in a lot of countries, they use field corn, that's why we don't like their corn as well as we do our own.

>>And it's so good, it's one of my favorite things to eat during the season. Now are they a warm or cool crop?

>>These are warm season crop. And they're also sensitive to daylight. And by being sensitive to day length, we have to get those varieties that are adapted to our location. If we take one that is adapted to the northern hemisphere and we take it down to the central, it forms little tiny ears and doesn't grow big. And so we have to get corn for our area. And that's what we have to make sure of.

>>What about the soil and the fertilizer? Will that make a difference in the size of the corn we grow?

>>No. It's the plant itself and what's interesting is these ears are going to get a certain size, and that's it. But it does like a lot of fertilizer.

>>Now I have never, use a lot of fertilizer throughout their season?

>>We'll side dress this. We'll fertilize in the spring like we normally do. And when it gets about knee-high, we'll come in, side dress on both sides, and it usually will do just fine. But we may even have to side dress it again during the year just as it forming a head.

>>Now one of the reasons why we haven't tried growing corn at our house is that we don't have a big enough lot to plant enough corn to pollinate itself. So let's talk a little bit about how it is actually self pollinating?

>>Well what it is its cross-___ pollinated crop. And I don't recommend for homeowners, because it just takes too much space.

>>You need about…

>>At least four rows, 25 feet long. And you have to plant it so the wind comes through it and pollinates it. And this is one crop where pollination from another source can make a difference. And so if you happen to have a lot of people that like to grow what is called Indian colored corn. You have colored corn next to your sweet corn, your sweet corn becomes colored, partly. So you have to be very careful about that. So if you plant

colored corn in the Indian corn, you always want to have it on the side that doesn't get the wind and then go through the other corn.

>>What if we're determined to grow corn? Can we put it in a small square in our garden?

>>You can put it in a circle. And what you do is you make it in a circle, and you'll plant the plants every six inches around, one in the middle. That'll give you some corn.

>>Wow, that's a surprise for me. And the one in the middle, its job is to?

>>Well, the wind blows both ways, so it gets fertilized more than any other, to give you the best.

>>How about watering?

>>Watering is an important part of corn. Now, as we look at these little, this is silk.

>>Kind of soft tendrils, beautiful.

>>What it is each one of those were attached to one kernel, and that's how it's pollinated. Fertilization takes place through one of these. If you notice these on the cob, and a lot of people get this, these end ones didn't have any seed. That's because they stopped watering it too soon. So if you want to make sure they have kernels all the way to the end, you have to make sure it's watered continually.

>>Is that one of the telltale signs as to if it's ripe or not, if they're undeveloped? How can we determine? Because they're kind of covered up.

>>The way to tell if they're ready to harvest is to look at these silks. I can't eat corn unless I grow it, because I did research on it. So I like it really fresh. And if you pick it in your field right by the house, stumble going in, you might as well throw it away and go back and get some more. So what you do is look at the silks. One that just started to dry down. And these are a little too dry. They just started to dry down.

>>A little white rather than silver-light green.

>>Well we want this brown here. And if it starts to get the brown and dry down, you can see how these are drying down, then it's ready to harvest.

>>About how long do you think the average garden, if we plant a big plot and we get it there, about how long before we can harvest?

>>Depends on which variety you plant. Some varieties are what we call 55 day corn. 55 days from planting, you've got corn. Depending upon temperature. Other varieties are 85 day corn. So plant it, 85 days later, you'll harvest it. Depending on how warm it was.

But that's about the average. So what we do if we want to harvest corn over a long period of time, we can take one of the shorter season corn, plant that at the same time we plant the 85-day one, and we'll have corn for an extended period of time.

>>Now you mentioned how you'll only eat your own home grown corn because it's fresh. If we want the best corn, how soon do we need to eat it after we harvest?

>>You should have the water boiling. Run out, get it husked, put it in that water immediately, and that's the best corn.

>>Fantastic. And that makes a big difference in the taste?

>>Oh, very much so!

>>What about different pests? I know I've opened it up before and found little friends inside.

>>We had the best friend is the corn ear worm. And you can see this one probably had corn ear worm, because it's nice and smooth, so he probably fell out. Corn ear worm comes down, lands on the silks, and then moves on the silk, starts to feed on the corn. So to get the best idea is to take and put various pesticides we can use. We don't spray the whole plant, we just put it on the end of the silk.

>>Now, what are suckers and why should we get rid of them?

>>We don't really have to get rid of them, but if you're getting suckers, there are branches that come off the bottom. It means they're planted too far apart. So the ideal spacing for corn is on a 10 x 10 space. You'll get one ear, you'll get no suckers, and you get by far better yields because it's taking far less space. About a 10 x 10 spacing. Then you won't have suckers. But if you plant 3 x 3, you get fiber suckers. And they don't produce fruit, they don't have the kernel there.

>>So we have to get it right to the boiling water after harvest?

>>That's correct!

>>Well we're almost out of time, but before we go we want to review some of the simple things we can do to make sure we get the best harvest possible. First, be careful not to plant different squash varieties too close together, because they need a lot of space. Next, resist the temptation to pick your winner squash too early. Frank says they need to stay on the vine at least until the first frost.

>>Correct, or until their skin's hard.

>>Also, be sure not to plant your beans until your soil is warm enough to avoid having them rot in the cool, damp soil.

>>Finally, remember to eat your corn right after you pick it, that way you'll taste all the yummy sugars, and not the starch.

>>That's about all the time we have today. For more information on this and other episodes of HomeGrown, or to order a copy of this series, be sure to log on to HomeGrown at www.byubroadcasting.org. Thanks to Frank Williams, and thank you for watching. And remember, everything's better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to grow leafy greens and salad vegetables. Whether you're an avid gardener or just starting out, you'll learn everything you need to know about leafy green vegetables like charred and spinach, and how to take care of those yummy salad vegetables, and how to bring them from seed to your table. Be sure to tune in.

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>>Next on HomeGrown, we'll learn how to grow leafy greens and salad vegetables. Whether you're an avid gardener or you're just starting out, we'll discuss everything you need to know about leafy green vegetables like chard and spinach, and how to take those yummy salad vegetables from seed to your table. Stay tuned!

>>Welcome to HomeGrown, I'm Rebecca Cressman, and today we're talking about growing greens, like spinach and chard, and salad vegetables, like of course lettuce and celery. With me today here at the beautiful BYU Terrace garden is Dr. Frank Williams. He's with the plant and animal sciences department at BYU. Thanks for being here Dr. Williams.

>>Glad to be here.

>>First of all, what do we mean when we talk about leafy vegetables?

>>What it really means, we used to talk about, was they're pot herbs. They're leafy green vegetables, but they're called pot herbs simply because they were cooked. Today we've changed that. We eat raw lettuce, we eat raw kemp. Years ago, no one would eat that raw, they always had it cooked. So they were called pot herbs. Where the lettuce and that and our leafy green vegetables.

>>So most of these—back in time—would have been cooked like in a soup rather than eaten raw?

>>A soup, or cooked and then reused on a plate like spinach, you know, with vinegar and stuff like that. So they were always cooked rather than fresh.

>>Now what kind of nutrient value do we find in these greens?

>>Other than the cold crops that we have, and some of these are cold crops, they're by far higher in nutrients, vitamins and that, because we are eating the green, leafy leaf. And that always has the greatest amount of nutritional value in it.

>>Now what about these? Are they considered warm or cold season crops?

>>Both. So some will be spinach. Of course it's a very cool season crop. Spinach, if we don't have it—if it gets too warm—it goes to seed. So it's usually a crop that is grown where it's very cool or very early in the spring, so we have it off before it gets very warm. And that's why a lot of times we recommend that rather than eating spinach, we use Swiss chard. Same flavor, same use, but it'll grow all year long. And so the spinach is just a very short crop. Swiss chard is a long season crop.

>>And we have some samples of those. Here is our cud spinach. Very beautiful and green. And this is the Swiss chard?

>>This is Swiss chard. Rhubarb Swiss chard, because it has the nice red color to it. Where and it looks a lot like a beet green. Same family. And so this is getting to the point where it's just about too old to actually cook, but we still put it in salads and use it fresh.

>>That's the first time I've ever seen that, and the yellow…

>>The yellow is another Swiss chard that is like this, they still call it rhubarb chard, just a different variety.

>>Well let's talk a little about growing spinach. Because we've all heard how healthy it is. So when we decide to grow spinach, what type of soil preparation should we be planning on in fertilizer?

>>It doesn't use a lot of fertilizer, because it, we harvest it very early, and it doesn't put out a lot of yield, so it doesn't take an awful lot, as we mentioned, it probably takes about one pound per hundred square feet. Beginning of the year, worked in. And that'll take you through the growing season.

>>Now what about if you're getting ready to plant the spinach? Are there any tips we should know about in terms of depending on the season that we grow it?

>>Make sure it's cool. Make sure it's during the early part or in a warm season, in a warm climate where it's real warm, we may plant it in the wintertime. And so it's grown as a winter crop in some of these areas. If you have very high temperatures in the summer, you'll use it as a winter crop.

>>Speaking of winter, I've also understood that there's a trek in the sense that if you want to harvest early in the spring, you can actually plant these in the fall, right before winter? So tell us a little bit about that.

>>There used to be a farmer in Utah who would plant it in the fall, and in the spring it would come up. Then it would be frozen a little bit on the tips, and then in the spring, when it'd start to grow again, he'd pick it and he'd brush off the little frozen part. He got to the market very early; he could charge twice what everybody else would do. So it can be and will survive the winter.

>>Does it just lie dormant, I guess, underneath that?

>>Just lies dormant, and if there's snow, it's even better.

>>What about spacing? What do we need to think about?

>>One to two inches, in row, maybe 10 inches between rows, 10-12 inches. Just so you can get in and out of the row. But they can be very close together because we're going to be thinning them for a period of time.

>>How about daylight? How much light does spinach need?

>>Now spinach—and we found that some of the cooler season crops, those would take cool temperatures. They can have a little shade. So 4-6 hours, it's always better to have more, but we can grow some of these leafy vegetables, the pot herbs, in the shade. More shade than we would others.

>>Alright, talking about planting it, would you recommend that we actually start from seed?

>>Seed is by far the best, because it comes up very fast. It's wintertime. Cool season. So just put it in as a seed, and it'll do just fine.

>>And how do you recommend we actually plant it? Should we be going out and making rows?

>>You can always make the furrows, by far, the easiest for us. More than anything is if you just plant it how you like to do it. If you like to plant it in circles, fine, I don't care. Plant it in a circle. But be just so you have enjoyment in and around your garden.

>>And do these need to be heavily watered, or how much should they get?

>>They like a lot of water, because they're a spring, cool season crop. So they get quite a bit of water that is already in the soil. So we don't have to water them too early, but yes, they like to have a good moisture content in the soil.

>>And a lot of us are always thinking about fertilizer and in terms of how much and how frequently. What would you recommend, even though its not taking a long time to get a crop?

>>Just very little. What's in the soil usually will take it through. And so we just fertilize it very lightly.

>>And how long would it normally take to become mature?

>>Well, now, in our area its probably 2-3 weeks. After it has started to grow and get a pretty good size, it's a very short time. So the total season's probably, oh, 3-4 weeks to a month and a month-and-a-half.

>>And that would depend just on what climate, where you're living at?

>>How warm it gets. Soon as it gets warm, it's going to go to seed.

>>So it sounds like it will be a different amount of time. Is there a way for us to just recognize looking at it, that it's ready to pluck?

>>When it's big enough that you think you can eat it.

>>And these ones we're saying are about 4 inches, 5 inches high?

>>Yes. And then you can see that they're getting to the point where we may like it a little older and you may like it fresh. But different sizes just how you like it.

>>Well, looking at this, the average spinach, when you're plucking it, do you leave the roots underground or how would you harvest it?

>>Oh, just pull it out. And if the roots come with it, we just cut them off or pull them off. So just pull them out is the guide.

>>And we typically use them, maybe the top 2/3 of the plant?

>>Yes.

>>What if I waited too long and I missed my opportunity to plant the spinach in the summer?

>>Now we can plant if you have to live in an area where there are cool winters and they don't have real frost. We can put it in as a winter crop and harvest it during the wintertime. As it likes cold temperatures. Or we can plant it in—it'd actually be frozen a little bit—and harvest it, get it started growing next spring. And we can still harvest it a little. A lot of times there will be little dead leaves on the very end. Rub those off and it's very usable.

>>Now I've heard that to some vegetables that we can actually treat like a perinea. So you can actually let it go to seed and actually bury it and then bury it in the spring?

>>This one is a biennial. But we use it as an annual, and we really want to start over again, because first of all, it gets out of hand and starts moving around. We don't know if there's virus in the seed, when it falls. So we want to plant this every year, new seed.

>>And what about the different type of pests? There's so much foliage. Dark, leafy spots. What are we worried about when it comes to pest infestations?

>>Usually there are very few pests that occur on spinach because it's there for such a short period of time and it's in the ground growing when it's very cool. Pests, most insects, are very responsive to temperature. As it warms up, they become more and more active. So this usually is out of there before you have any problem with pests.

>>That's good news! Now let's talk a little bit about Swiss chard. These are two beautiful species that you talked about being a rhubarb. Are they warm or cold climate crops?

>>Cool season crops when they're planted. So they can take temperatures that are cooler. But they will grow all summer if you're in a warm temperature area that has even 100 degree temperatures, the Swiss chard will still continue to grow, and you can harvest it. And as long as you continue to harvest it, it will continue to grow. And that's one of the things we have to remember with these crops, with many crops is when we stop harvesting, they stop growing. They stop producing. And so, continue to harvest it and it'll go right through the year.

>>We're going to hold this up for just a minute, because I think some of us are less familiar with this. Which part of the plant are we eating?

>>Primarily, we eat the leaf. It's a leafy vegetable. The stems are usually discarded because it's a little stringy in that. So we're really looking at just using this tip.

>>So beautiful! You almost want to just leave it for decoration at least.

>>It is, sometimes it's used as an ornamental.

>>What about the soil requirements for growing Swiss chard?

>>Swiss chard has about the same requirement as the spinach. It's a very…just any soil will work, as long as it has a little organic matter in it. And we can work it and get the seed planted.

>>What about fertilizer? And especially, we've talked before about successive planting and you wanting to grow this throughout the season. Do we need to keep fertilizing this frequently?

>>What we should say is we fertilize in the spring before we've planted. We usually, as we mentioned, we use the one pound of nitrogen. Then we watch the plants. And with this being a long season plant, we may have to come in and side dress just a little bit alongside of it. And we may have to use different types of fertilizer. Use the fertilizer that's recommended for your area. Extension service usually can tell you that.

>>Now, you talk about using the leaves, that we actually eat this. Once we harvest off this, is it bad? Or can we just continue to harvest more and more leaves off the same plant?

>>What we'll do is we'll take the leaf off the same plant, but we take the entire stem and it produces a crown and the leaves will come up. So what we'll do is we'll harvest it this size, then we'll just cut this and discard it.

>>Okay, and how close can they be planted? What spacing do they need?

>>Usually it's with six inches is about what we'd like them at. In the row, between row 10-12 inches.

>>And how much daylight, sunlight, does Swiss chard need?

>>They're…again, as much as you can give them, but about a minimum of 4-6 hours of direct sunlight.

>>Now we talked about growing spinach from seed. What about Swiss chard?

>>Same thing. Excellent from seed. In fact, there's no ____ to transplant.

>>Alright. So get the soil ready, the furrow ready and spread out the seeds. How much watering does it require?

>>It will take as much as you'll put on it. So we keep the soil moist for it. But, again, probably with Swiss chard with water…depending upon the temperatures you have. Anywhere from 4-10 days.

>>And are we expecting it to be ready for harvesting? Six weeks? What approximately are we…?

>>About the first harvest would be 6-10 weeks from when it started to come up and was starting to grow.

>>And do they have different risks when it comes to pests and diseases than spinach?

>>Well, these will have aphids will get on these. Just like they do any other kind of crops. Kind of hiding in there. But that's about it. And we can have some little cabbage lupers that get on them. But they don't have a lot that are bothersome.

>>Cabbage lupers. I've never heard of that. Is that a worm?

>>A little worm. It's a little green worm. You'll see a yellow butterfly. That's it.

>>Now we have a lot of other green leaves here, kind of samples on the set. I've never seen this. This is kale?

>>Kale.

>>Tell us a little about kale.

>>Kale is a crucifer crop. Kale is probably the most nutritious crop that we can have.

>>And you say crucifer, like cabbage?

>>Yes, it is a cabbage. Can't tell them apart when they start to grow. And it's found usually in soups—cooked, of course. But some people are even eating it. But it's very bitter. And so usually it's hard to get our children to eat it. A fellow I worked with, asked him how he got his children used to eating it. He said he put a piece in their beans. He'd put one piece for a year, then he'd put two. Finally built it up so they could eat it. Very slowly.

>>Well collard greens are kind of familiar to different parts of different countries. Let's bring out a sample of collard greens.

>>Collard greens are, look at these here.

>>This is green chard.

>>The collard greens again are the same family, if you look at it. They're in the same family as kale.

>>You can almost see the big, broad leaves.

>>You can see the big broad leaf. Again, we eat it as a cooked vegetable. Part of the problem with these are they're a little slimy. But they're a good one to grow. Excellent for harvesters. And most of these, the only thing that will bother them are aphids.

>>Okay. And in great nutritional value?

>>Great nutritional value.

>>Let's talk a little bit about salads, because I think more and more of us are stepping out of the iceberg and finding the value. So what are we learning about in terms of the nutritional value of these types of salad greens?

>>Well again, they're always—they're green. So they're going to have nutritional value much better than those that are not green. Or if other parts of the plants that we might eat. So they are nutritional for us. They have vitamins, minerals…the iceberg, a lot of people don't like it. But it has about as much as the rest of them, because it is nice and green. But the leafy vegetables are ones that we seem to like that right now more.

>>Now are these considered? We have a lot of samples here of all kinds of different lettuces. Are they considered warm or cold climate crops?

>>These are all cool season crops. You can see this one.

>>Looks like she needs a hairdo, doesn't she?

>>Yes. This one is grown hydroponically. So it's grown in water. And it's one of the ways to get to the early market, probably grown in a greenhouse.

>>Now you can see the red tinge on there. This is called a red leaf lettuce?

>>The leaf is called Savoy because it has the crinkles to it. So we have all kinds of lettuce.

>>Now we have romaine here. Okay, we've got a sample of that. This is really quite big. So this would be our romaine leaf?

>>And this is much better for the homeowner to grow, because it's a little hard to get the iceberg to form the head. If it's not handled just right, the head will be very loose and it'll be leafy. So most people find that this is by far easier to grow for them than the head lettuce. So this is much better to grow.

>>Alright, we've got romaine. We also have the butterhead, which is very delicate looking. I'll try to keep the display pretty, but I don't think I'm going to do very well. The iceberg wants to roll down. This is the butterhead? And it's very soft. Delicate.

>>And that's about what a head lettuce looks like if we grow them in our garden. So you can see here's the loose part of the lettuce. And it's very nutritional. We cut this and put it in our salads. Now, one of the things I might mention as a tip, if you smell it, if it has an odor to it, it'll be bitter. It means it hasn't had enough water.

>>So you want it to be very neutral?

>>That's right. When you go out in your garden, you want to smell it. Or if you want to go to the grocery store. Smell it. If it has any kind of harsh flavor smell, don't buy it.

>>When we're growing leafy lettuces like this, what type of soil prep do we need to do?

>>This is one crop that likes a basic soil. It does not like an acid soil. It likes to be grown in an area where it's hot…warm. Even though it's a cool season crop, we can grow it where we supplementally irrigate. Grows very well. So we have to be very careful, though, because most areas that are high in moisture, where there's a lot of rain, have acid soils. So they don't like acid soils. So usually we have to grow it in a basic soil.

>>I don't think I'll ever pick up lettuce again without giving it a good smell on that. What about certain types of pests and other diseases that might be risking our harvest?

>>Aphids, again. Aphids are always there. Leaf miners, its another one that they'll get. Mites.

>>What about planting the lettuce. How much light and maybe how much space do they need?

>>They don't need an awful lot of space, but they don't like a warm soil. You have to plant them in a soil that's less than 60 degrees Fahrenheit. If you plant them in a warmer soil, if it gets above 75-80, they'll go dormant. The seed will go dormant, and it won't germinate. And that's what happens to a lot of homeowners. They plant it in a warm soil, and then it ends up and they won't germinate, and they end up without a plant.

>>Now in terms of planting lettuce seeds, I remember them being very, very small. So what are your recommendations for planting?

>>Mix them with sand. A little sand in the package, it helps to thin them. You can if you want, you can grow transplants of lettuce. Putting them in a little container. And grow them from the seed there and then transplant them out before they get very large. But again, they have to be in a cool soil.

>>Now you talked about mixing it with sand. I've seen you before open up a pack of seeds, add sand to it, shake it up, and then use that.

>>Spread that out and it automatically kind of thins it for you.

>>What about activating seeds on ice? I don't know more about that either.

>>That's because it is a cool season crop and the hot soil will make it go dormant. Farmers have found that if they can sit it on a block of ice for 24-48 hours, cool the seed down, they can put it in a little warmer soil. So if your soil is starting to get warm, if you set it someplace like that where it's real cold, then it will germinate.

>>Now you talked about these liking moisture. How often should we plan on watering these? What kind of fertilizing is it ongoing?

>>The fertilizer is a lot…we want to fertilize it in the spring like we've mentioned. But that'll take some, we may also put some side dressing on it so that we put another pound on. They like a lot of fertilizer like they like a lot of water.

>>When you say side dressing…?

>>That means we just put it by the side of the plant in a little furrow, maybe two inches below the surface. Dig it with a hoe. Put it in this little furrow, cover it over. And the roots will move out into that. Plus when you water it, it moves out into the ground to soak.

>>Now all of these lettuces are different sizes. And I think if you're unfamiliar, you might not quite sure know when to harvest them. I mean, the butter is very small…how do we know when it's ready to be plucked?

>>The general rule of thumb is, when do you like it? So try it at different stages. Because as it gets older, it will become stronger and it will have a stronger flavor. The younger it is, the less flavor—that strong flavor it will have. So get used to harvesting it over a period time and just experience when is the ideal time to harvest it.

>>Occasionally when I buy a head of lettuce—you know, we're always encouraged to rinse it well—go leaf by leaf. What type of pests are actually attracted to lettuce and we should be watching for them?

>>Aphids will get down inside here. Mites you can't see. But aphids you'll see down inside. More than anything, why we like to rinse it, though, is it gets sand and soil in there from the irrigation will get inside here and then it becomes gritty. Of course, so we're trying to clean it up.

>>What would be your best recommendation to get rid of the aphids?

>>Ladybugs are a good one. Of course, if you want biological control, we want to use some ladybugs. We can use soap, safer soap, it's called. Spray it with that. Just rinsing them off with water during the day, if you'll go out with a hose, rinse them off, that knocks the insects off. And then there are chemicals if you are willing to use some of them very carefully, you can buy chemicals that will take them away.

>>Oh, you have a lot of experience growing all of these. Any specific challenges or cautions for us if we want to try growing lettuce?

>>The main thing is the soil temperature. Making sure that you've either treated the seed beforehand, or that you keep the seed cool or the soil still cool and you put it in. Same thing with the spinach. We want to make sure we're going to get them early so that it germinates.

>>one of the vegetables that are commonly found in salad is one that we use a lot when we're feeding our kids snacks, and that is celery. And I'll pick this one up and bring it over, we have a sample of a celery heart. And the celery plant itself. Let's talk a little bit about how long it takes to actually grow something as tall as this.

>>This is a fairly long season crop. And, requires a lot of water. It's the one crop that we can't grow from seed, it has to have transplants. And so you have to either have someone in the area that grows the transplants, or you have to grow them yourself. The seed has to be soaked in water for at least 24-48 hours. And the soil you have to put in has to be extremely moist. This plant will not grow if the soil gets dry. So it takes a lot of water.

>>So when you say "long time," you mean…

>>Long time. Oh, you know 4-5 months. And we used to—you'll notice—it used to be that we loved having our celery like this. Blanched. And so we used to grow it actually inside, under benches in the basements and that. It will still grow without the light, but it's white. Nowadays everyone wants the green color. So we have what's called a self-blanching, so it doesn't get too green, and we can grow it just like this outside.

>>And are these warm or cool season crops?

>>Cool season crops. Most of these leafy vegetables and that are going to be cool season crops.

>>How about the nutrition value in celery?

>>Very good. Lots of roughage, for one thing. Because you get all of the vascular bundles that you have to consider that are in there. But it's a good one because again, you're eating part of the leaf that's green, so it's going to have the nutritional value.

>>And most of us live in areas that don't necessarily have a five-month growing span. So I understand that very often, you recommend starting these in a greenhouse. How would we do that?

>>What we would do, as I mentioned, put them in a greenhouse. The soil has to be extremely wet, and because this is the only one that we have, that takes almost growing in water. So starting in a very moist soil, and keep it moist once it's germinated and when we take it even out into your garden, you have to plant it in a very wet soil, so usually what we do is we'll actually plant it while we're watering, and we'll actually work in the mud to plant it.

>>Now you mentioned that blanching it reminded me of boron, which is used sometimes to protect color. Do we need boron for celery?

>>Celery will get—if we get into the middle like this—we get brown spots and black spots. So you need to put boron on these.

>>And how would we find out how much boron we should be adding to our garden?

>>Well, it's awful hard to get it. Usually what we do is just make up a mix of borax soap or some soap that has the boron. Most of the soaps nowadays have boron in them. So a little bit of soap in a bucket, just spray it on and it'll be sufficient.

>>We talked a little bit about starting in a greenhouse with very moist soil, but now when we're ready to take it from the greenhouse into the garden, what should we be watching for in that transplant process? What should we be doing?

>>Cool. They want to be a foot apart. At least 12 inches in all directions. And as I say, plant them in mud, and have it very wet.

>>And when you say muddy, does that mean wet enough so that we step in, our shoe stays down and our foot comes back out?

>>That's exactly right.

>>And how will I know it's ready? Is it just by height?

>>Height. Yep.

>>And is it typically going to have a darker shade of green, the more ripe it is?

>>Uh, no, the way they are developed now, the self-blanching one will have about that light green color at all times.

>>What if we're interested in blanching it ourselves?

>>Well it's very easy, just wrap paper around it. And go out with some paper sack, something that's fairly thick. Wrap it around the plant as it starts to grow, and it will be blanched.

>>And for those who don't know what blanching is…?

>>It means no color. White. Is all it means. And what it really is that growing of the plant in the absence of light.

>>Okay, great. Now what about certain pests or diseases that are affecting celery?

>>They'll have some diseases that affect them. Rust is a primary one. Aphids, again, mites. And they get thrips. Thrips are just little insects that you can't even see but they make little tunnels in it, so that's part of the problem.

>>So when we're harvesting them, we should wash them well?

>>Just wash them well and eat them. Its not going to bother you.

>>And how can we get rid of the thrips?

>>Again, if you have ladybugs, or a lot of people will get praying mantises, and they'll have those in their yard, that helps to keep them down. And you can, if you want, you can also get chemicals that you can spray them with, and that will keep them out.

>>And if you let loose the ladybugs and the praying mantises, will they pretty much stay in that garden area?

>>No, that's the problem. They don't realize that you want to soak…so as soon as they've consumed what insects are there, they'll be gone and then you've got to redo it. So what we do is we'll usually release them about once every week or every two weeks. There are suppliers that will send you these in the mail, that are just hatching and you'll put them out and they'll stick around for awhile and then they're gone.

>>Alright. A lot of fun in the garden for the family when you're out getting the ladybugs. What about any other special cautions we should have or things we should know when we're growing them?

>>Just this moisture. They need a lot of water. They'll start to crack, they'll start to have these physiological disorders if you don't have water.

>>oh, that's a sign of needing more moisture? Thank you so much! Well we're almost out of time. But before we go, let's review a few of the simple things we can do to make sure we get the best harvest possible. First, be sure to prepare the soil in the fall, after your last crop so you can get out early the next spring and get growing your spinach and other cool weather crops. Next, you can harvest your Swiss chard all season long, but remember to side dress it with fertilizer after the first month. Also, lettuce is very sensitive to the heat, so plant early when the soil is cooler, and remember to activate the seeds with ice. And finally, celery likes lots of water and boron and can take up to 5 months to grow, so start early in a greenhouse. That's about all the time we have for today. For more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log on to HomeGrown at www.byubroadcasting.org. Thanks for Frank Williams for joining me today, and thank you for watching! And remember, everything's better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to grow herbs. Whether you're an avid gardener or you're just starting out, we'll discuss everything you need to know about how to grow all kinds of herbs, like basil, cilantro, parsley, sage and thyme, just to name a few. And we'll also learn how to use herbs in homemade remedies, like lythol. Be sure to turn in.

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>>Next on HomeGrown, we'll learn how to grow fleshy fruited and cole crop vegetables. Whether you're an avid gardener or just starting out, we'll discuss everything you need to know about fleshy fruited vegetables like tomatoes and peppers, and how to take those nutritious, cole-crop vegetables like cabbage from seed to your table. Stay tuned!

>>Welcome to HomeGrown. I'm Rebecca Cressman and today we're talking about how to grow fleshy-fruited vegetables like tomatoes, eggplant and peppers. As well as cole crops, like cabbage and cauliflower. With us today is Dr. Frank Williams, professor of plant and animal sciences at Brigham Young University. Thank you for joining me today at the BYU Terrace Gardens. First of all, we want to talk about the fleshy-fruited vegetables, what are they?

>>Alright, those are the vegetables where we consume primarily a part of the plant as well as the seed. So it's the reproductive part, but it's also part of the female plant that we're consuming.

>>Give me some examples about that.

>>Okay, when we look at a tomato—if we have one here—when we look at that, what we have is this is the fruit of the tomato. So we're consuming…what forms the tomato itself is part of the plant. So if we cut this open, if we look at a part of it, we can cut it open. We can see the seeds inside where they're attached. And this is what causes the plant to have seeds so that we can then plant those. So we're consuming this entire portion of the plant rather than just the reproductive part of the plant.

>>Now what about cantaloupe and watermelon? They grow on the vines as well.

>>And they do that, that's the same thing with them. We're actually eating part of the plant plus the seed itself. So part of the reproductive part.

>>Now I know growing up, everybody in my family had to eat those type of vegetables. But what are the nutrient values that are in fruits and vegetables?

>>Well tomatoes and most vegetables have all of the nutrients and the vitamins, the minerals that are required by the body. In fact, the cole crops, or the crucifer crops as you were talking about, they're probably the number one crop that we have for vitamins and minerals. They are the healthiest food we can have. And it's actually "a cole crop a day keeps the doctor away," not apples.

>>Now let's talk about tomatoes for a minute. How would I know what type of variety I should be planting?

>>Okay, that's entirely upon…first of all we have to look at what I want specially for them. If we like the little tiny cherry tomatoes, we like a lot of them, then we would plant this type of tomato. And if we like the regular beef-steak type, or ones for hamburgers and that, we plant this one. The yellow one and the orange, the interesting thing about these, these are usually low-acid. So they have a little milder flavor. So if we're canning, we would can these. For fresh, these are ideal. I myself like the yellow one.

>>What are they called?

>>This is a Cheyenne. We have lemon, so they have all different types of names. So it's what you want to do with the tomato itself that's interesting to us. If we're looking for canning, a lot of times you may want to plant the ones they have for canning are square. And actually have very little gelatinous material in here, and are just seeds, and they'll bounce. They're just like a rubber ball.

>>I'm wondering, you know, a lot of us live in different climates. Would you consider these like a warm climate crop or a cole climate crop?

>>Okay, now, when we talk about this, there's an idea of cool-season and warm-season. This is actually a warm-season crop. It's a crop that has to have warm temperatures. A lot of sunlight. If you don't have enough sunlight, there are certain varieties that have been developed for those most light intensive areas, but that's all that will grow there are those. So primarily we want them in an area where it's high light intensity—a lot of light. Warm temperatures are extremely important to them. So that's the primary function of it, or idea of where we want to go.

>>Now I've heard a lot that what we grow depends on the type of fertilizer and ground we're planting it in. If you want good tomatoes, what should we do to prep the soil and what kind of fertilizer should we use?

>>Okay, ideally we don't want too much nitrogen, because that makes the plant grow too much. So it's a moderate amount of nitrogen. We talk about fertilizers, N, P, and K's, the others just have to be about the same. But it's not a really heavy feeder of fertilizer. So we usually, we have a rule of thumb of one pound of "N," actual nitrogen, per 100 square feet in the spring, and that should take your tomato clear through the season. Soil preparation is just making sure that it has some organic matter in it and that it holds water but that it drains.

>>Now there are some options with tomatoes. You can either plant them from seed or transplant. What do you recommend?

>>The very best and the easiest is probably from seed. It's cheaper and a lot of times, transplants you're not sure what you're buying. Someone may have switched them. But seeds are much easier and we just have to plant those about two weeks before the last frost. And then if it does freeze and we lose these, we can buy some transplants. But

ideally, myself, I like to look at catalogues, purchase the seed, grow them myself and then I know what I have.

>>I'm just trying to remember, one of the breeds of brown's ideas was "beefeater" isn't it? It was big!

>>Huge.

>>Huge tomato. Now transplants, you were talking about seeds growing in the soil two weeks before frost. When should we plant transplants?

>>About a week-and-a-half after the last frost. So that we don't lose them due to the frost.

>>For those of us who actually want to start our own seeds and get the transplants growing in our house rather than going somewhere to buy transplants, how do we do that? How do we take it from seed to transplant in our homes?

>>The ideal thing is to just have some kind of media. And we have some we can look at. Here are some plants that have been planted. We can just look at the media itself, its organic, its artificial, and we want to remember that we can buy that in any nursery. Just put them in these, we're just spreading the pot. And those tomato seeds are coming up.

>>How far down in the soil should we go?

>>Usually just a quarter of an inch. And we put a little soil over top of them and keep them moist. But a lot of people keep them too wet, and they'll actually rot the seed. So don't put them deep. Just a little moisture periodically, make sure that the moisture is on the top.

>>Well since we want to plant the transplants just about two weeks after frost, how long would it take before the transplants are ready to go? So if we take them from seed in our house, is it 2-3 weeks? How long is it?

>>Now with tomatoes, you'll have to start about the first of March. And this is for our area. Now wherever you're at, this will change. But you have this for the Provo, Utah area, we would start on the first of march, grow them until about the fifteenth of may inside.

>>So that's six weeks…?

>>So six weeks, these have got to be inside. And so if you buy seed, plant the seed, it's just got to go outside and thus it's much easier to do that. SO you have to, and one of the things about tomatoes that's fortunate, they can be any size to transplant. Other plants, like this cabbage, has to be a certain size that we'll talk about a little later on.

>>One of the mistakes I know I've made when I've planted tomatoes is that I would get them too close together. So how far apart should we transplant them?

>>Actually, when we transplant these, and as we look at this, one of the things to mention is as we would take these out to transplant—don't pull these out—if you've got too many. Only use scissors to cut them off, to thin them with scissors. Because if we pull them, we disrupt the roots of the other plants. And so, we take these out and then we want them to be about a foot between plants in row. And about two feet between plants, between the rows.

>>Now once we're in the garden, how much sunlight do they need, and how much space do we need?

>>Tomatoes, we want 8-10 hours of sunlight, a lot of sunlight. High light intensity. They don't like shade. And so they like more than other plants that we'll talk about.

>>Now if we have a sprinkler system or we're going to water on our own, how frequently should we water them?

>>Usually a tomato would go 7-10 days between irrigations. Once you've put it in and that. 7-10 days you can water it the next time. Now we have to be very careful because if we don't water it enough, we water it too much, then it has some physiological problems that will occur.

>>One of the things I've noticed about my tomatoes is that occasionally they won't look as nice as this. They'll be bursting over cracks in them. Is that a sign of overwatering?

>>Yes. What it is getting water on the fruit itself. Happens an awful lot after a rainstorm. We get a rainstorm in the spring or in the summertime, you'll get a lot of that cracking. Now I might mention one other thing to remember. The end here are watering. If you'll get what we call cat facing or a leathery appearance here. That's from underwatering and overwatering. And so if you get a black area developing on this end of the tomato, away from the stem, you're overwatering or underwatering, you need to change it.

>>Now, it's a little bit easier to find out if a tomato is ripe or not by color and other things. But what should we be looking at? How do we know it will be ripe? Does it take 8-10 weeks? What are we looking at?

>>Color. If it's a nice, bright red color, and you take a taste of it and you like it, then it's ripe. And that's why you like it from the garden is because those that are shipped to our stores come in what we call a breaker stage. They're harvested green and then they ripen while they're shipped to us. They're not as good.

>>Can we do that as well? Ripen off the vine?

>>Oh yes, what you do is you can take this tomato—what we do a lot of times—we'll tell homeowners if you have a tomato plant and they say it's going to freeze, have a lot of tomatoes on it, there are a couple of things you can do. One is, go out and step on the plant, bust it over. That will ripen every tomato, even the little ones will ripen. Or you can take the green ones in and put them on the shelf and they'll ripen very slowly, or put them in a sack, cut an apple into quarters and put a quarter of an apple in the sack, close the sack, and they'll ripen right up.

>>Wow, you know my father-in-law used to always give us brown paper bags and tell us to put the tomatoes in there, but we never did put in the apples, so what does the apple do?

>>It has ethylene gas, which is ripening gas. And that's when you buy them in the store, when they're shipped, they were treated with ethylene gas before they were shipped.

>>Wow, so let's talk a little bit about pests and diseases, because that will always encroach in our gardens if we're not watching for it.

>>First, number one pest is the white fly. And that just comes and it's in all areas, it's a real problem. The other is the tomato horn-worm. Which is a great big worm, a green one. Most of the time, those can be handled by going out every morning, pulling them off and stamping on them. And so, but the white fly is a real problem, so there are pesticides, or at least washing them down every day with water.

>>Now we talked a little bit about the pests and overwatering, and maybe planting too early. Is there anything else we need to watch out for when it comes to tomatoes and their health?

>>With tomatoes, it's probably the watering, that's the number one thing is knowing how to water and keeping that water from fluctuating.

>>Now let's go to peppers, because I think we need to learn a little bit more about that. Now what kind of varieties of peppers are there?

>>Oh, hundreds! Varieties. And we have to remember that there's also horticulture varieties. That's a main. We have cayenne, we can have a bell pepper or a Tabasco pepper or something. A horticultural name. We also have botanical names, and they have about 5 different botanical names. We have the bell pepper, which we can see here. One of the interesting things is that these are both, all of these are actually bell peppers.

>>So they're the same variety?

>>They're the same variety. Not same variety, but same *botanical* variety. This one will be a different horticultural variety. And this green one, here, could be the same as this one or it can be the same as this one. We don't know for sure until we let it. Looks like it's going to go yellow, so it's probably this one.

>>So when this ripens up, it will either turn red or yellow.

>>These are just ripe ones of these. That's why these, the colored ones, have a milder flavor than the green one. This is a much milder. Then we have some, the hot ones that are cayenne, Tabasco, habanero, the Anaheim…

>>We cook a little bit more with this, it's less spicy.

>>We cook a little more with that, less spicy. One of the things we might mention is, if you have a hot pepper and you want to find out if it's hot, always bite on non-stem end first. The closer we get to the stem, the hotter it gets. So the heat is back here, not up here.

>>Alright. So take a little nibble, have a glass of water nearby.

>>No, water spreads it, so that just makes it worse. A piece of bread. Eat the piece of bread after. But always to find the heat, just take a tip, eat that. Don't ever come back here.

>>Would you consider peppers cold or warm season crop?

>>Warm season crop. These are even worse than tomatoes. These actually have to have very warm temperatures. That's why most of them are grown in New Mexico, areas where it's extremely hot. But we can grow them in our garden.

>>What about the type of soil and fertilizer that's bred for peppers?

>>Same as tomatoes. They do like nice, warm water even. It's kind of funny. If you grow them from transplants, don't water your transplants with cold water, that will kill them. They like warm water.

>>Now what about space in a garden? How close can we plant some of these pepper plants?

>>Depends upon the size of pepper you're looking at. If you have a bell pepper, usually that's a very large plant, so we want the same as the tomato. It varies. If we're getting the Anaheim or the little hot ones here, the Tabasco, then get closer, one by one, in other words—one foot in-row, one foot between rows.

>>One foot within each row?

>>Within the row, that's between plants, and then one foot between each row.

>>Well that's fantastic. What do you typically eat? Some of these you say are way too spicy.

>>I used to eat all of them. I don't anymore. Age has caught up with me. I like all of them; they all have their flavor, that's extremely good, nice. So I try all of them.

>>Now if we live in a climate that has a lot of warm temperatures and a long, growing season, how would we go about planting peppers?

>>Just the same as a tomato, except we have these transplants. They usually won't come from seed as well. So we'll put them in the pots, they have to go in about the same time as the tomato. So in Utah, it would be March. So it's about a 45-day growing period that we'll put them in. So depending upon where you're at, you'll have to have them in.

>>Now this is an example of peppers.

>>This is a pepper.

>>And then you have another example of a fully grown pepper plant. Which is beautiful! This is absolutely gorgeous, and can you eat them? Because they look gorgeous.

>>Now, this is an ornamental pepper. But you can eat it, except this is extremely hot. These are the habanero type. And so they'd be really hot. So we don't recommend…but you can see the difference here. They're green and they go yellow, and then they get kind of an orange color, and then they go red.

>>Well if we start here with our seedlings and we're ready to transplant you said, about the same time, about 4-5 days before frost? So we plant the seeds then, they're ready to go. What is the distance between the pepper plants?

>>Okay, one by one, spacing, one of the things to remember, we don't transplant them, and you can see this is not a true leaf, but we have to transplant them as soon as this starts to form a true leaf. As soon as that true leaf starts to come out, that they should be transplanted.

>>So the true leaf is the little teeny one between the two vines?

>>That's right. These two are not true leaves, so they're just getting to the stage where we can transplant them.

>>How much water do peppers need?

>>Peppers need a little more than tomato, during the growing season. But again, they like more water, but nice, they like really hot temperatures.

>>They're quite a bit smaller than tomatoes; do they have a shorter growing season?

>>No, in fact, these are shorter, but the bell pepper and depending upon how you want to harvest it too. If you want to harvest these little cayenne pepper ones, that's a long growing season. This one's shorter than this one, by about 3 weeks. So you have to harvest this one earlier than you would the red one.

>>Is that why they're a little bit more expensive at the grocery store?

>>Yes, and they're a lot harder to handle than the green one.

>>And are they easier to transplant or harder to transplant than some of the other vegetables?

>>All of the tomato, the pepper and the eggplant are all fairly easy to transplant. The tomato is probably the easiest to transplant of all of them.

>>Now do you recommend that we let them ripen naturally? Or that we pull them off and let them ripen off the vine?

>>They don't have the quality if they're ripened. If they don't ripen on the plant, that's when we get the best quality. So yes, let them ripen on the plant.

>>Do they have the same pests and diseases as tomatoes?

>>Exactly the same ones, because they're the same family. So we look to have the same pests, same diseases, and that would be on all of them, that goes for eggplant too.

>>Are there any specific challenges that we should know about when we're planting peppers?

>>Just that one of the things we have to do that we don't have to be so careful with tomatoes is, the depth of the plant in the pot has to be the same as when you put it in the soil. So don't plant it any deeper. It has to be planted at exactly the same depth.

>>So if the roots are just coming by the dirt in the pot…they've got to be just covered in the garden?

>>At the same depth. Tomatoes, we can bury them all but the top two leaves and they'll still grow. But peppers won't. Eggplant won't. They have to be buried exactly the same depth as they were in the pot.

>>Now we've been given some samples of some fleshy-fruited vegetables. What are some that we haven't actually focused on? I'm seeing eggplant in the basket, for example.

>>Okay, we do have eggplant. Eggplant is, again, a fleshy vegetable. This is more than just the seed. Its part of the plant itself. And so it's, again, a fleshy one. It's not as

fleshy. The tomato, when you cut it, you have that gelatinous material in there. This one, and then the pepper has a hole with the seeds. This one the seeds intermixed in the flesh, so it's a little harder, fleshier than the others.

>>And it's becoming more and more popular, by the way. The eggplant as well.

>>Yes, and now they have a white one now that looks just exactly like it.

>>Well let's move on to the cole crops now. And I hadn't ever heard of that term before the show. So what is a "cole crop?"

>>In reality, it's a crucifer crop; a mustard is what it really is. And so, and a mustard is a plant that always has four petals and has a yellow flower.

>>And its spelled c-o-l-e. And it's also called…?

>>Crucifer crop.

>>Crucifer crop.

>>Or cruciferae. Now the cole comes from the cabbage—is a cole crop. And the cabbage is grown in Denmark, is actually where the name kind of comes from.

>>Oh, okay, so we have cabbage, which is one type of a cole crop. Oh, I don't want to remove these. So we have cabbage?

>>We have some cabbage here. We have cauliflower. We have brussel sprouts, or broccoli I should say. Brussel sprouts here. And then kohlrabi.

>>Which I've never seen before. I've heard about it, but I haven't…

>>Kohlrabi is a plant that is an excellent substitute for turnips. Now today, people don't eat turnips like they used to. But this grows above ground, so it doesn't get worms and that kind of stuff. Peel it, and then you can just eat it like an apple. And I myself really enjoy them. As a kid, I used to eat them all the time.

>>Now do cole crops have a specific nutrient value that maybe we don't find in the fleshy fruited vegetables?

>>oh, this is the best! They have by far, more nutrients. The minerals, and definitely the vitamins. Because one of the things you have to remember here, when we eat the cabbage, we're not eating…we're eating the plant. When we eat the cauliflower, we're eating the primordial of the flower, so we're still eating part of the plant. And anything that's nice and green, of course, usually has more to it. But this still, even though it's white, has excellent nutritional value. This is also a flower that we eat. But these have—by far—more nutritional value than any.

>>Well let's talk a little bit about the soil and the fertilizer. Do they have specific needs?

>>Yes. One we might mention is the cauliflower itself. We've cut this open so you can see the difference, the little heads that we cut off. If this one is lacking boron, you'll get black streaks in here. Brownish-black streaks. It will be very, very bitter. So when you cut them open and you find that, then you know that this has not had enough boron. So the old borax soap that you can find in the grocery stores, if you'll spray a little bit of that on these plants as they're growing, they won't have the boron deficiency.

>>Now we just have a few minutes left in the show and we have so much to learn about the cole crops. What about planting? Distance in the garden? How close can we plant them?

>>Well, the kohlrabi, very close. Six inches apart. The cabbage and the broccoli and the cauliflower, we want those to have more space because they do get fairly large, and we have to have about a foot-and-a-half to two feet between in row and between row for those.

>>And how do we know when the cabbage and the cauliflower are ready to pick?

>>Now the cauliflower will have a nice white color. One of the things that nowadays we don't have to do but we used to, to get this white color, they had to blanche it or pull the leaves up over it, so that there's no sun on it. Sun makes it go yellow. Today we can buy, the varieties we buy, are self-blanching, so they'll cover this and you won't have the color develop and they'll be nice. It's good to have them so they've just started forming this curd as we call it. And they're still quite smooth, but it's just forming the curd, and we harvest it.

>>What kind of pests are typically attracted to cauliflower and to cabbage?

>>Aphids and cabbage looper. They come in and the aphids—one of the problems we have is with aphids in the broccoli—they like to get down inside here. They're nice and green. Of course, when you cook them, they'll float to the surface, but some get caught. But remember, it's just added protein, so it doesn't hurt us, it's just unsightly to us.

>>Are there any risks of overwatering or specific challenges we have of planting these?

>>Not with cole crops, they like a lot of water. That's a factor that they do have. But they like cool temperatures. So that's why they grow where it's cool. We have problems growing brussel sprouts in our area, because it's so hot. But they like cool temperatures so our cabbage, our broccoli, everything has to be harvested early in the year. Planted early and cut off early.

>>Is that the same also with our Chinese cabbages? Just become a little more popular?

>>Yes, they're the same. Just the same. I might mention too…one of the harvesting facts about this is when you buy them, cut them in half. You'll see this is the stem. We don't want a big stem, we want just a small stem. Because the rest of it, that's waste. So we want a variety and we want to handle it, so we get a nice good growth in there.

>>Now I've heard of a term called blanching. And you mentioned it earlier. If we want to blanche this ourselves?

>>Pull the leaves up, take an elastic band and put them around, and you do it when they just start to form a little tiny white head in there. Bring it up, cover it, and that will blanche it.

>>And let it continue growing inside?

>>And it will continue to grow, yes.

>>And that will keep the color and consistency?

>>Yes, and it will make it nice and white and you want to keep watching it, though, because as soon as it gets this shape here, then you have to do something or it's going to start to get really bushy and then it will start to go to seed, so. It has to be harvested about right.

>>Well thank you for all of these tips, and we're almost out of time. But before we go, let's review a few of the simple things we can do to make sure we get the best harvest possible. First, remember that if you have a short growing season, use transplants for your tomatoes. Next, remember peppers need a very long growing season too, so it's always better to start them from transplants. Also, don't wait too long to plant your cabbage or they'll go to seed and the heat, and finally remember, your cauliflower likes a good dose of boron to grow, otherwise it gets the marks inside. That's about all the time we have today. For more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. Thanks to Frank Williams, and thank you for watching and remember, "Everything is better HomeGrown!" Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to grow mushrooms at home. Now when it comes to growing mushrooms, some folks imagine it to be nothing but a smelly, dirty mess, but there's others who say "It just ain't so." In fact, home cultivation of mushrooms is a growing trend. And on this episode of HomeGrown, we'll learn from a mycologist, just how economical and clean it really is. Be sure to check it out!

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>>Next on HomeGrown, we'll learn how to irrigate our vegetable gardens. Some areas of the world could survive on natural rainfall, but for most of us, we have to give nature a hand with a little well planned irrigation. And on today's show, we'll demonstrate a variety of water-saving irrigation methods. As well as a way to improve your soil so that it will retain more water. So stay tuned!

>>Welcome to HomeGrown, I'm Rebecca Cressman, and today we're talking about how to irrigate our vegetable gardens. And joining me today here at BYU's beautiful terrace garden is Dr. Frank Williams. Hi! A BYU professor of plant and animal science. Welcome! Now I understand that even though we're going to talk about watering today, we really need to turn our focus first to soil. Why is that?

>>Now, first of all, where will the plant grow? It's in the soil. And a lot of us don't understand the function of the soil and that this has—one of the biggest problems is we need to get water into the roots of the plant, but many times we think that the more water we put in, the better it is. Now we have to remember that roots of plants need air also. And so we put the water on, that puts air that is driven out. So we got to watch how we're doing it. And the larger the air pockets in the soil, a little more water and a little more air this soil is going to hold. And so it makes it so that our plants will do better in some and not as good in others. And so we have to be very aware of what the soil has.

>>Well we have a lot of samples of different types of elements of a good soil. Let's start with organic matter. Now this is essential in order to help get—you talked about pockets—but in order to help get that water to the roots?

>>I'll say, what it is that not only does it hold water, but it helps to break up the soil so that it doesn't compact on us. So this organic matter is ideal for holding water, making those air spaces, keeping the soil from becoming compacted. If we look at…there's a good example of what happens when we don't have organic matter. You can see now that it clogs up, forms clots. This is low in organic matter. Part of our problem is making sure we have enough organic matter.

>>Now this looks like what's in my yard—which is clay. Is this dry clay?

>>Clay.

>>Okay. Now what type of different soils are there? We're talking about clay…

>>We primarily have three different types of soil. We'll have what's called a clay soil, and then we have sand. This is one type of sand, and this is the sand that causes most problems to homeowners. They look at this and they say this is a real sand, and so it's causing me problems. Well what this is it's kind of a loamy sand. It has very fine

particles. Now if we take this sand and we mix it with this clay soil, and the clay soil has little tiny pockets in it. Very, very small. We take this very fine sand and we mix it with that, it fills in the holes. We have concrete. So we don't have soil, we haven't improved anything.

>>We have a recipe for concrete!

>>Concrete. So what we really want is a sand like this that's very coarse.

>>This is *very* coarse and very rigid.

>>This is very coarse sand. This, then, mixed with the clay soil will help. We don't recommend mixing clay and sand, because that causes more problems. What we really want to do is then put the organic matter in, which we'll talk about.

>>Now how does having sand in your soil affect water retention?

>>Okay, the sand, it can help in retention because it opens it up. But if we get too much sand, then it doesn't hold as much water, and it lets it kind of go through. Sand is not a problem, a lot of people think they have a problem with sand, but the sand will let roots go deeper. Where clay doesn't. And then in between those two, what we have here is a loam soil, or silt.

>>S-i-l-t?

>>S-i-l-t. And that's in between. So what we really like is a mixture. About 40 percent, 40 percent, and then 20 percent sand. Or 45 and 45, 10 percent sand.

>>So *each* of those are essential elements to a good soil?

>>A good soil has a mixture. And once we've mixed it, then what we want is we want to have some organic matter. This is some good organic matter that we can put in. About 10 percent. Most soils in a hot climate, in a native climate where we're very, very dry, will only be 1 percent organic matter. Now if you leave it in a climate where it's very, very wet, then it has 50 percent organic matter. Very high. So you have to be aware of where you live. What the weather conditions are like, then that changes how this organic matter will be.

>>Well some of us, instead of going about and looking for different types of material to order, make the best soil we can actually go to the store and buy the perfect soil?

>>Well, sometimes. Usually what they have is they'll a small amount, but it's so expensive. So what we can do is go to the store, buy some organic matter—peat moss. Peat moss is not as good as some mulch.

>>This really breaks it up because of much larger pieces.

>>This breaks it up because it's much larger now.

>>And this could be leaves as well as twigs?

>>Yes. The good ideal mulch has leaves, grass, twigs. The problem with this is it breaks down very, very fast. Now if we put this in, and if we look at it, we have different size particles. It takes a long time for some of these to break down, so the effect is a long time in the soil. So that's why we try to put that kind of organic matter in.

>>Now, what about mulching. We hear about mulching. How important is that?

>>Mulching is very important if we want to conserve moisture. If we use the right kind of mulches, and we have two different types of mulch. One is an organic mulch, that's where we make it from live material. And we'll lay that on the surface of the soil, never putting more than about two inches. Now, one of the things that a mulch does is that it cools down the soil. So the soil is not only going to hold more water, the water will go through this very readily. It then stays in that soil and it's actually cooler. So in a very hot climate, mulch helps to cool the soil, helps to cool the roots, helps the plants to grow.

>>And does it help to slow down evaporation as well?

>>It has these little air pockets and that. And that helps to stop the evaporation of it. So that's a good organic mulch. Now one of the things I might mention is that a lot of people like to get their mulch very, very fine. The ideal thing is to have some big ones. Don't really make it fine in that—some of the bigger pieces. They don't like the looks of it, but it's much better to have big pieces.

>>You see more and more yards with some of the larger mulch, and that's the way to go.

>>Now, can we use that?

>>This is what we call an inorganic mulch. Now the black plastic is one type of mulch.

>>And we would never have thought of that, so this is interesting.

>>This is another type of mulch, is the clear plastic. Now we have to look at these as two different purposes. Both of them will control moisture. In other words, they'll keep the moisture in. Now we have to have some way to get the moisture under them, so we'll either have to put them over the rows, irrigate in the furrow, let the water come up underneath, or we'll put a line down a little furrow underneath—down in there. These serve two different purposes. This one, the clear, that is to heat the soil and conserve moisture. So this is what we put on early in the spring if we want to warm the soil up. We put clear plastic down. If we want to control weeds, we put the black plastic down. Clear plastic lets weeds grow under it. So the problem is we get lots and lots of weeds, because it doesn't block the light. The black plastic holds out the light so we don't get

the weeds down here under this. Now I might ask you, which one do you think warms the soil up the most? Black or clear?

>>I would think the clear.

>>The clear does. Why?

>>I think because it lets in the sunlight.

>>It lets in the sunlight and traps in the heat. That's right! The heat can't come back out. Where this one stops this heat right there on the surface, doesn't heat the soil surface.

>>So again, we would spread that out, maybe cut out a hole where the plant will be?

>>Plant goes, but w have to make sure we have a place where we can get the water down.

>>Either by perforated holes or whatever works for us?

>>Or something. I might mention some people use newspaper as a mulch.

>>And that would break down eventually?

>>That breaks down eventually.

>>That's kind of nice. Semi-organic. Let's talk a little bit about different ways to water.

>>Alright.

>>How about planting in zones?

>>Okay, now when we plant our plants and we start to talk about water and in the garden, sometimes it becomes really hard. But we want to try and zone it, so we have the plants that need more water in one area, those that don't need as much water in another area. That's what makes it so nice to furrow irrigate is we can furrow irrigate those that need water, we don't need to do the others. Where we're sprinkling, then we're going to have put it on hold.

>>So if we have plants that require a lot more water, they should be near each other?

>>Right. Tomatoes, squash, those plants require a lot of water—watermelons, and that. They require a lot of water. A watermelon is 95 percent water. So we need a lot of water on those. Those plants that don't require so much water, then we'll put those someplace else.

>>And those would be maybe beans?

>>Peas and beans. Stuff like that.

>>Okay. Now when we talk about different ways to water, this actually brings out childhood nightmares of having to stand for hours with a garden hose. But this is still the basic and traditional way for us to water our garden!

>>For a lot of people, it's the best way—in my opinion. Of course, the original method, and in some areas of the world, they still have to do it. And that's by just…we use the old water can. And just go around and water each plant individually. Now the reason for this is that as we water, we're getting the water just where we want it. The rest of the area remains dry.

>>So you have less water waste?

>>Waste. This stops water waste. Now, when we flood irrigate that, we can use a hose. And the hose is an ideal way. Now to do it by hand—and you mentioned doing it as a young person—on BYU campus I love to watch them water with a hose, because it takes them 5 minutes to cover 40 acres. That puts out very little water. Now what we're trying to do is we try to water enough that it goes down at least to the bottom of the root zone. So we're trying to always have water where the roots are. We don't want it to go deeper, because that's wasted also. So we water just until it's to the bottom of the root zone. Now, how long does that take? With a hose this size, a half inch hose and a sprinkler on the end, if we were to turn it on for 2-3 hours, then we would get enough water to have watered our area. Not 5 minutes. This is one of the problems we have. Particularly where there's a lot of water available, people put these systems in and they water for 5 minutes and think the thing's watered, but it's not.

>>And the roots never have a chance to grow down.

>>That's right, they stay on the surface.

>>One thing I learned I thought was interesting is that in England, because of requirements and restrictions there, they actually can only water directly. Either through the bucket or with a hose!

>>With a bucket. And I don't even know if they'll let them use the hose to water the plants. But they have to water *at* the plant itself. And if you're standing there with the hose, that would do the same thing, but usually we put a sprinkler on it and then we're covering everything. And it will waste water, but the funny thing of it is, if we do it right, it's probably the best way to water.

>>That's surprising to know. Now with the growth of the suburbs, more and more people are putting in automatic sprinkler systems. And what are you personal feelings about them?

>>I don't like them. One of the problems is—and we have some here—this is the head type that comes up, then we have the impact head, which works off of the impact pressure. The problem with these is that, I hate to say it, as we put them in, most people try to do it as inexpensively as possible. So they don't put enough heads, so they leave dry spots. And in our garden, we can't afford that. And then what happens is, they put these in, they leave a dry spot in the middle of the garden, and the only way they can figure out to water that, is to turn the sprinkler on longer. That wastes the water. So ideally, as I usually talk to my students, if you don't have a dry spot, you're watering too much. But if you do have a dry spot with a sprinkler, the ideal thing to do is water it and then take the hose and water just that dry spot.

>>And use that as a supplement.

>>That's the ideal way to do it.

>>And we actually used a company that helped us lay out…so that we would—every 8-10 feet—have a sprinkler head. But we still occasionally get those dry spots too.

>>Yes. Because we just can't get this…it goes in circles. And so we're always going to have those little triangular pieces that just don't get enough water.

>>What about other problems with sprinklers? For example, we have sons in our house and I mow the lawn too, but we're always clipping the head of these.

>>That's one of the problems. So after every mowing, turn the water on. Or every time you go out in the garden and weed and do something, turn the water on. Make sure it works. That's the biggest problem we have is that people turn them on and forget them. Now, we have a device here that we can look at. One of the problems we have is we get rainstorms. And what we'd like to do is if it's raining, at least turn the water off. And in a very dry climate, it's really not going to hurt to have it watering while it's raining. It's actually the best time. But public relations says, the neighbors are going to say, "Well he's watering and it's raining!"

>> "He's wasting water!"

>>And the funny thing of it is, it will rain for five seconds, put out a quarter of an inch, and they'll go without water for two days. Worst thing we can do. The ideal thing to do is if it rains, as soon as it stops raining, turn the water on. Supplement that rainwater enough to wet your roots.

>>So this would automatically sense when we'd need water?

>>What this does is when it rains, it shuts off the sprinkler system. And then when it's dried down enough, it tells that it's stopped raining, comes back on.

>>Ah, better than mother nature almost, huh? Now you had mentioned how you don't like sprinklers, but for just a moment, are there specific pros and cons between the two? The impact head and the pop-up? Especially in a vegetable garden.

>>In a vegetable garden, this one probably is the hardest used because as we're starting out our vegetables, this will pack the soil down, because it puts up big drops. This is probably better.

>>It's a light, kind of arc.

>>Yes, light arc. So what we do is we can actually in our garden, put it on a stand, put it out in the garden, and then when it comes on it's a nice, smooth, and it's not so impact. And that's why we call this an impact head.

>>I've noticed a different size of the pipes that you get that you can screw right into the end, so instead of being buried underground, it's right on top.

>>And for the garden, we'd want to do that. And in fact, if you have corn and you say you have trellised tomatoes, we have trellised beans or something like that, if you'll take this and start out with a small head, small little extension, then as your crops get larger, you just keep getting a bigger one and a bigger one, raising it. Now you'll have to brace it so it stands up, but you can still use it.

>>And ideally with corn, you're going to need one about five feet high.

>>Five feet high is exactly what it is.

>>Now we're looking at drip systems—which we use at our house as well—and this one's kind of tangled up. But tell us, is this the ideal way for us to water a vegetable garden?

>>If you keep your shadow in the garden, this is ideal. But some of the problems with this is that this—as I might say—this will save about 50 percent of your water over furrow or flood irrigation, where we just spread the water out. It'll save 25 percent over a sprinkler. But the problem is, you have to spend the time to make sure it works. The heads have to be working. And if we have down here, we can show the little system that we have. There are some things we have to watch for. First of all, clean water. That was one of our problems. And we think our culinary waters are clean, but they're not, they're full of sand. And so what we have to do is put a small filter in. So this takes out the sand or any debris that comes through the water. And there's a lot of debris that comes through and a lot of sand!

>>I imagine if you're watering off of irrigation canal water…

>>Then you've really got a problem, because now there's weeds in here, weed seeds in that.

>>Now this is a smaller version of what could be found in a traditional home?

>>I might mention a couple of things that goes with all sprinkling systems that we're looking at. Filter. Then we have, for a drip system, we have a pressure reducer. Now, for these to work, we have to have high pressure. 60 pounds or more to get a good distribution. With these, and the drippers, we want 25 pounds of pressure. So here we have a pressure reducer. Even more important than that is the next little thing they've developed to put on here, and that's called a backflow preventer. And the backflow preventer, if we happen to have one of these little drip tubes here laying on the ground, as the water shuts off, there's a back pressure. Pulls a little bit of the soil. And what happens is we actually can pull chemicals, fertilizers and other things back in through the system so that it gets in here and then it's in our culinary system. And we're drinking it! So we want to make sure that we always have a backflow preventer. A lot of homeowners will put these systems in and they don't do that, and that's not the right thing.

>>And for the first time users, in terms of putting it together, you talked about making sure we have a filter, making sure we have a pressure reducer, depending on what type of head we're using.

>>That's exactly right.

>>Okay. And then, this took me a lot of time when I was trying to put it together, you actually see a punctured hose here, and this is optional? Where you insert the pressure into the hose?

>>Yes. This hose comes with no holes in it. They have a little gadget thing, push in a hole, make a hole in it. Then this is inserted. But one of the things is that you'll find is that hole is just a certain size, so that it doesn't let in water leak out of it. Now, what happens if you want to change? You can pull this out if you've got the muscles. And then, we have a little plug that can be put in that hole, and that won't leak. So we can change these.

>>Where they're going to be in the length of this, so this is plugged in, this is staked into the garden.

>>Just put in the soil in the garden, and this can water individual plants or water a group of plants, and it would work very well.

>>And off of a hose, you can have a number of small little things.

>>You want to make sure you don't get so many, though, that the end one doesn't get any water.

>>Now you talked about how, if the drip system is good, if our shadow is crossing into the garden, if we're walking, let's talk about the pros and cons then.

>>One is that, it isn't as easy as we think. This is much harder to maintain than just furrow irrigation where we let the water go out. Because we've got to make sure it's working. We've got to walk out and make sure it's always working. This one, we've got to make sure it's working after we've been in there and weeded. Same thing here. Have we knocked? Have we put a hole in it? Now, this one is easy to pick up in the winter. This one we've got to go out and pull it all up. If we're going to rototill, store it, then come back the next year, put it back out. So we have more work with this. It takes a lot more work and a lot more care and a lot more observation to really use this.

>>And because plants and vines are growing around it, I've found that with my drip system, they're constantly moving.

>>That's exactly right.

>>Alright. Also, looking at folks who want to try a drip system, how much do you think they need to budget? How much do you think it will cost?

>>Now, it's really hard to say and it's going to depend entirely on where you're located. Because the plastics is not going to be a cheap system to put in, but once it's in, then it could last for a long period of time. So you're going to have to look at and go to the store, go to wherever your supplier is, find out. But it's not going to be a real cheap situation. Now, some people try to build their own. One of the biggest problems we have is inside of this, when you have water, it develops moss. Now if we develop our own system, and I've visited some systems where a gentleman has fixed his own for the garden, and he forgot about moss and that growing inside here. Well it isn't very long when all these are plugged up with material. Now the other thing is, we've had people who see soaker hoses…

>>Hoses with holes all the way across.

>>And they think "oh that's good for my garden," so I'll just take this and I'll punch holes in it. Well, if it's going straight up or it may go straight down, this is not an ideal thing to just punch a hole in it.

>>So it's less economical? Or more economical?

>>It's more economical, but less efficient.

>>What about sprinkler systems for corn and tomatoes and other plants that are growing on our crops?

>>As I say, we'll just extend them, but we have to spend the time to go through and

change those, and you can save them, though. You can save those expansions until the next year you do the same thing. So we'll just raise that up as it goes.

>>Now we have a discussion all the time in the neighborhood about the best time of day to water. So what are your recommendations? Is there really a good time or a bad time for vegetables?

>>Ideally, the best time is very early in the morning. We like to use it very early in the morning because if I'm hooked to a culinary system, everybody's watering in the afternoon. Everybody comes home from work and that and they go outside and water. Water pressure goes down. So if I am watering in the early morning, my pressure's up, the other thing is, if we water in the afternoon and then in some areas where it's quite humid, afternoon it doesn't have time to dry, so they'll rot, get rotting in the garden. If we put it on in the early morning, then we have the opportunity to have it dry down, then we don't get that problem with the rot and the different type of things that can happen.

>>You've mentioned different climates. Are there certain climates where they shouldn't water in the morning?

>>No. In fact if you're in a wet climate, you probably ought to go out and—we have a system that we call syringing. Now if we're in a very hot climate, we can syringe in the afternoon. It's really hot, go out. Our tomatoes, tomatoes don't like to bloom and send fruit if the nighttime temperature is above 75 and the daytime temperature is above 90. So what we've found is if we go out in the afternoon and just, for 3-5 minutes turn on the sprinkler, cool the area down (and that's called syringing), then that cools those plants. And that will help them to put fruit on in the very hot part of the season. Now, if we live in a wet climate, in the evening and during the night, we get a lot of spores and different things collecting on the plants. The ideal thing to do is in the very early morning, just go out and for a few minutes again, turn the sprinkler on and wash them off. That will help you to keep your plants from having as much disease.

>>Alright, so lots of great tips when it comes to watering in the morning, ideally, and then syringing it. For a minute I thought you were going to talk about filling up a syringe of water and then heading out…

>>We just want just a small amount of water that will wash that off.

>>What about fertilizers? Since we'll be fertilizing our vegetable garden, does that affect the use or requirements of water?

>>We need to have, in fact we find that if we have enough fertilizers, you can actually use less water if you have a little more fertilizer. So fertilizer becomes an important thing in the fact too that the healthier the plant, the better it can withstand not having water. So like tomatoes in your vegetable garden, if you're keeping it healthy, you have mulch, you've put the fertilizer on, the nitrogen fertilizer if it's certain crops. Beans, tomatoes

and that don't need it, but we want to make sure they're healthy, then we should only have to water every 7-10 days in our garden.

>>Only every 7-10 days! If we're getting the water down to the root system. And we're doing it like we should. Making a deep root system.

>>And how can we tell whether we're actually overwatering our garden?

>>The best idea for overwatering is to dig it. See how deep the water is going. The ideal thing is sometimes you can just take a screwdriver, push it down and see how easy it goes in. But what we like to do is just keep the root system wet and let the top two inches dry down, and after that top two inches is dried down, reapply water.

>>And what about underwatering? What would be a sign?

>>The underwatering of the plant is it looks the same as overwatering. Because what's happening is the roots are dying and they can't take up any water. So if you have a plant that's overwatered, it looks a little more succulent, but they'll have the same appearance.

>>Same discoloration?

>>Yep. And the funny thing of it is, a lot of people are overwatering and they think it looks like I'm underwatering, so what do you do? Turn on the water! You add more water. So they keep compounding the problem.

>>Alright. And the best is to just diagnose that with a shovel.

>>That's correct. Shadow again. And if it's a screwdriver, make sure. And you'll get to know one of the crops that shows symptoms of drought in the garden that we can watch is the tomato. If you watch the tomatoes, and in the afternoon it starts to show a system it's flagging or what we call flagging, it's kind of wilting. Water the next morning. And then it will be just fine.

>>It's amazing how quickly they revive. Any last-minute conservation tips? Because we talked about the drip system saving 50 percent of water or using 50 percent less water than some of the others. But what other conservation tips do you have?

>>The ideal thing is to put on a mulch, make sure you water what you want watered, and not…a lot of us water other things in areas where there's sidewalks, driveways and that. We're always watering the driveway, the sidewalk. Make sure the water is going on the garden, not anything else. And never overwater to get it below that root zone, but water enough that there is water down six inches.

>>Alright, thank you so much. And we want to review this, so when it comes to watering our vegetable gardens, there are a few simple things that we can do to make sure

that our plants get all the water they need. First, be sure to prepare the soil well by adding plenty of organic matter.

>>Get organic matter in your garden.

>>Alright. Next, remember to use plenty of mulch around the plants to keep water in the root zone.

>>And never more than two inches.

>>And also be sure to fertilize correctly, so that you will have healthy plants that can survive with less water. And finally, remember the more often your shadow falls in the garden, we've heard you say it's 2-3 times, the better you'll know exactly what it means. And that's about all the time we have for today. For more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. Thanks to Frank Williams and thank you for watching and remember, "Everything's better HomeGrown!" Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to plan and plant a vegetable garden. We'll talk about all the basics, from selecting just the right vegetables to starting your own transplants indoors. And we'll share some tips—special tips—on planting your garden that are sure to help you cultivate your best garden yet. Be sure to tune in!

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>>Next on HomeGrown, we'll learn how to grow root and bulb vegetables. Whether you're an avid gardener or just starting out, we'll discuss everything we need to know about root vegetables like potatoes and carrots, and how to take those tasty bulb vegetables – like onions and garlic – from seed to your table. Stay tuned!

>>Welcome to HomeGrown! I'm Rebecca Cressman. And today we're talking about root vegetables like potatoes and carrots. And bulb vegetables like onions and garlic. Joining me today at the BYU terrace gardens is Dr. Frank Williams. He's from the BYU Plant and Animal science department at Brigham Young University. Welcome.

>>Glad to be here.

>>First of all, let's talk a bit about all the different kind of root vegetables there are. And maybe the root-like vegetables too.

>>Okay. When we're talking about a root vegetable, we're talking about something we consume. A part of the plant, not the fruit. And so, when we look at a root like we have beets here. We have sweet potatoes here. These are roots. And you said root-like because one of the plants that a lot of people call a root is a potato. Now potato is not a root, it's a stem. And there's a big difference. Because, if we look at this, if we look at sweet potatoes.

>>This is a big one, by the way!

>>It is a big sweet potato. And if we look at a beet, there are no nodes and internodes. If we look at a potato, you'll notice they'll have what we always call eyes. Those eyes are the nodes, or where a little bud is. And then in between is the internode. So a stem has nodes and internodes, and therefore we can cut a piece of it and both roots and stems will come from that. But on a sweet potato, we have just a root with no nodes or internodes. It's just a storage organ.

>>What about the special nutrient values in sweet potatoes, in potatoes and everything like those.

>>Now potatoes, very little. Sweet potatoes, again, very high. With a lot of vitamin C. It's orange. So there's a lot in the sweet potato, not much in the potato.

>>And what about in general, root vegetables? Are they a good part, a healthy part of a diet?

>>Oh yes, yes. Because even a potato has some roughage and some other things to it. So all vegetables are good for us. Some are just better than others.

>>Now would you consider these warm or cold season crops?

>>Some of them are warm season crops. Some of them cool season crops. Beet, radish, parsnip, and the carrot…those are cool season crops. Sweet potato and the potato are warm season crops. In fact, potato is in the same family as tomatoes and peppers. And so it has the same characteristics as those.

>>Now these are obviously something that are loved around the world. People love their potatoes. What type of fertilizer, what type of soil preparation do we need to have in order to grow good, healthy potatoes?

>>We like a soil without any rocks. Because rocks will cause it to have knobs and different things like that. So we like it to have a fairly fine soil, a good soil, one that has organic matter in it—to a certain extent. And so it holds water and yet will dry, will leach out. Let it drain. So we like it fairly medium soil to a good soil. Poor soil, it's very hard to grow potatoes.

>>And without rocks, I didn't know that…

>>And we don't like a clay soil. Get a clay soil, and it's hard to get this potato out and not have soil all over it. I said soil because we don't call it dirt.

>>Well what about the fertilizer?

>>Okay, fertilizer, it's a high fertilizer—mostly nitrogen in requirement. But like any vegetable, we can start out with one pound of N for 100 sq. feet. And what we do is we get it started, and if it looks like it's not doing it how we wanted to, without growing like it should. We might sidedress as we call it; put a little nitrogen alongside the plant. So that then it can get a little extra nitrogen to go.

>>How crowded can we plant potato plants?

>>Potatoes are spread out quite a bit. And so we want them about a foot-and-a-half to two feet in row, and two to three feet in rows.

>>Now can you kind of give us an example of maybe how to plant a potato?

>>Okay, now one of the things about potatoes is that we do not plant seed. We plant what's called a seed piece. And what we do is, and we have a copule here. Ideally, this can be planted by itself as a seed piece. Because we want a minimum of about one to one and a half inches.

>>Like a small little red potato will be okay?

>>Now this one, we would take, and what we have to do is we can cut it up and we try and cut, so we have, again, about that same size. Now, one of the things we want to remember is that we don't want to use a potato that we got from the store. Most of them have been sprayed with a chemical to stop them from sprouting. So they won't sprout. So buy them from a good nursery or some place that sells them, as seed pieces or seeds that we can plant. So they don't have that spray on them.

>>Now would it be the same for sweet potatoes as well?

>>Oh no. Sweet potato will have a little part down here. A sweet potato, we normally will take a piece of the vine. And we cut what's called a slip. So we'll cut, and just take a leaf, and this part right here, we'll plant. Because this, if we were to cut it up, then the only part that would grow would maybe be the part that was the top part, which would be this end right here. We'd get some plant out of that and little roots out the bottom. The rest of them would not produce anything.

>>So do we put this in a cup of water 'til they both sprout?

>>Well, no, we put it right in the soil. Because one of the things to remember, this grows in an area where it's high moisture. Here in Utah and the drier climates, sweet potatoes don't do very well because it's too dry and the season's not long enough. So we don't really grow a lot of sweet potatoes for the fruit itself or for the vegetable. We do now have some more ornamentals that we use, but we don't have the ones for parched areas.

>>What about watering them? You talked about that liking moist environments. So how often a day…?

>>You'll probably water them, again, and we hate to say a regiment, but we can water them when they need it, which is about, oh, every three to four days. Maybe seven days if there's rain, if it's cool, then we can go longer. So it's when it needs it, is actually how we like it. And we get to know a plant when it starts to wilt a little bit, it needs to be watered.

>>Seems to me it would be kind of tricky. They're underground, so how do you know when to dig them up and when to ripe. How long would the average go?

>>Usually, with potatoes, we dig them up when we want to start seeing if they're ripe. Now they will start to…if you let them grow long enough, they'll start to die down. Dig them up. But usually we get a little anxious. So we dig them up and we get these little tiny potatoes, we call those new potatoes and we're happy and we eat those. And then we wait for a little while longer, and we dig up another one. And until they get to the size that's ripe.

>>So the longer you leave them in the ground…the bigger and better they'd be? Oh.

>>These are not a storage potato, but the regular potato that we want to store will have a…we want it in the ground long enough to suberize—form a tough skin.

>>How should we best harvest? Do we go with our hand, do we use a pitchfork? What do you recommend?

>>Usually you use a pitchfork or a shovel, and dig them. Usually, it's too hard to dig them with our hands. Some people do plant them in tires. What they'll do is plant them in the ground and they'll put a tire around it and fill that with straw. Then when it gets up so the plant is showing above the tire, they'll put another tire on, and fill that with straw, and let this plant get 3-4 feet high, then the potatoes are all produced inside the straw, and then all we have to do is reach down in the straw and pull those potatoes out.

>>That's a great idea! Now what if…my understanding is potatoes need a little bit of frost, right?

>>To harvest. They'll need…what happens is they need to be knocked down, the stems have to be knocked off so that they then can have a suberize and then be ready for harvest.

>>What happens if you live in an area where there is no frost?

>>Usually we don't plant potatoes. Best time to plant sweet potatoes. And they're by far more nutritional for us. So plant sweet potatoes. Potatoes need an area where they get a little frost.

>>And now, let's move on to carrots and talk a little bit about those. They are very common. Alright, we have carrots on display here. I've never successfully grown carrots of this size. So let's talk a little bit about carrots. Are they a warm or cold climate vegetable?

>>Cool season crop. So they have to be grown where it's nice and cool. They like to be in the ground. It's interesting, we can plant them early in the spring and have them come up, or we can plant them in the fall. For Utah, again for us right here, now's an ideal time to go out and plant a couple of rows of carrots. Let them come. They'll start to grow, and they'll be ideal in the fall because that little bit of frost really stores some sugar in them, and they actually have a better quality.

>>So late summer, right before fall…

>>End of July, middle of August is ideal.

>>Tell me about the soil.

>>Now one of the things we want to do is we want to make sure—and I only have a couple here—this is not a good carrot, as you can see. Because it'd be hard to peel for

one thing. But there's a problem with it. The soil for carrots has to be without any rocks and no organic matter. So we like soil…the clay soil's not bad. The sandy loam soil is ideal. Because wherever one of these tips touches a rock or organic matter, it splits like this. So we get this splitting characteristic of the carrot.

>>And the organic, which is kind of like an artificial soil…

>>Twigs or any kind of organic matter that we add to our soil, will cause this to happen. The other problem is if our soil gets too wet, it'll start getting the cracking like this, and of course we have insects, everything. And get down and part of the problem is…

>>It's too moist of a soil?

>>Yes. And you can see what the problem is here. This is highly organic matter soil he was growing these in. And that's why he has this problem. Now one of the…and so we try to stay away from that. Get a kind of a sandy soil. In fact, if your soil has high organic matter and is rocky, an ideal thing to do is dig a little trench, six inches wide. A foot deep, and put sand in it.

>>Do you have an example of that sand?

>>Now, we've got some here. We've got a couple of other things. We'll bring this up. Now the sand that you'd fill it with would be something like this right here. Just regular old sand that we'd put in concrete. And then they grow in that, they won't have the splits. It drains well, and you'll have ideal carrots.

>>It's very soft and moldable and doesn't stop…

>>And so what you do is you make that trench, and then when you rototill your garden, work it for next year, that's incorporated into your soil and adds to the soil to help break it up.

>>That's fantastic! So would you make kind of a hole in the dirt and then add that?

>>Yeah, you'd make a slit. Now that's talking about planting the carrot, that's where you're going to grow the carrots. Now to plant the carrots in that soil, what we'd like to do is if we look at here, part of the problem is that anybody that has planted carrots…if I get some out, you can see…the sand. And so, part of our problem is how do you get one seed without putting them all together? If we plant them, if we spread them like this, then we got a bunch of them.

>>I hate to ruin it.

>>Yeah. So what we do is we take, and get some seed like this in a packet. Mix our sand with it. Mix it up. Then we can put a furrow, this you can do right in the garden.

>>And the sand is giving it that…?

>>The sand spreads it out. So now when we spread these, you'll see as we put the sand in like this, and put it so it's nice and heavy. Okay, now we cover that over, and those carrots will be thinned automatically kind of thinned, so that they have come up already separated.

>>What about watering? How often should you be watering the carrots?

>>At first you've got to water them constantly. Keep them moist. Once they've start coming up, then it's again on a basis of when does it need it, does the soil start to dry down? When the soil starts to dry down half an inch to an inch, we'd water them again.

>>That's fantastic. But how, you talked a little bit about thinning, which is something I've had to do quite a bit. What are we looking at? Once we've got our seedlings coming up?

>>They should be, and that's why we do it this way. We're trying to keep them about one to two inches apart. We don't want to get them too large. This is small. But we don't want it much larger than that. And so one to two inches within the row, and then three to four inches between rows. Or if you want to walk up and down the rows wide enough that you can get up and down the row.

>>You know, special fertilizers, once they're in the ground?

>>Once they're in the ground, carrots use very little. Again, it's the one pound of N per 100 sq. feet that we've always talked about being put on in the early spring. We'll take care of them.

>>Now are they like potatoes where you can kind of pull them out and see if they're big enough and then put them back in?

>>That's what we do. No, we don't put them back in, we just pull them out and that's kind of thinning them. But you can tell because they'll start to have a nice, good size top, then you'll know they're getting to be fairly good size.

>>So on average if you can estimate about how much time it takes to get a good size carrot?

>>Oh, a month. You can probably harvest them once they're up within a month, and then you're going to be harvesting them over.

>>What about pests and diseases that are risks?

>>Carrots don't have a lot of pests or diseases that homeowners have to worry about. Weed control is probably the most important, because they have such a thin leaf, they're

so spindly, weeds will compete with them. So we have to keep the weeds out. That's our most important thing.

>>Well let's put this dirt away and we'll talk a little more about some of the other root vegetables that are out there. How about beets, which is something…its good pickled.

>>Beets are really easy to grow. And of course, this is about the size you want it, you don't want it much bigger than that then it starts to get woody. So we want them even a little smaller than this is actually better. But we pull them, and we want to remember they're planted just like we plant any other vegetable, we put them in a row, put them down about, oh, anywhere from a half to a quarter of an inch deep, cover them over, and then let them grow.

>>And how long would you estimate…?

>>That takes about, oh, again with them, anywhere from 3-4 weeks once they're up. You'll see the tops. And pretty soon you'll be harvesting them.

>>We're really fond of radishes in our house. Looking for them, we add them to our salads. How easy are they to grow?

>>These are really easy to grow, and in fact, if we…this is the standard old red one, but there are some really nice ones that are long from Europe that have some nice, long radishes that are very, very tasty. But these are very easy to grow and very fast. So these are in a couple of weeks, take them out.

>>That's great. What about the turnip? That's less popular but still wonderful. If you haven't introduced it to your family, these are good.

>>This is an excellent crop, especially for areas where there is a cold and that, because it's a long season crop. It takes all summer. But what you can do is you leave them in the ground. Put a little compost over them or mulch in the fall, and just leave them there. What we used to do when I was a young man, young boy, we would leave them in the ground, and put a stake at the end of them. We'd come and dig them up, even in the frozen ground. Leave the stake at the end of the row and then come back and get some more. These are excellent in my opinion. A lot of people don't, as you say, try them.

>>And they're easy to store, you can leave them right in the ground!

>>Now what about bulb vegetables, and why do we call them bulb vegetables?

>>Because they're a bulb, if we take them we can get one of these nice big ones here. A bulb is if we take and cut this…

>>I'm going to make some room here, if that's okay. I love red onions, by the way. I notice you're not crying, so you've got a lot of experience with this.

>>Alright. A bulb is nothing more than a compressed plant. And so when we look at this, we have a little tiny area right here. That's the stem. And on that stem, each one of these reams, onion rings, is a leaf. And in the axle of that leaf is a little tiny bud. So in reality what this is when it goes to seed it just expands. So a bulb is a bud; compressed. And we're consuming a storage. This again is a storage organ. And so this is for survival of the plant.

>>What about leeks? Is that a bulb?

>>Leeks are a bulb. Okay we've got some leeks here. You can see this. This also is a bulb. This is the basal stem, with the roots coming out. And these are just modified leafs for storage here. Garlic is another one. And what we have with garlic, of course, is we have some little cloves that we can—and again—we buy the cloves and we buy them for planting, and that's what's planted is a clove. When we're going to plant that again.

>>Again, the whole layer, right? Very similar to the onions.

>>Just like the onion. The only difference is you'll notice the onion has a single skin around it with one bulb protecting it. Where if we look at the garlic, it has several little bulbs around and then a covering.

>>Would you consider onions a warm or a cold climate crop?

>>They actually can be planted as a cool season crop. But they grow in warm climates also. So they're kind of a plant that grows everywhere.

>>And this is the red variety. We also have yellow…

>>Here's the yellow.

>>Okay, and you know, I've always wondered whether they're perennial or annual…

>>Actually they're a biennial. So it takes two years. First year we get what we call…and this is what as we talk about planting…we get a little onion the first year, then we take that and we plant it the next year as a set. And that produces the big onion. And so, they're actually a biennial—two years. Actually two growing seasons in the ground.

>>Speaking of the ground, how about soil and fertilizer?

>>It likes a nice, loamy soil. Not much fertilizer, again. Because it's just leaves. One pound per 100 sq. feet will do. And so that takes care of it.

>>How about in terms of thinning? How close can we turn?

>>Okay, we like them about three inches apart, in row. And about a foot apart between rows, so we can get up and down the rows. If you want them closer and you can move around them, fine.

>>Now we talked a little bit about how to plant a potato. But how would we plant an onion?

>>Okay. Now, we plant the onion by using last year's little set.

>>And that comes every other year.

>>Yep. So we take this from these big ones, they can get little ones or they'll grow these just for one year and get a little set. So we'll use that. Or we can plant seed. Usually we plant the sets.

>>And then that would take…six weeks, eight weeks about?

>>Well no, it's going to take…and on onions there's an important thing to look at. If we look at these right here, it's a little scallion. The important thing is, size of the top here, the vegetative growth, the taller that is (and there's a day length sensitivity in onions). When day length reaches a certain point, they start to form a bulb. Now, when they form that bulb, the bigger this top is, the bigger the bulb. So onions are very site-specific. In other words, if you grow onions in the southern United States to bring them to the northern United States, you get little tiny onions. Where if you take the little tiny onions from up here, you never get the bulb because it never gets the right day length either. So these are very sensitive to that.

>>What about water sensitivity?

>>They're not as critical as a lot of plants. They can actually go quite dry. But we try to do the average of 7-10 days, keeping the soil moist down. And when it dries down to about an inch to two inches, we'll re-water.

>>Again, the challenge to me is they're underground. So how would we kind of know they are ripe and ready to harvest?

>>Okay. We can harvest them anytime, now. But what we really like is if you're going to get one like this where you're going to store it, you'll notice the top's dried down. So we grow them until this top falls over. And the reason we do that is if we were to harvest this while the top is still green, then we cut the top off, we put it in storage, it will start to grow again. If it's like this, it won't grow again. The other thing is that once it's nice and tight like this, there's molds that go down the leaves. When it's tight like this and it's formed, then it can't go down.

>>What about pests? Are there specific, or are there any pests brave enough to try to attack an onion?

>>Yeah, there's some onions. We have maggots. We have other insects that will attack them. Not many. It's disease that's the big problem. Disease like soft rot, pink rot. Things that will go in here and cause them to soften. But if we let it dry down like that, usually we don't have any problems.

>>Any challenges we need to be aware of if we're deciding to plant the onions that we haven't covered yet, what to watch for?

>>Just make sure you've got the variety that grows in your area, or you won't get a bulb, and we've had people do that before where they've bought seed from somewhere and brought the one they like, brought it to a new location and it hasn't grown.

>>Now you've brought up garlic, and we've talked about how they have their individual bulbs attached to it. Is this a warm or cold season plant?

>>it's actually can be planted, planted in the cooler season. But again, it will grow in the warm season. It's one of those that's kind of both.

>>Okay, how about the soil?

>>Soil has to be about the same as an onion. They don't need a really good soil, because remember, we've got a really shallow system that just spreads out, but this is almost always on top of the crown. So it's not really a problem. So the soil just has to have…if we can get 1-10 percent organic matter in it, have it so it's not full of rocks, then they'll really do well.

>>And just to review again, can we just remove one of the bulbs and plant that to get garlic?

>>Usually we want to buy it as a garlic clove for planting. Not a garlic from the store, because again we're not sure if this had a disease that can be in the clove itself just like the onion. And so we get some that are grown specifically for planting, and that's an important thing for us.

>>One thing I have heard about garlic is that it is sensitive to overwatering.

>>Yeah, it doesn't like to have a lot of water. So we have to watch how much water we put onto it. Keep it a little on the dry side.

>>And about how long would you estimate for it to reach maturity?

>>It takes six months. So it's a long growing season.

>>And how would we know they're ready?

>>They'll dry down. You can see, it's dried down, the top…

>>Similar to the onion.

>>Just like the onion. And then we cut them, it's been cut off after it's been dried down. But we want this nice, dry skin around it, because that again protects it against disease in storage.

>>Now you've talked a little bit about maggots actually eating onions and being one of the pests to watch for. What do we watch for our garlic?

>>Same insects will bother this one, and they will rot if we don't handle it.

>>Alright. How about special cautions with planting a garlic?

>>It's a little harder to grow. So we have to make sure that we don't plant it in a really wet soil. The soil has to be somewhat dry. But they'll usually do…most vegetables actually we can grow them anywhere with a little care.

>>How about leeks?

>>Okay, the leek is a lot longer in growing. It's big. And again, it likes a lot more moisture. It likes a higher humidity. So they don't do really well in a dry climate. So if you're in a climate where it's extremely dry, then they'll have some problems getting them to grow. But if you're in an area that has high humidity, rainfall and it's wet, they'll grow fine.

>>Well thank you so much for introducing us. Hopefully we'll try some new vegetables for those who haven't got those out to the kids. And we're almost out of time, but before we go, we want to review a few of the simple things that we can do to make sure we get the best harvest possible. First, be sure to keep burying your potatoes under plenty of soil to prevent them from turning green by exposure to sunlight. Next, to avoid cracking, be careful not to overwater your carrots. You showed us a great example of that. Also, be sure to plant the right variety of onion that is adapted to the day length of your area. And finally, remember, garlic likes consistent watering, but not too much and not too little. And that's about all the time we have for today. So for more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. Thanks to Frank Williams, and thank you for watching. And remember, everything is better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to grow fleshy fruited and cole crop vegetables. Whether you're an avid gardener, or just starting out, we'll discuss everything you need to know about fleshy fruited vegetables like tomatoes and peppers, and how to take those nutritious cole crop vegetables like cabbage from seed to your table. Be sure to tune in!

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>>Next on HomeGrown, we'll learn how to care for the soil in our vegetable gardens. Whether you're an avid gardener or you're just starting out, we'll cover all the basics from how to tell what type of soil you have, to how to amend it. And even learn how to make your own perfect soil. So stay tuned!

>>Welcome to HomeGrown! I'm Rebecca Cressman and today we're talking about how to work with the soil in our vegetable gardens. With me today, here at BYU's beautiful Terrace Garden, is Larry Sagers, Utah State University Extension Horticulture Specialist, a radio host and a newspaper columnist. Thank you so much for joining us today.
>>Thank you for the invitation!
>>Let's talk a little bit about the different types of soils that there are.
>>Well, of course there are lots of different kinds of components of the soil. But the three kinds of soil that most people would be familiar with are the three kinds of particles in soil are: sand particles, silt particles, and clay particles. And they make up the mineral fraction of the soil. So that's kind of the solid part of the soil. And that should comprise about 45 percent of your soil. Now there's a lot of difference between these three particles. You look at sand. Sand is very coarse. And if you actually put some between your fingers and rub it around, it feels very, very gritty. Silt is the intermediate kind of particle. And silt will feel kind of slick to you, as you rub your fingers across it, if you don't have any sand particles on there, it feels quite slick. And then the clay, once you wet this clay up, and if we put just a little water on this clay, we'll see that this becomes quite sticky. And so it actually will—and of course if you walk on a clay soil, it will stick to your shoes, stick to your fingers. So soils with a lot of clay in them become very, very sticky. Now ideally, we don't want just one of these kinds of particles. Each of them have advantages and disadvantages. And so if you have relatively equal amounts of sand and silt and clay, then you have what's called a loam soil. And that's what most gardeners would like, a mixture of some sand, some silt, and some clay.
>>So some sand, some silt, and some clay. They all work together to give you that ideal soil.
>>Right. Because the sand drains well. The clay holds the water and the minerals very well, and silt is intermediate between those two. So if you've got all three particles mixed together, then you're going to have a good soil.
>>So it's pretty rare for all of us to actually have in our home that perfect, loamy soil. What do we traditionally find at people's houses?
>>We usually find they either have too much sand, or they have too much clay. Now in parts of Utah, specifically, because we're in an old lake bed here, we tend to have a lot of silt in our soils. So if you're in the old Lake Bonneville area, you'll have a lot of silt. But most areas of the world, too sandy or too much clay. So we have to learn to work with that. Because we have what we have. When you bought your home, you probably didn't go check out the soil, you probably checked out, what does the home look like? What's the interior of the home and things. Although maybe you should have checked out the soil. You didn't.

>>Unless if you're a horticulture expert like you are, I'm assuming you're out there a little bit, checking things out.
>>But we have what we have. And you can't really change that. You have to just learn to modify that so you can grow your plants well.
>>Well what happens if we go out and we actually determine, okay, we have sandy soil. Or I have clay soil. Can we actually get this to a stage which is much more ideal?
>>You can. And the best advice I could give anyone is if you have a problem soil, don't learn to live with it. If you learn to live with it, then you're going to be frustrated your entire gardening life. If you learned, improve it. Now there's a lot of old spouse's tales, or myths out there of how to make your soil better. One is, if you've got too much clay, haul a few loads of sand in there and mix with it. If you do that, you get low grade cement! You need to learn a little bit about your soil and you need to realize that you can't modify all the soil in your growing area. So we concentrate on the soils that we're going to work the most, obviously our vegetable gardens and our flower beds. Our turf grass and things, we don't spend near as much time and effort trying to modify the soils in those areas, because we don't have to till them. We take care of them every single year. You're not out there trying to dig your carrots out of that and things. So it's not much of a problem there.
>>You identified the three major parts, silt, sand and clay. Three major kinds of soils. So what else do we find in soil or do we need to find in the ideal soil? For example, minerals?
>>Well, in terms of the mineral fractions, those are the three mineral fractions. Now an ideal soil would be 45 percent mineral fractions, and silt and clay. It would have 5 percent organic matter. We'll talk a little bit more about that in just a minute. But an ideal soil is also 25 percent air and 25 percent water. And that's what's going to allow your plants to grow well. We often don't pay enough attention to this air factor. But plant roots have to have oxygen. Every living cell needs oxygen. You and I breathe in and our bloodstream moves the oxygen to the portions of our bodies that are not near our lungs. Plants can't do that! The plant roots have to have oxygen. So even if you've got a large tree, most of those absorbing roots are up near the soil surface where they can get the oxygen because that's what they need to respire. So good aeration is important. Don't go out and work your soil when it's wet. Don't mix sand and clay because that makes low-grade concrete. Don't compact your soil and don't till it when it's wet. Always try and keep it nice and loose and fluffy.
>>So if we keep it nice and loose and fluffy, it will already be able to get air? Or you don't actually go through and actually poke holes in the soils.
>>You don't have to do anything like that. We do with turf grass and things. But that's one of the reasons why we till in the spring. To kind of mix that up and get some oxygen in there. But things like raised beds and container growing and things, and problem soils will help us to increase the oxygen content of that soil.
>>What about organic material? What exactly is it? This is some organic matter. This is some others?
>>Well, you know, organic matter is anything that was once living. And so we have lots of different kinds of organic matter. Here we have peat moss with some other pearlite materials in it. But peat moss was once a living plant that has decomposed into peat moss.

>>Very light.
>>Yes. And very light and fluffy. But one thing you want to remember is that peat moss holds water very much like a sponge. If we put a little water on there, it just absorbs right in there.
>>Is that good?
>>That's good unless you're mixing it with something else that absorbs and holds water. So if you've got a clay soil, then you'd be wanting to put something a little coarser in. Something with a little bit more aggregation. This is actually a blended, composted steer manure product.
>>Mm-hmm. You're right; I'm smelling it, just in case.
>>But again, if it's fully composted, it should smell like rich, brown earth. It should not have that manure-type smell that you would have. So this is something that you could add, but the thing you want to do is to add organic matter. A minimum of two inches of organic matter. And keep adding that year after year after year. Almost all of our vegetables are annuals. So we get that opportunity to go in every year and improve that soil and make it better and better and better.
>>Which is important to know, because I think some of us think all we have to do is fertilize every year. But we actually have to add new, organic material. We've got some big chunks of bark here. You've showed us some of this manure and peat moss. Are there any cautions we need to watch out for, if we're going ahead and going to add manure?
>>Well the thing you have to remember about manure is, it depends what the animal eats. If the animal eats a lot of weed seeds, that passes through their system, and guess who has to pull the weeds? You do. So you want to get something that's been hot composted or somehow treated so those weed seeds will not be viable. And if that same processes—I mean if it goes through that same process—it will also kill any diseases that might be in that plant.
>>So avoid using manure, for example, from your pet, your pet dog or something like that?
>>Dog and cat manure. There are, in particularly in a lot of areas of the world, parasites that can live in that animal that you would not want to use that. So probably the larger animals. Horse manure, deer manure and a lot of places use a lot of poultry manure. But again, if it's hot composted, any pathogens that might be in there would be destroyed in that composting process.
>>What do you mean by hot composting?
>>Hot composting is when you get that temperature up to at least 140 degrees. We don't have to sterilize it. That's a common misconception that we have to go and sterilize it. We don't want to sterilize it because there are beneficial organisms in the soil. But we want to get it up to hot enough so that the weed seeds will be killed and any pathogenic organisms that might be in there will also be killed. Now I'm not talking about pathogens that would just only hurt us, but there are also pathogens that would hurt your plants if you planted them and had some diseases in that compost.
>>Now one of the things my father-in-law loved to do was make his own compost. And it does heat up on its own. Do you recommend that we try that?
>>Homemade compost is wonderful. The issue most people are going to find is they don't have enough material to make enough compost. Now if you live in an older,

residential area and you can go around and gather up everybody's leaves and you're producing a lot of stuff, then you need about five bushels of material to make really good compost. And so most of us only have that much materials in the fall when we're raking up the leaves, cleaning out the vegetable gardens and things. But composting is a great way to recycle the nutrients back into the garden, but also to improve your soil. There's nothing that you can do better for your soil than add organic matter.
>>And keeping with the compost idea, you talked about getting leaves from your neighbors, especially in the fall. What are some of the essential ingredients if we want to make our compost, what should we be looking for? Is it grass cuttings, leaves, what do you recommend?
>>Well, you want something, and the more woody it is, the longer it's going to last in your soil. So if you have access to wood shavings or sawdust, or if you want to take a little bit longer, even some of the chip materials like this, that you would get if you cut down a tree and have it chipped up or you can buy this kind of material. But grass clippings, high in nutrients but very low in solid matter. It's very much like composting lettuce. Take a head of lettuce and let it sit out for a day or two, then you can hardly see anything left there, then you compost that, so you don't get a lot of material out of that is going to give you permanent long-term soil improvement. So one of the things is to use the grass clippings as a nitrogen source, but add something that's got a little bit more cellulose or a carbon material in there. And leaves are ideal. You know, composting materials have to have three things. Number one, they have to be abundant. Number two, they have to be cheap, and number three, weed free. And almost all the leave, by the time they drop off in the fall, there's no seeds on the tree. So you've got weed-free. You've got an abundance, and the price is right…it's free!
>>Well some of the things I've seen in people's backyards include tarps that are used, where you can actually buy some contraptions to make your own compost. Are those actually helpful in being a little bit more fruitful? Even barrels.
>>They all work well. The thing you have to remember is that you have to have oxygen in that compost to work. So those tumbling barrels, that's to get the oxygen in there so it will break down. You also have to have sufficient moisture, so that's what the garden hose is for. If it dries out, it should be about the consistency or the feel of a sponge after you've wet it down and kind of rung it out. And so it should transfer a little moisture to your hand if you squeeze it. And then the last thing you probably need, if you're using something that's high in carbon, is a little bit of nitrogen fertilizer. The brown materials are carbon, the green materials are nitrogen. So in the fall if you don't have a lot of grass clippings and things in there, add a handful or two of nitrogen fertilizer, ammonium sulfate, ammonium nitrate. Sprinkle that in there, turn it in, and that will help break it down faster.
>>You talked about if we get the barrel, it's rolling, and that adds some air to it. What if we don't have the barrel? How often should we get in there in that compost pile and rotate it to get the air in?
>>Oh, once every week or two. Just take your digging fork out and turn it over. Sometimes people will build a series of three bins and they'll just throw it from one bin to the next bin to the next bin. I don't know how your father-in-law does it. But that's just an easy way to keep it mixed up. Sometimes if you see big commercial operations, they have machines that turn it to introduce the oxygen back in there.

>>You mentioned my father-in-law again. One of the things he does…again, he's a depression era…so he hates to waste scraps. And he'll put in meat scraps, he'll put in eggshells. Are there any cautions when it comes to that?
>>Well, those are two things that I would not put in. But I live out in the country, and if I put eggs in there, I find skunks coming into my compost, and that's not what I like.
>>They're not invited!
>>If I put meat scraps in, it brings in the raccoons and things. So I wouldn't put in eggshells and meats and lots of things. But all of the trimmings off your salads, everything like that, your grass clippings, all that stuff can go in your compost and make a long-term soil improvement.
>>I wouldn't have thought that skunks would have been the worry for me when it came to compost. Let's talk a little bit about fertilizers. Because it's so essential for us to have the right ones. And we've got two samples here, small bags, sometimes fertilizers are obviously coming in bigger bags. But when we are shopping for fertilizers, what are we actually looking for to make sure we get the right kind?
>>Well, I know in previous episodes, you talked about soil testing, and we're going to do some more on soil testing. That's always a good idea to establish a baseline. What does your soil really need? And different gardens will need different kinds of fertilizer elements, and different crops will need fertilizer elements.
>>So just like there are different types of soil in our own gardens, there will be different nutritional needs, different fertilizer needs for our gardens.
>>That's exactly right. And if we look, we'll always see three numbers on a bag of fertilizer. Now this is a 12-10-5. That means that it has 12 percent nitrogen, 10 parts phosphorus, and 5 parts potassium. And so that is considered to be a complete fertilizer. Now that's a legal definition. That's not everything that plant needs to grow, but if you have a zero in any one of those, then that would be considered an incomplete kind of fertilizer. So this is a complete fertilizer. This is an all-purpose tomato and vegetable food. It has something in every category. Now if you are fertilizing, say, your lettuce or your lawn or something where you were trying to promote a lot of green growth, you would look for something that was higher on this first number. If you were fertilizing, say, your tomatoes, you would look for something that's higher on the second number or phosphorous. Because if you put too much nitrogen on your tomatoes, you're going to get great, big huge tomato vines and no fruit. And nobody wants fruitless tomatoes! I mean, there's no market for tomato vines.
>>I know, I think I've had some of those. For just a moment, I know we talked about how in other episodes we're going to talk some more about testing our soil, but basically this may be a new idea for anyone. So if someone wants to find out what their soil has or what it needs, what do you recommend in terms of getting a good picture of what they've got in their hand?
>>I recommend they go to a commercial or a university soil test lab. Most of the home-type soil tests, particularly in the intermountain west, are not very accurate. And so if you use them, you may be off a point or two on pH, which will make a tremendous amount of difference, because the pH is a logarithmic scale, you'd be off 100-fold if you were off two points on the pH scale. So you need to get an accurate measurement. It's going to cost you about the price of a nice shrub. So before you spend a lot of money

putting in plants that don't work or getting a lot of frustration trying to grow stuff that will not grow in your area, get a soil test done. It's just cheap insurance.
>>Makes a difference between a small zucchini and a big zucchini. Or a small tomato and a big tomato. We won't talk too much more about zucchinis. Well speaking of the soil testing service, we caught up with new home owner, Danelle Bates. And we followed her as she took advantage of the university extension office soil testing service, and tested the soil in her new backyard right before planting her vegetable garden. Let's take a look.

>>It's a wonderful neighborhood. We've been here about two months. We've been working really hard to get the landscaping done, and our last project is going to be our vegetable garden. Well the children have decided that they each want to plant their favorite vegetable. We have several planting tomatoes, a few planting onions. Some beets, some corn, some radishes. It's their first opportunity to grow a garden and I want them to have a good time, I want them to be successful. Being new to the area, we decided that we need to talk to some gardeners and see how the soil is and they told us that what we need to do is contact the university extension service and go and get our soil tested.
>>You know, right now the soil seems to me to have a lot of clay in it. It's really chunky and coarse, and when you hit it with water, it just turns into cement. So I'm hoping the extension service office can give us some idea of what we need to do to improve the soil.
>>HI, yes, University extension service. If I need to bring some soil in and have you test it, what's the process? Okay, so I need to come in and get a packet? Terrific, thank you. Buh-bye.

>>Hi, how can I help you?
>>Hi, you can. I have heard that I can come here and get my soil tested.
>>Yes you can. I do have a kit I can give you. The gist of this is you put the soil in the bag, the bag in the box, and then you're going to mail that off to the lab. There are two standard charges, one is more comprehensive than the other, but you can read through that and see what it each involves. And then you fill out this side of the form, and you're going to mail this separately with your check to the lab, and you should get your results in about a week and a half to two weeks.
>>Okay, thank you so much. That's it.
>>If you have any questions, give us a call.
>>Great, see you later.

>>Hi, can I help you?
>>You can, I need to discuss my soil results.
>>Oh, that would be Adrian Hempton, and yes he's available right now.
>>Oh hello. How are you?
>>Danelle Bates.
>>Danelle, glad to have you here. I'm Adrian Hempton and what's on your mind today?
>>Oh, I have this soil report that I got and I was a little confused. So I was hoping you could talk to me about it. I'm a first-time gardener. Maybe just tell me what all these numbers mean, and then let me know what I need to do to make it better.

>>Let's go right down here to organic matter. What was your organic matter?
>> 0.2
>> 0.2. That is low, very, very low. But common for this area. In some other parts of the world, they have high, as high as 5.2 or maybe even higher because there's more trees in various parts of the world. And the rest of us, now phosphorous and nitrogen and potassium, those are the three basic macro-elements.
>>Those are the big ones?
>>That's the one that the plants like the most.
>>Okay.
>>So we have to look at those pretty close to see where they are. Then the zinc is also low. And the iron is adequate. And the copper, magnesium, these are all called micronutrients. Meaning they need very little.
>>So it's just like vitamins for your soil?
>>Yes. That is needed. You can tell by the color of the plant, by the color of the veins, which of these elements are missing. Or sometimes even the shape of the leaf.

>>And then, if you would like to, I'll tell you about this little do-it-yourself soil test where you find out the texture. You take a cup of soil, which is about what you've set in your bag when you set it in. Then you stick it in the bottom and you fill it to about right here with water, and then you just shake this up really good in the afternoon, and then you set it down very quickly. Because if you have sand…
>>Upside down?
>>Right side up.
>>Oh, okay.
>>So you shake it, and then set it down very quickly so this will come down in layers. And the heavy stuff is the sand. You don't have any big rocks. You have big rocks?
>>No.
>>If you have bigger rocks or bigger sand particles, they would go to the bottom, and then the heavy sand, the light sand, and then you can see these layers right here. This is all one layer. There's a layer here, and a very thin layer on top. That tells you what is in your soil, and you may want to do that in relationship with this too. Okay? Well thank you very much.
>>Thank you so much, this has been really, really helpful!
>>We hope you enjoy that and have a very productive year, okay? Alright.
>>See you later.
>>Bye-bye.

>>My experience with the university extension service was great. We have such high hopes and they really met our expectations. It was wonderful! When they told us that our soil was sand and not actually clay, we were really surprised. So now we've learned what we need to do. We're going to add some fertilizers, some organic material, some micro-nutrients. Things that will help our garden be successful.

>>That's such an interesting work that they're doing!
>>It is, and of course, that's the key to getting people to get their gardens more productive is to know what you need to put on there to make them better and better.

>>So nice to see that going around the world as well. Well, good for them. Now before we go, there are a few simple things that you can do to have healthy and productive soil in our vegetable garden. First, best way to mend your soil is with basic organic material. We gave you some examples of that. So add it to your soil every season.
>>Every season!
>>Alright. Next, if you haven't already done it, remember to get your soil tested. You can't get the best yield out of your soil until you know what you're working with!
>>And if you don't need to know what to add, because you don't want to add stuff you don't need.
>>Very expensive. Also, be sure to only add fertilizers as you need them, fertilizer can become toxic to plants if it's applied too heavily, and it's very expensive! You said the cost of them shrub…
>>Cost of a shrub for a soil test, but if you put the wrong stuff on, you may spend years trying to correct that!
>>And finally, organic mulching is a great way to protect your soil from the elements, and it also continually improves your soil. Well, we're out of time but for more information for this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. Thanks to Larry Seders, thank you for watching, and remember: Everything is better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, we're talking about all the things gardeners hate. Weeds, diseases and pests! We'll discuss how to recognize a problem, how to diagnose it and where to go for help. We'll also discuss organic and inorganic solutions to common problems. Be sure to check it out!

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>>Nothing beats the flavor and aroma of fresh herbs! Whether in our garden or in the kitchen, fresh herbs can't help but enliven the senses, and it turns an average, everyday meal into a gourmet treat! And on today's show, we have a very special treat. We're headed to Paris, France, to learn from a gourmet chef how to make the most out of those fresh herbs. Hi, I'm Rebecca Cressman, and you're watching HomeGrown.

>>Welcome to HomeGrown! The show that brings you all the dirt on vegetable gardening. Today we're all about fresh herbs. And to learn the best way to use those herbs in the kitchen, we decided to head to one place that we can think of that's most known for its use of herbs and for cooking in general. And that is, of course, Paris France! Our very own Miriam Casos had that tough assignment of traveling to Paris and meeting up with celebrated gourmet chef and educator, Samira Hradsky, to learn from all her tricks and tips for using those fresh herbs. Let's take a look.

>>So you said there are three things I need to look for when I shop for herbs? You said it has to look; I have to pay attention to the appearance, the fragrance, and the texture.
>>Yes, exactly. This is the tarragon. So when you look at it, just look how green. It's absolutely beautiful, brilliant. You can't even see one brown leaf on it, you see? Because it looks new, see? Not even one brown leaf on it. I mean, when it starts getting like this, for example, like a little brownish here, that's when it's really starting to get old. So if it was old, all of it, especially at the end, would look like that. This is one of the herbs that you have to rub here. See? You don't smell much, but when you rub it with your hand…
>>That's when you smell?
>>Smell now.
>>Yes, indeed.
>>See? Isn't that beautiful? Like licorice, kind of a smell. It's green, it's soft, if it was really tough and it wasn't soft, then it would be old.
>>Look at the parsley here. It looks so green, it's absolutely beautiful. It's standing like a bouquet of flowers. This is the flat-leaf parsley or the Italian parsley. In the United States we are more sort of used to see the frizzy one. Here, you will be used to seeing more of this flat-leaf or Italian parsley. Now parsley. When you touch it, and if it's really harsh, rough, it means it's old. It's been sitting there before they picked it for a long time. It's soft, you see how nice and soft, like silk! You know? Smooth, like silk. Tender. That's really good parsley. Green, nice green. You see how beautiful green? Once the parsley starts getting too yellow, very yellow, then it's old. It has been sitting there for awhile. And you really don't need that.
>>Right. And how will they smell?
>>Once you start picking it and sniffing it, you will have the smell, because you're releasing the aroma, the juice. But it's been picked already, so the juice from the bottom here, when they picked it, has already been released. So to really get it, you have to start chopping it, or again, rubbing it.

>>Or I can rub a leaf?
>>Ah, smell that now.
>>Oh yeah.
>>So this is mint right here?
>>That's mint. And you can tell that from just smelling it, right? The aroma.
>>Very strong, you can't miss it.
>>And you can see that it's all fresh, it just came, and look how standing, see? Now if this was old, it would, again, would be sort of falling apart.
>>The leaves, probably the stems would be falling.
>>Exactly. And you see? Feel here. It's really soft. It's not too harsh. Because sometimes you buy mint, and the leaves are so tough, so off, because it's been sitting, standing there for too long before they picked it up. So it's much better to pick it up when it's just starting to be about, let's say, ten inches like this? Or even shorter, start picking it. And if you want it to grow when I used to plant it, I would snip the edge here, so it will sprout two more leaves and it would go two directions.
>>That's a good tip!
>>And the leaves are not too huge, too large and too off.
>>Oh okay, so it has to be a regular size?
>>Yes, smaller like this. You see, it's really like a leaf of a little rose, kind of. You know? Now…aneth in French, I'm sorry if I refer it to it, I'm so used to saying aneth, the dill…
>>Dill.
>>Aneth comes from the anise and it has that anise kind of smell to it. So if you take it and rub it a little bit. Ah, smell.
>>Oh yeah, it smells a little bit. And the texture, it should be soft again?
>>It's always soft, it has to be. Even when it's old, it will be soft, because it's a very fragile leaf. You see how fragile? Look how the leaf, it's very thin, it's very fragile. So even when it's old, it will still look and feel a little soft because it's a very fragile leaf.
>>This is sage.
>>Wow, it's beautiful.
>>When it's really—this one like this leaf—look, when it starts getting older, it starts getting… it starts to fold and curl. And look at the difference in colors.
>>Oh yeah.
>>If we rub it, you can still smell the sage smell. This would be stronger.
>>These would be stronger? Let's see.
>>It's much fresher and stronger.
>>Oh yeah, much stronger!
>>You see, much stronger, much fresher. I find sage very pretty.
>>It is very pretty.
>>And it has a sort of rough…
>>A silky texture.
>>But a little bit like a velvet, a velvety, a velvety texture. And I like that, I like that velvety texture.
>>And it seems to be pretty strong leaves.
>>It's a dark leaf. It's firm, it's tough.
>>So coriander, would you call cilantro, right?

>>It's coriander, it's called cilantro, or Chinese parsley. These, when you see Chinese parsley, cilantro, it is fresh coriander. Some people prefer to use coriander when it's dry, for the seeds. Some people like to use that to say coriander seeds, and when it comes to the fresh, they say cilantro. When it's nice and green, and when it's fresh it's green, it's beautiful. And you can smell it.
>>It's a very strong smell.
>>It's a strong smell. And I'm picking here the bad leaves. You see? They have spots. They're turning yellow. Okay? Look at the spots. Even though it could be green and still have spots, which means they've given it too much water. You know, when it gets too much water, it starts getting spotty. But when it gets old, it starts getting yellow. Alright, basil.
>>Okay, this is basil right here.
>>That's a basil. Look how beautiful, green, perfect the leaves are. They're wonderful.
>>And they have some pretty long and big leaves.
>>Big leaves, and it's sort of like it has lines, you know? It's like all the lines of beauty. And when you buy it here, I like buying it…when you buy it, try to buy it with roots. Because if it has roots, you can put it in water, and it's like a flower. You sort of have it in water and it's dancing right then. It's absolutely beautiful. And it stays for a few days in water like that. Now basil, you really…it's the most fragile herb that I can think of. It is so fragile …it's thin, and it's very fragile, and it has a very short life, if you may. So that's why get it in roots so you can have it still alive. It needs to be alive, once you pick it up. And put it aside. It will start getting dark. You see, when it starts getting dark, look at this little teeny leaf. If you handle it, if I handle it with my hand, it will immediately start getting darker. So be careful when you're handling basil.
>>So don't touch it too much?
>>Don't touch too much. Because you don't even have to rub it to get the smell. The smell is right there, the aroma is right there. And the greener, the better!
>>How would you describe the smell of the basil?
>>Uh, the word that comes to my mind when I smell it is "sweet." Very sweet. Rosemary, this one is starting to get old. And that's dry. You see, when rosemary starts drying, it starts getting darker in color, not…
>>Brownish.
>>Exactly, it's brownish, not greenish. You see the difference between this?
>>Oh yes, definitely.
>>This is getting drier.
>>It's like a different plant.
>>Ah, it's like a different plant, you see?
>>Alright. So when I buy rosemary, I should look for, of course, it has to be standing up firm, green, leafy and soft. Very smooth. And the smell. And we need to rub it. You can smell it right away.
>>You can smell it, but if you rub it.
>>It doesn't smell…it's not as strong as the other herbs.
>>It's even sweeter than basil.
>>So what do we have here?
>>This is thyme, okay? And before we start, we thought we'd say anything about it. Just do this and smell it. Smell now.

>>Mmm, it's very strong.
>>Isn't that beautiful? The fresher it is, the stronger the smell it's going to come. And that's really with any herb. The fresher, the more pungent the aroma is going to be. So always, that's why we look for the fresher, because we want to infuse as much of that taste, the aroma in what we are making.
>>And it's very soft.
>>It's extremely soft. It's very, very teeny. It's teeny, teeny, teeny. Smaller than a smaller aunt, each leaf.
>>The smallest leaves ever.
>>And this is one kind of thyme. As it gets older, these will start…look it's getting older. Starts getting drier and drier, you know? As it dries.
>>So when I buy thyme, I need to look for pale-ish green, soft texture. And the aroma. And the smell, it has to be fresh and strong.
>>Okay, well that was great. I'm really excited to go to your kitchen and for you to show me how to use them.
>>Oh great, let's go.

>>Okay so now here we are in your beautiful kitchen with all the herbs that we purchased this morning. And now we'd like to know how you keep it fresh.
>>First of all, with all these herbs, don't mush it until you are ready to use it. I prefer using the fresh herbs. If I cannot find a fresh herb, then I will use the dried. The purpose of cleaning these herbs, first of all, to take any bad leaves. And also to make room for the water, so when I take the glass of water, right here, and you cooked it, you want to make sure that not a lot of it in the bottom not touching the water because it will get wilted, and it will wilt and it will get bad. It will look really yucky. So this, I can keep it for a couple of days like that. The mint, I can keep just like that. It will be nice, it will stay erect, it will not go bad. As long as you change the water, it's like you do it for a flower. When you have roses, you change the water, you keep it clean, you trim them. The same thing you do with your herbs, you know? Be nice, be gentle and kind to your herbs. They will be nice to you and they will last longer. Now, if I want to keep them in the fridge for, like, say longer than a couple of days, for like a week or so, I will clean them. Just take the bad ones, the dark ones, you know, just take all of that, and then what you do is you take a paper towel…and you roll it, you roll it nicely. Okay?
>>So use a paper towel?
>>Paper towel, not wet, dry. Because it will absorb the moisture and then you take a Ziploc bag, okay? Put it in and then that goes for parsley, for the coriander, for the dill, okay?
>>So for all the herbs, it's the same technique?
>>Except for the basil and I'll show you and tell you why. Okay, when we get to the basil. See, what I'm doing here, flattening it and rolling it. Why? To take the air out.
>>So it has to be…
>>Airtight. Yeah. And then go ahead…see, there's no air.
>>Oh yeah.
>>See? The air is gone. Then I put it in the vegetable and fruit drawer in your fridge. I can assure you this will stay green and nice for a week like that.

>>That's good.
>>Okay? And that's what I do. So this is for the mint.
>>Now, we come to thyme. And the way I buy it here, as you saw in the market, it comes with the roots. Just put it in the water, and here. If I keep it like this, it's fresh, it's nice and the smell always, it's fantastic, the smell will always be nice.
>>And this is good for how many days, if you keep it here?
>>I keep it like this for a week. I don't even have to wrap it in paper towels and put it in here. As long as it has the root, yes, it's tougher because it's tougher. You see? But as it gets older, look what happens, there's no green leafs anymore. It becomes dry and they start falling. So if I dry this to keep it as a dry herb, look at how the leaves are falling, so I can get rid of all the dried leaves. And we have basil now. And again, I buy it with the roots, so all I have to do now, take it and put it in water here. And it's my flower. And it's full.
>>It is very pretty!
>>Yeah, it's a very beautiful—it's sweet and fragile. I don't wrap it in paper towels and put it in a Ziploc bag. It will get brown immediately. It needs to breathe. If I want to keep it, sometimes if I want to keep it for…I advise that basil, you pick or you snip, you immediately use. Don't let it sit for a long time, because if it starts getting…it's very fragile, it doesn't have longevity there. It really doesn't.
>>Not ideal for storage, then?
>>No. I can keep it for up to three days.
>>Just three days?
>>For a couple of days in here, if it's with the roots. It's with the roots, you will get much longer life from it. If it's not, what I do is I take a Ziploc bag and I make holes in it. I make holes. And put it in with no paper towels. Put that if it doesn't have the roots. Make the holes, and put it in when it's dry—no water. And leave it at room temperature. It will stay for three days, no problem. It needs to air, it needs that air. And the other ones we took the air out, but this one they need the air.
>>So this is a special one? A special treatment.
>>Very fragile, very special and it requires a special treatment.
>>And now I would like to know how you prepare and clean them.
>>Okay, as you see here, we'll start with the mint. I started doing part of it when I was showing earlier, is we took the leaves from the bottom there, and here I haven't because I wanted to show you how, okay you see one that is dark and whatever, it doesn't look nice. So all you have to do is take them, and then, clean them like that.
>>Can I try one?
>>Yes, please. You know, as if you were cleaning, you know, how you do the rose? Exactly. When you do the roses. And mint is absolutely like this. It's okay, because I'm going to use them for chopping right away. Anything that looks dark like this, it's old, I throw it away. Now if I want to wash it then take the leaves, I want to take just the leaves. Then when you get to the end, just snip that like that, okay? So that's what we do, we take all the leaves, okay? And that, okay? And then what we do is let's say we finish, that's all we need. We take it and run the water. Just gently, gently. And then, there. It's ready. And if you want to leave it a little bit, you can just take it and let it dry a little bit before you use it. And there are really two ways of cleaning parsley. You can take it and do like I did with the mint, but if it's really dirty because sometimes it comes

and it has a lot of sand in it. So what you need to do, I do sometimes, for example, I'll take just the leaves, okay? And those that are the tough, rough kind of stems you don't need. You just take…you see there are two here? Okay. One here. So I just take that, and go and take that.
>>So you take the tops of those, the ends of those…
>>But not just the leaves, I take the little bit of the soft stems, okay? These are soft so I take them like that.
>>And why is that?
>>Because these are too tough. Okay? And if I want to chop them and put them in my salad, they're really tough to chew, even. I save them sometimes because there's a lot of aroma in them. I save them sometimes I put them with soups, you know, with broth, when you're making soup.
>>So you take the thinner part of the stem, not the thicker part?
>>Right, and then you chop it very fine. Then I wash it. And like I have here, it's already chopped. And what I did was I put water and all the sand and the dirt goes to the bottom. Then I skim that and squeeze it a little bit with my hands, and then I wash it again a couple of times. And after I chop it. You can do that, it's much easier. I find it easier for me, you don't have to waste any effort because what you do is take it back to your sink, wash your hands, take all the chopped parsley, all of it, and then…
>>Oh, perfect! That way you won't waste any of the parsley.
>>So all the bag, all the stuff, the dirt is in the bag. And same here. See? And then, I do this, I don't even have to touch it with my hand. And I go, there.
>>If you ever want to dry all these herbs, and you don't have a salad spinner and you don't want to go buy one, the best way, the way my mother used to do it, is, there…like that. Like that.
>>Oh, great. That's very practical, yes.
>>See the water? It absorbed the water, and look, see all the water? All the water, the towel is wet now. All the water is…
>>You could probably use another towel.
>>Yeah, you could put a double towel. Or you can use it from one corner. See? Now it's wet here too. So that's how you can dry it. So now it's dry and we can use it.
>>The way I clean dill, I take them one by one like that, line them all up, okay? Like this. And then I go to a bowl of water, and just have a bowl of water. And you know, I don't clean them until I'm…because they don't really take a lot of dirt and sand in them. They're very fine.
>>So it's easier than the parsley.
>>Exactly, it's much easier, because they're very fine. Nothing will stick or stay in them. It's very, very, very fragile. So now, we move into that sage. And I put here that dry form. I bought some a couple of weeks ago. And it gets grey-ish, more white. To wash it the same way we did with some water, let the water run on it. And with a bowl of water, have it and then shake it like this, okay? And then you have it ready to use. And when you're using what you need…
>>Just the leaves, no stems.
>>The leaves. And then you chop it, very, very fine. But don't use a lot of it, it's a very strong herb, and a little bit of it would do. Now if I want to cook with thyme, all I have to do, I don't even have to take the leaves, you see? I will, if I want to take some for

cooking, I just snip some like that. I take a bunch of them, take it like that and then get my water… It's really dirty, it has a lot of dirt because you have it with the roots, you see?
>>So you probably have to wash it more often more times.
>>Exactly, yeah. When I wash it like that, I don't take the leaves because it's tedious, it takes a long time. As I clean it—it's clean—I take it the way it is, tie it and put it in your dish. And then when you come out, when it's done, you pick it up. There will be no leaves. All the leaves have fallen into your dish. And that's what you wanted.
>>So you don't have to take the leaves out…
>>You don't have to take leaves, you don't have to chop, you don't have to go through all that trouble.
>>Basil, wash it only just before using. And again, what we use is we use the leaves. We take the leaves, see? Suppose I'm going to use this.
>>Just the leaves, no stems.
>>The leaves, not the stems. Here. Here, there…and there. And that, I throw away. I have no use for it. And this, after it's washed, then I'm going to use this. Now, some recipes tell you decorate or use with chiffonade. Cut it chiffonade style.
>>What's chiffonade?
>>Aha, good question! You line up your basil like that. Alright? Take those little stems, roll it, you know? And then get a cutting board and a knife. I'm going to show you how you chiffonade it. And then see? I rolled it. I lined them up into both each other. And then roll it, and then very…then see? Basil, when I cook with that, I don't really let it boil or cook. After I turn off all my sauce, like the tomato sauce we're making for the eggplant parmesan, I will not put it and cook it with it. I will turn off the stove while the tomato sauce is still very hot, and I will add that chopped basil to it.
>>Just to add the final flavor.
>>Right. So the infusion comes from the little heat, but it's not boiling to the point where you're killing it and it's dissolving into your dish.
>>And because it is a sensitive one, you said it is the most sensitive. So that's a good thing to remember.
>>Correct. Very, very correct. Yeah. When you want to use rosemary, you just take those leaves, you know? And then you chop them and use them for sauces again. I use a lot of them, I put a lot of them when I'm going to make potatoes, I cut the potatoes very fine and just mix this with some garlic, a little bit of milk and salt and pepper and put them over the sliced potatoes and in the oven. It is absolutely delicious. And you would love it. I always like to pick the longest ones. Why? Because this is a dry, you see how tough it is? It's very tough. I take that and use that as a skewer to put shrimp, scallops seafood, little pieces of fish, and grill them. Your seafood will never taste the same. You will be so surprised how good it tastes. Because all that aroma that comes from the rosemary, it's sort of infused in your seafood.

>>I just love Paris, it's so beautiful! Now, before we go, let's just review a few of the simple things we can do to make sure we successfully use those herbs. First, when buying the fresh herbs, remember the three senses: sight, smell and touch! Next, if you want to store your fresh herbs for longer than a few days, roll them in that paper towel, seal them in a Ziploc bag, and then place them in the refrigerator. Also, remember that

basil is the most delicate of herbs, handle it with care, just like you would a flower. And finally, be sure not to add your fresh herbs to your dish until the very last minute, and that will preserve their flavor. And that's all the time we have for today. But for more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. Thank you for watching, and remember, everything is better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to care for the soil in our vegetable gardens. Whether you're an avid gardener or just starting out, we'll cover all the basics, from how to tell what type of soil you have, and how to mend it. And even learn how to make your own perfect soil! Be sure to tune in!

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>>Next on HomeGrown, we'll learn how to plan and plant a vegetable garden. We'll talk about all the basics, from selecting just the right vegetables, to starting your own transplants indoors. And we'll share some special tips on planting your garden that are sure to help you cultivate your best garden yet. So stay tuned!

>>Welcome to HomeGrown, I'm Rebecca Cressman and today we're talking about how to plan and plant a vegetable garden. With me today is Dr. Frank Williams, a professor of plant and animal sciences at Brigham Young University, and an avid gardener as well. Thank you for joining me today, Frank. Well today we're going to start a little bit with learning how to plan a garden. What should we be looking for?
>>Well, first of all, you want to decide what you really want to eat. Don't plant something you're not going to eat, except sometimes if we take and plant just a little bit of something our children don't like, but then plant it, let it be their garden, you'll find they'll actually eat something they don't like, and they may develop a taste for it.
>>What about cool and warm season crops? How does that affect things?
>>Well, warm and cool season crops, primarily we're talking about something that determines when we plant. So they can plant a warm season crap and we can plant a cool season crop in the same area, it's just when are we going to plant those?
>>And we have a lot of examples here, so let's take a look at some of the cold season crops and some of the warm season crops.
>>We have some. Tomatoes, warm season. They like warm, in other words we plant them after frost. Onion, that's a cool season—more or less. We plant that early, before the frost season's over. Cucumbers…
>>I didn't know what that was, actually.
>>That's a European cucumber. Skinless, seedless. And that's a warm season crop. We plant that after all the chance of frost is over. So we'll have many of them. All of the squashes would be warm season crop. Carrots, radishes, cabbage, broccoli, brussel sprouts. All cool season crops, planted before the warm temperatures.
>>Well you mentioned frost. I grew up in a climate that never had frost. So how does that determine? If we live in one of those tropical climates or warm climates, how does that affect our crop?
>>Usually what we look at is, again, when is the coolest temperatures, when are the warmest temperatures. Now a lot of places have to look at if it's the wet season or the dry season. Usually we're going to plan tin the drier season so that our crops don't rot. But we have to have some moisture.
>>As we move into a new home or we have a home that's been built and we're ready to put a garden in or maybe we're in an apartment. How do we determine, okay, what's the best place in a house, or in the yard to put the garden in?
>>The very best place is always where the greatest amount of sun comes. So sun's number one. We try to stay away from any structures as best we can. And so try and get it out where it has air movement, where it has great sunlight, and that's where our garden will be the most successful.

>>There are so many different plants, but how—off the top of your head—what plants need more sun and maybe some that can go with partial sun?
>>Okay, all of the fruit vegetables, those vegetables where we eat the fruit, going to need more sunlight. All of those where we eat the leaves and part of the plant, less sunlight. So if we look at lettuce, spinach, Swiss chard, those will take 4-6 hours of sunlight, and they will survive. Where we're eating just the leaves. Now it's important which way we run the rows. The rows should run north and south, if at all possible. Because that gives us the greatest interception of sunlight. We get sunlight in the morning and it goes across the plant. Where if we run them east and west, then we just get one side of the plant gets the predominance of sunlight, and the other one does not.
>>What about air? Is air circulation important?
>>Air circulation is very important to us. And so we don't like to have structures that stop air movement. Because a lot of these vegetables: tomatoes, peppers, all of them will start to rot if they don't get good air movement. So we like to have as much air going through them as possible.
>>You talk about air. I heard of something called "cold air traps." Could you tell us what those are and what dangers they bring?
>>Usually that's a low spot. You might have a low spot in your yard. And a person should know where those are. Watch the plants there, and you'll notice nothing grows well there. Put your cooler plants or those plants that don't need the heat there. A structure, if you have a structure down at a lower elevation, and you have a structure, the air movement goes down and a pocket will settle right there and you'll get cold air. It'll freeze there where it doesn't freeze someplace else in the yard, it will freeze much later. And so why plant there and just lose it?
>>We hear about annuals and we hear about perennials. Tell us a little bit about it. Because perennials are going to be with us year after year. Why is it important to have a specific site in the garden for perennials?
>>Well because they are there for a long time. The perennial is usually one that we consider 3-5 years it's going to be in the same location. An annual is one that's just going to be there that growing season. We're going to put it in the spring; we're going to harvest it in the fall. Or we may, if we're living in a hot area, we may put it when the cool season starts, we're going to take it out when the warm season starts.
>>Now it's a lot to remember, and I understand that you recommend that we actually get a plan and put it down on paper?
>>Yes. We always want to have a "plot plan," as we call it. So there are two things we should do. Put down where we're going to plant it. Make sure in the garden that it's there in a certain spot. We want to remember that the reason we're doing this is we like to practice crop rotation. Because we don't want to put the same plant in the same spot every year.
>>It's funny because I thought of that, like, with large farms. But I haven't thought about an individual's garden needing that same type of rotation.
>>Same principle. If you've put in tomatoes, don't put in tomatoes the next year, and you don't want to put potatoes, you don't want to put eggplant, because they're all the same family. They build up insects and diseases, and so we have to make sure that they're not in the same location for at least 3-5 years. And they can't even follow some crops, and you need to learn that. So we have a plot plan, and on that plot plan, we

decide where we're going to plant. And we also write down what we planted. In other words, what variety.
>>Well we have just a few samples, and of course everyone will create their own. But this is an example of a plan and it lays out the first year. Let's say in this house they had 4 different beds in their yard. It just lists the facts of each bed, what they're planting that first year. And then the second year, the third year and so on.
>>And that's a great idea!
>>This is in a table format. You can also do it this way where you're laying it out in different boxes. And you're one just tells you in this gardening, this is a little bit more visual. What's going to be in this bed, third bed, and fourth bed. And they're rotating throughout it. Also another sample, one here is basically identifying a 3 year rotation, which you recommend. Whatever works best for the family and the key of succession, right?
>>Yes, and the key is success. We want you to succeed, because we want you to have a garden next year. One of the things to remember in deciding what to plant and where to plant is the size of the garden. Never make the garden larger than what you can handle. We want you to be successful. That's the most important thing.
>>And I've heard that sometimes people will put a garden together and in that one box, all they do is grow their corn, or all they do is grow their tomato. And so in terms of succession planting, my understanding is that it's actually within the same growing season, growing a variety of different…and here is kind of a colored example. And maybe you can tell us a little bit about how there's using the same plot. You can plant one thing after another.
>>And what they want to do, see, it's not all crops take the entire growing season. Radishes, carrots, and some of these cops, beets, are off very quickly. So we can come back in with a crop that grows during the warmer temperatures and put that in. And if we live in a very long growing season, we may even take that on one out and put another one in. So it depends entirely upon how long your growing season is, and then what the crop was. In our area, a tomato will be there the entire growing season. So we don't come in with another one. But we definitely can come in with radishes, if you have radishes you can come back in fall planting with carrots, or something like that's another short-season crop.
>>Well how do we determine, for example, you know some of us have longer day lengths, and some of us have shorter day lengths? How can we decide what's the maximum we can get out of the garden, the maximum vegetables that can grow in succession.
>>What it is that each vegetable has a number of days from seeding to maturity to harvest. So we have to look at those. And knowing that…some of them are 35 days, some of them 45 days, some corns, and 85 days. 85 days is all we've got. So we can't do much more than that.
>>What if you don't want to have, for example, you would like to have carrots throughout the summer. If you plant them all at the same time, you harvest at the same time, right?
>>Approximately. So what we do is we try to plant them in staggered situations. We have to look at the temperatures. If we plant a half-a-row, we may plant again a week later, and then another half-a-row, but when we harvest, the harvest dates may only be 3

days apart. Because remember, it's warmer, they're growing faster. So this is ideal with corn. Corn, we plant in the early spring. We'll plant one variety; we may wait three weeks to plant the next variety. And when it comes to harvest, though, we may be harvesting a day apart.
>>You know, we go to grocery stores and we go to a lot of other discount stores and there are seeds in the springtime all over. How do we determine where there's a good place to get the seeds and when we should be buying them. Can we buy them years in advance?
>>You want to buy them that year. Now we can save them for a year, but the best idea, buy them the year you're going to use them. The ideal thing to do is go to a nursery. Buy reputable seed where they have it, where it should be in a drying climate.
>>What about seed catalogues? Because occasionally, when you to a nursery or you get on a mailing list, you'll find some samples.
>>We've got some samples here. And myself, in the fall the greatest thing you can do is write and get these. Most of them are free. And we have one here that, actually, if you look at it, it tells us all the growing conditions and how it reacts. And the greatest fun I have is in the fall sitting and reading about these and deciding which ones do I want to try. Great reading material. This one is excellent. It even has here, as you can see, a planting chart. It tells us how much we need to furnish for so many people and how many seeds it will take. And so it gives us a planting chart right there.
>>Well once you get the seeds, what would be some of the basics of sowing the seeds so that we are not damaging that as we're getting started?
>>Most of the time, if we're going to grow our own seed, here we can just sow right in the flat, we're going to pull them out and put them into the ground or put them into a larger pot. But here we have what we call a seedling tray. And each little seed goes into its own little tray. So you have to have it so it's pretty compacted. So we can then, there are several different ways, you can use your finger that way. We also stick with what we call dibbles on, which you can push these down, as you can see like here…
>>And it perforates a perfect size.
>>It perforates a hole at the right spacing. Now the other thing we can do is we can just make a little furrow in it. And this can be outside in the soil, or if we're going to grow transplants we can do it like this. And we would just spread these along, try and get them a little spread out.
>>I like the size of those seeds, because they're easier to see.
>>They're nice and big. I like big ones. As we mentioned, sand is ideal for small ones.
>>And the sand just gives a little more weight so that it will spread the seeds out as you lay them.
>>It automatically spreads it because it gets in between them anyway. Then we just cover it over. This could be in the yard in our garden or…
>>So these are barely covered. Maybe half-an-inch of soil on top?
>>An inch to a quarter of an inch. If we're using the holes, we would just drop one or two seeds in each one of these holes, and cover those over. Now we have here, we can use all kinds of things for transplants to grow them at home. Here are just egg cartons, where we fill it with artificial media that we can purchase in a nursery or that. And then just put a hole in there and we can do the same thing here by dropping a couple of seeds in.

>>Now does this organic material, does that hold water a little bit more than the regular soil?
>>Yes, now, yes. And one of the things we want to mention, if you're going to use this, you want to make sure that it's moist before you plant in it.
>>Okay, so once we plant the seeds, and let's say we're going to keep these indoors before we take them out, before frost if you're in a cold climate. Keep that indoors and how long before we see some sprouts?
>>Depends upon what you plant. Tomatoes? Two weeks. Cucumbers, two-three days. So it depends, but you'll see them. Now, one of the things we want to remember to do, a lot of people put these in their windows. And that's fine, except you want to pull them out of the window at night, just in case it gets cold. The other thing is when you put it in the window or you have light, we rotate it after they're up every day we rotate it like this. Because it will start to grow toward the light, and we don't want them to get crooked. So if we keep rotating them, they'll keep growing straight.
>>What about if we decide not to take it from seed and grow it to a transplant, what if we want to go ahead and buy transplants? We have some samples here.
>>We have some here. We'll play like this is outside.
>>This is cabbage?
>>That's cabbage. We have squash here. One of the things to remember, this cabbage, we want to make sure that if we look at this, we can see these two leaves right here are not true leaves.
>>Now what are true leaves? What does that mean, they're not true leaves?
>>These come from the cotyledons, where they're just food storage that's in the seed itself. And you'll notice now, here on the squash and cucumbers, they're much easier to see. Notice how round they are? They're round here. But notice here they start to serrate. We don't want to plant them at this stage, they've got to have these before we transplant.
>>So if we transplant these or the true leaf, it's too early?
>>That's right. What we can do is we can just reach down…
>>And how do we make sure we don't damage the root systems since we're moving it?
>>Now one of the things most people do is we can see this has some roots here. A lot of people are really careful, and those will die. We want to make sure the roots get kind of roughed up, and so we rough them up and we put them in like that.
>>And roughing up just helps them kind of…
>>Get out.
>>Okay.
>>Because they get in these…they're growing and they're in the little, especially if they're in these cell packs. We put them in without roughing them up, and then they just sit there. So we've got to rough them up. And put them in at exactly the same depth they were in the pot. Because if we don't, they'll die.
>>And how much water should we be looking for when we're taking care of them? How much should we be adding?
>>Just take…we try to keep the soil moist. The bigger the pot, the longer it takes between watering these little cell packs on a hot day, everyday we're going to have to water.

>>Now sometimes we want to plant our seeds directly into the garden. And if so, what would be the best way and maybe the distance between?
>>Ideally, rows are by far the easiest to take care of. Now there's a lot of different ways that people do it. But rows are easy. And so what we do is, usually with a hoe, we'll come through. We'll make our little furrow. And our biggest thing is to make sure that we're spacing them at the right spacing. Usually we want, depending on the crop, and again this is experience, but we're going to try to give us enough that the plant can reach full size to maturity without competing with this plant on its side. So in row is usually anywhere from 3-12 inches. Between rows is 1-3 feet.
>>Well thank you so much for joining us! We wanted to explore this topic a little further, so we decided to send our very own Jonice Hubbard to the one place we can think of where the gardeners are known for their meticulous attention to the planting of their gardens. And that place, of course, is England. Specifically she decided to visit Kent, known as the Garden of England. Jonice met up with a few avid gardeners and chatted with them about the different techniques they use in planting and planting their vegetable gardens. Let's take a look!

>>Oh, you have a beautiful garden out here!
>>Well thank you. It's typically an English garden, really. And its problem with small size and oblong.
>>Tell me, as you moved into this site, what did you do to plan out your garden and to accommodate such a small space?
>>Well the two main things we had, because the garden was fairly well-planned when we came here, there were only three main things that we did. Firstly, we had to take the base out of the palm here. And we fill that with compost and use that for growing because of the danger of the water. Therefore, the young child. And secondly, what we did was w e had to reorganize this rockery here and re-stone that. And the other item was to take all the trees out. The rest of it was already planned for us.
>>Oh that's wonderful! I noticed that you have a lot of tomatoes growing here in pots.
>>Yes.
>>Two whole rows of tomatoes!
>>Well the idea of this was, because if I put those pots onto the grass, the actual containers make rings on the grass and will spoil it, so I got these two benches, covered them with a waterproof cover, and I have the extra six top tubs on there. These are the small tumblers, and those are the Italian type tomatoes. And these are just beginning to ripen. And there will be plenty there for us as a family. And the idea of this too with them growing in pots, of course, is when I feed them, you don't get waste. The waste doesn't go away; it's constipating the pot, alright?
>>Do you practice any kind of rotation in such a small space?
>>Yes I do. In the little bit of vegetable garden that I've got. I transplant them around there, but the point is within the pots, it's a different situation. Because what I can do there, I can grow one particular product in the pot, like, for example, potatoes. And when they've been harvested, what I do then is, I take the potatoes out, I use the same soil again, recharging it with some fish blood and bone. And then I plant other things such as carrots or spring onions into that same pot.

>>What kind of problems have you encountered as you've tried to make this garden into a very productive area?
>>Well some of the problems is that with the particular pots, there is a lot of work in them in the watering. Because although they have to be well-drained, inasmuch as you can't let the water sink into the bottom and stay there. They would rot off.
>>Sure.
>>So what I have to do is make sure that's done. And one of the other challenges of the English garden is that I'd like to grow a lot more. But of course, I can't. I'm restricted because of the space that I've got.
>>Sure.
>>But we enjoy the things that we do, though.
>>So what recommendations would you make for someone who had the same problem of a very small space?
>>Well I would suggest, very much so, that they try this pot growing. Because it's very, very successful. I've had a tremendous crop of potatoes out of them this year. And then I've got…I've eaten and enjoyed lots of spring onions, carrots. We have croyets growing, and runner beans. And of course, it is important that when people grow in pots, that they use the right ingredients.
>>Sure.
>>I use in there a compost, which is, it has compost and also something—I'm not sure—it's just in England, but *Jonenith* is a brand of soil, which is specially treated and used in pots. And I mix that with mushroom compost. I put one-third soil in the bottom, one third compost (the mushroom compost) and one-third of the ordinary compost on it. And then grow into that.
>>Okay.
>>Because there's plenty of nutrients in that, you see? Lettuce is one of my favorite vegetables. And I tend to grow them in a very quick succession. I plant them in seeds, I usually plant them in a container, and as they come through, I leave some of them in a container and then some of them I transplant to other containers or into the ground. But what I need to do then is to make sure that we have a six inch. And they probably take 6-8 weeks to be able to be cut to be used.
>>Okay.
>>So I have the tiny ones here. Which have been recently seeded. And the little ones that are transplanted. And I've transplanted some more out in the garden that will be coming on by about the end of September. And I've got the ones that are ready to pick, the cos lettuce, lovely and crisp, and beautiful to eat. But they do need succession planting because, if you're not careful, you've got loads of them or none at all.
>>So the planting of your garden is probably a central factor when you have such a small space.
>>It is. And that makes a difference whether it will be successful or not.
>>Well you've certainly done a very good job of making a small space very productive.
>>Well thank you. I certainly enjoy it. I'm not only doing it, but I enjoy using it.

>>Okay, well John. You knew you had this very small space to work with.
>>Yeah.
>>How did you plan it? How did you decide what to grow where?

>>Well what I've done at first, because as you know, we come to a new place and everything is bare. So I thought I'd draw a little plan out. And draw it on a bit of paper first.
>>Well and I've noticed that you've used several methods in your garden plan. You have some in the ground, you have some in baskets, and you have it growing up the fence there. You have the trellises. You also have containers. And over here, you have some containers growing right in a pot with your flowers.
>>Yes, we can combine the two together and produce some fruit for us to eat and also to enjoy the scenery of the flowers.
>>Oh now that's interesting. You've got these tomatoes now growing right up the fence.
>>Yes. And they're growing in grow-bags.
>>You didn't need any soil at all! Now you told me earlier that in the planting of your garden, you really didn't think you could grow strawberries, but here you've got some. How did you grow strawberries?
>>This is a first time I've grown strawberries, actually. The strawberries we bought from a garden center and my wife saw these pots and she thought they'd look alright in there. And so we gave them a try. Hence, we've got some lovely strawberries.
>>Over here on this fence, you've got some wonderful sweet peas growing right up the wall. How did you decide to go ahead and put those in?
>>Well being a small space to put more flowers in, was to put some sweet pea climbing up the wall. Like, if you add a vegetable garden, or when you do plant gardens over the different seasons. So next year I'd have to rotate, say, some cabbages and put carrots in there. And vice versa, to rotate the different vegetables over the garden.
>>So even in a small space, you practice rotation, crop rotation.
>>Yes. You can practice rotation, and maybe next year we can put, say, for instance, tomatoes instead of putting them in the same basket, put them in another basket.
>>Okay. What would you recommend to someone who is just starting out with a garden?
>>I'd recommend that they, first of all, plan it out. And draw a plan or have something in their mind what they're going to do to start off the garden. I'd recommend that they wouldn't put too much into the garden. That they would put things in that they're going to like. So you do need knowledge of getting yourself a nice gardening book on how to grow plants, what diseases you get in the plants and that sort of thing to look after and nurture.
>>Well John, you've made an amazing use of space and I understand you've even won some gardening competitions with your amazing plan. What a wonderful example.
>>Thank you very much!
>>Thank you.

>>Well those are some fun ideas! I can't actually wait to try them out in my garden. Now before we go, let's review a few of the things we can do to make sure we're successful in planning and planting our own garden. First, always remember to use the three-year crop rotation plan. And be sure to do succession planting within each growing season. Next, put your garden plan on paper, and keep track of performance of the vegetables with a garden journal. And also be sure to purchase your seeds in the fall of the year before you plant them. And finally, remember that you can experiment with

your garden and try new things. Before you know it, you'll have the garden you always wanted. That's about the time we've had for today, but for more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. Thanks to Frank Williams for joining us, and thank you for watching. And remember, everything's better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, did you know you could grow vegetables without soil? It's called hydroponics, and it's becoming more and more popular. And it's making it possible for homeowners who don't even have a garden or even soil at all, to grow almost any vegetable right at home. Be sure to check it out!

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>>Did you know that you can grow vegetables without soil? It's called hydroponics, and it's becoming more and more popular. And it's making it possible for homeowners who don't have a garden—or even any soil at all—to grow almost any vegetable right at home well on today's show we'll learn how to set up our very own hydroponic system, and learn how to grow everything from lettuce to strawberries. Hi, I'm Rebecca Cressman, and you're watching HomeGrown!

>>Welcome to HomeGrown, the show that brings you all the dirt on vegetable gardening. Today we're talking about how to do hydroponics—or how to grow plants in nothing but a liquid solution. Some critics say that hydroponics is too expensive or too complicated. But Professor Alfredo Rodriguez Delfin, at the University of Agraria de la Molina in Lima, Peru, has developed an easy and affordable way to set up your own hydroponic system at home. Our very own Miriam Casos traveled to Lima to learn just exactly how Hydroponics works and to see how a very determined group of women have been able to set up their own hydroponic system with great success. Let's take a look!

>>I'd like to know…what is hydroponics, and what do you mean by hydroponic system?
>>The word "hydroponics" has Greek roots. Hydro = water, and ponos = work. A quick and simple translation would be "work on water," or "growing on water." And it's a technique that allows you to cultivate plants without using soil. So a hydroponic system would be a combination of methods that we use to grow plants without soil.
>>What type of plants can I grow through the hydroponic method?
>>In principle, all kinds of plants. Plants that produce fruits such as tomato, melon, strawberries, it could be peppers, cucumbers, etc. The plants that produce leaves, such as lettuce, basil, cilantro, parsley, etc. Root vegetables, such as the potato, bulbs such as onion and garlic, it could be aromatic plants such as mint.
>>All kinds of plants, then?
>>All kinds of plants.
>>How many hydroponic systems are there? Could you give me a summary as to what my options are?
>>Well we could classify them in two big groups. One system in water, which we use to grow leafy greens. The water culture system, or NFT system. And another group is an aggregate system, where we use growing media in containers. Growing media in columns, or in a drip system.
>>Where in the house can you do hydroponics?
>>Well, you can take advantage of any part that receives natural sunlight. For instance, a rooftop or a terrace, it can be a patio; it can be a hall inside the house.
>>A hall? Can it be a balcony?
>>As long as there is enough light. One of the greatest advantages of hydroponics is that we can grow where it would not be possible to do so with traditional agriculture.
>>Okay.

>>For instance, it's difficult to grow plants in sandy soil. Or in soil with bad drainage or salty soils.
>>Which is the case for many people; they don't have good soil to grow.
>>Right.
>>Or they don't have the space.
>>They don't have the soil to cultivate. So like I said before, on the rooftops, on their patios with the hydroponics system, they could grow plants in their homes.
>>Sure.
>>Well, among other advantages we could mention are: we can produce more plants per square meter.
>>Oh.
>>For instance, if I get eight lettuces per square meter of soil, with the hydroponic system I can get 25 plants.
>>Oh wow.
>>And the time of harvest is much faster too. Due to the efficiency of nutrition in a hydroponic system.
>>Great, I would like to see it! Could you show me how it's done?
>>Sure.
>>Okay, so how do we get started?
>>We have to start by preparing the nutrient solution. And in order to do so, we need to prepare two concentrated solutions. One concentrated solution "A," and another concentrated solution "B."
>>What ingredients do I need for each solution?
>>For concentrated solution "A," we need three fertilizers.
>>Three fertilizer, okay.
>>Potassium nitrate, 550 grams. ammonium nitrate, 350 grams, and triple super phosphate, 180 grams.
>>okay. And for solution "B?"
>>For solution B, we also need three fertilizers.
>>Okay.
>>Magnesium sulfate, 220 grams. One ciliated iron, 17 grams. And then we need a mixture of micro-nutrient, which are magnesium-sulfate, boric acid, zinc sulfate, copper-sulfate, and ammonium molybdate.

The first thing we need to do is add three liters of water to a container.
>>Okay.
>>Here we have, for instance, a bucket, and the first fertilizer we add is the potassium nitrate.
>>And where can I get all these materials?
>>In agricultural stores.
>>Okay.
>>In the U.S., there are several hydroponic stores in different states. You can also get them there. Or you can buy the concentrated solutions. Since it's a soluble fertilizer, it will dissolve. Once we've added the potassium nitrate, we now add the ammonium nitrate. I cut the bag. And finally, we add the triple-super phosphate.

>>And do we have to add it in that particular order, or can we add them in a different order?
>>Yes, because the first two I added are soluble.
>>Okay.
>>So you can see clearly that it dissolves. But this one, in particular, changes the color of the solution.
>>Oh, so that one always goes last.
>>Yes, it always goes last.
>>And the water is at room temperature?
>>Yes, pottable water, or tap water.
>>Pottable water.
>>Uh-huh.
>>And I imagine it also depends on where you live, for instance if the water in your area is not good?
>>It could be well water or rain water as well. Now, if we look here for example…we are close to 4 liters, so we have to add water up until it reaches 5 liters, which is up to here. The final volume should be 5 liters of concentrated solution A. **(7:54)**
>>5 liters.
>>All the ingredients we have added are to prepare 5 liters.
>>To prepare 5 liters and for how much is that good for?
>>For 1,000 liters of nutrient solution, or 1,000 liters of water…
>>Ok.
>>Now we can prepare solution B.
>>Yes.
>>Then…
>>…And this takes less water as I can see.
>>Yes, because we are going to prepare 2 liters of solution B.
>>2 liters only…
>>And why that proportion? Because for each liter of water, we have to add 5 milliliters of solution A and 2 milliliters of solution B.
>>Ok.
>>You always need less.
>>So always less solution B.
>>That's right.
>>Ok.
>>So the first thing I'm going to do is add 220 grams of Magnesium sulfate to 1 liter of water.
>>Tell me, it has to be exact quantities.
>>Yes, because if we add more the plants can suffer toxicity, it can burn their leaves... And if we give less, the plants leaves will turn yellow and won't develop well.
>>Oh, all right.
>>Now, for the micronutrients, I have to use boiled water.
>>Boiled water? …OK.
>>Yes, so here I have boiled water…
>>How much?
>>It can be 200 milliliters or 300.

>>Ok.
>>There are many formulas, and they all fulfill the objective of feeding the plant, so we couldn't say that there is an ideal formula for all plants.
>>Oh, I see.
>>What's important is to use a formula that you could find in the area where you live.
>>Sure, and in some situations, it would be better to buy it, it would be more practical to buy it.
>>Yes, if I'm going to grow something small, for instance a 1 square meter or 2 square meter container… it's better to purchase the nutrient solution than preparing it.
>>Sure, of course.
>>Everything is dissolved.
>>Yes.
>>And now we finally add it… to prepare solution B.
>>Perfect.
>>And then we add the chelated iron.
>>It goes at the end.
>>Yes, because of the color that we will see.
>>So chelated iron…
>>Yes chelated iron…this gives the solution a red color.
>>Oh! Wow.
>>Chelated Iron provides iron to the plants and iron is a basic element for the plants because it allows them to form chlorophyll.
>>Yes.
>>Which is important in photosynthesis.
>>Right.
>>So, this is a faster way to prepare the solution than solution A. So we have to prepare 2 liters.
>>Yes.
>>So we'll add some water. That's why it's good to use a measuring cup.
>>Sure.
>>So that we can get the right amount. So, there they are, the 2 liters… So, I have 2 liters of solution B, and 5 liters of solution A.
>>So in order to prepare 1 liter of nutrient solution, we need 1 liter of water.
>>One liter of water…ok.
>>Here I have a measuring cup…we are going to prepare 1 liter of nutrient solution. So, we add water…And, in order to prepare 1 liter of nutrient solution, I grab a syringe and we need 5 milliliters of solution A, I grab a syringe. 5 milliliters…We rinse…with water…for B. We take 2 milliliters of B. And I have my solution!
>>That's it?
>>And with this I proceed to water the plants.
>>Now we are ready to set up a hydroponics system.
>>That's right.
>>Well, here we have the materials we need. I see here that you have a wood box.
>>Yes, it's a wood box that we can use to make containers.
>>Ok.

>>What we do is, for instance; is to cut this box and we have a small container such as this one.
>>Ok.
>>A container which is 8 centimeters high which we then have to wrap with thick, black plastic.
>>Ok.
>>Right?
>>Black plastic.
>>And after wrapping it we have a container such as this one here already water proofed
>>Water proofed, this is so that you can place the growing medium.
>>The growing medium, which can be pomez stone, quarry sand, rice shells, quartz, etc, etc.
>>You can select from a variety of growing medium, and you can mix them as well…
>>Yes, we can mix them. What's important is to use a growing medium available in your area.
>>Sure.
>>Something you can get easily…
>>Something local, sounds good… So once we have the growing medium here in the container, what's next?
>>Well, the growing medium should have been previously washed. We place it in the container and we proceed to plant.
>>We are going to plant radishes. For this, the spacing should be every 10 cm.
>>Ok.
>>We use a ruler and each 10 cms we make a shallow hole… and also on this side. Okay? And with that…
>>Sure.
>>With that line of reference I finish up right…
>>Aha!
>>And what do I do? I place 2 seeds…
>>Why 2 seeds?
>>Because one may not sprout. So if one doesn't sprout we won't have a plant in that hole. So, we place 2 seeds, or it could be one if it's a good quality seed and sprouts well…
>>Sure.
>>Then we only use one seed.
>>Tell me, all these materials that we are using right now I can also get through the internet?
>>That's right in the internet or in agricultural stores or hydroponic stores.
>>Sure.
>>Then, we proceed to cover the seeds.
>>Perfect.
>>It can be with the ruler. Or we can do it by hand, no problem.
>>Ok.
>>And once we have covered the seeds, we humidify the growing medium.
>>Ok.
>>We can use a mister bottle, or any container used for watering only.

>>Any container?
>>Yes, the only thing we are going to add is water.
>>Sure.
>>Once the growing medium is moist enough, we should follow this procedure everyday until the seeds sprout.
>>Ok… So, it's with water. You don't add the nutrient solution?
>>No, because the source of nutrients will be the seed itself. So, once the seeds sprout we'll see the small leaves.
>>The small leaves…What size do they have to be?
>>They are very small.
>>Very small.
>>Perhaps 3 or 4 days later they sprout. And it is then when we have to apply the nutrients.
>>Ok, after 3 to 4 days.
>>That's right, the nutrient solution that we have prepared a moment ago…
>>Yes.
>>We water the growing medium with that solution.
>>And we can put it in that…in that…
>>Yes, in that mister bottle.
>>In a mister bottle.
>>Or it can be a watering can.
>>A watering can, ok perfect.
>>So, as the days go by the little plants are going to grow because we are feeding it nutrients.
>>How many days, approximately?
>>Practically from the time they sprout until the harvest they are growing. For instance, these are plants that are 2 weeks old and this other ones are 20 days.
>>And is this another type of growing medium? This is…
>>This is quarry sand.
>>Ah! Quarry sand ok.
>>Here we see the radish plants that are growing.
>>Yes, and these are even older.
>>That's right.
>>How old are these?
>>These ones are 20 days.
>>20 days, ok... Very good! Now, with this type of system I can grow all types of vegetables.
>>All kinds of vegetables…
>>Ok, but I see here that you grow lettuce in a different type of system. What is the name of that system?
>>Well, there is a water culture system or NFT.
>>Ok….NFT.
>>We can grow lettuce here… I could have 5 plants in this container.
>>Ok.
>>But the problem is that in a growing medium, lettuce takes longer to grow.
>>So, it is more convenient to transfer it to a water culture system.

>>Yes, water culture.
>>Oh, ok. Great.
>>For a water culture system we start out in a container which we already explained.
>>Right.
>>Which has to be covered and waterproofed, because here instead of a growing medium we will add water.
>>Water.
>>And we are going to prepare nutrient solution for this container.
>>And how much solution should I add?
>>For instance, for this type of container 40x40 8 liters.
>>8 liters.
>>Or I can have a bigger one; I can have 10, 50 liters depending on the size of the container.
>>Right.
>>So for this container, we have prepared this board of styrofoam, which is one inch thick.
>>Ok.
>>And of a 20 density or it could be 18 since the board is hard, and this board is going to float on top of the solution.
>>Is that so the plant has no contact?
>>No, well it's going to have contact because this board is going to float
>>Ok.
>>And it's going to hold the plants.
>>Yes.
>>But we need to make holes in this board
>>All right.
>>And in order to do that we use a piece of hole puncher with a diameter such as this, which is 1.5 cms. And we heat up this hole puncher in a stove, and with the hole puncher we are going to make small holes such as these.
>>Ok.
>>So in these holes we are going to place the plants of lettuce for example, or basil plants
>>Only leafy greens.
>>Yes, only leafy greens. And the small plants will be held by a piece of sponge.
>>Right.
>>We cut a strip of this size, which we will show when we transplant, and the plant will be placed here, held by this board.
>>Perfect! And is this the first stage of this process?
>>No, the first stage would be the seedlings.
>>The seedlings, ok…
>>The seedlings, right? When the lettuce plants have 15 days in this stage…
>>In the growing medium.
>>We are going to transfer to this second stage.
>>That's when you transfer it…ok
>>Where they will be for another 15 days.
>>Ok.
>>But then the plant needs to develop.

>>Right.
>>So we need a styrofoam board but…
>>With bigger holes.
>>With bigger holes.
>>Ok.
>>In order to make the holes, again need to use a hole puncher but with a bigger diameter. This diameter is just right to hold a little cup that would support to the plant, okay? So, in each cup I will place a plant. And why? Because in this cup as you can see, there is a hole.
>>Oh yeah…
>>Enough to let the roots pass.
>>So this is the final transplant, it's the last stage of this…
>>That's right; it's the last stage where the plants will remain for one month.
>>One month, ok.
>>What we do in this cups is for instance to place one plant with its root, which fits perfectly and passes through the cup.
>>Right…
>>We hold the plant and the cup fits.
>>Perfect!
>>And below is the nutrient solution.
>>Right
>>One thing we have to do every day is to aerate the nutrient solution.
>>Aerate? So you don't have to change the solution?
>>No, we lift up the Styrofoam board which has all these plants and with an egg-beater that we have at home but clean, we beat it.
>>Oh! Twice a day?
>>In the morning and afternoon.
>>Ok.
>>We can count 5, 10 and that's enough.
>>Great!
>>Through this action, what are we doing? Incorporating oxygen into the water and that dissolved oxygen is important for the roots to breathe.
>>Right.
>>That's why the roots grow well in a hydroponics system because we are aerating.
>>Oxygen is important then so we should do this.
>>If we don't aerate, the plant won't develop well because the lack of oxygen will affect the roots.
>>Right.
>>So we have the first stage, the seedlings stage.
>>The seedlings stage.
>>Second stage which is…
>>Post-seedling or first transplant.
>>First transplant, and we have…
>>The final stage.
>>The final.
>>Which is the final transplant.

>>The final transplant.
>>Ok.

>>So and after seeing all of this. How did you become interested in Hydroponics?
>>It was just a coincidence because when I did my thesis on Biology…
>>Uh-huh?
>>I used hydroponics as a tool to study the toxicity of magnanimous in potato plants.
>>Ok.
>>And then when I started in the university as a professor, I used it as a tool to teach my students about mineral nutrition.
>>Mineral nutrition.
>>In a course of vegetable physiology…and since then the formula for the nutrient solution got started, and further developed it through small workshops.
>>Right.
>>And because people would visit us constantly and they could see that we produced plants without soil, they became interested and from that point on, we started working on social projects.
>>And what kinds of social projects?
>>Among them for instance, in the schools the hydroponic gardens,
>>Oh really?
>>Yes, and in some marginalized communities in Lima for instance, there have been projects to create a micro-business in the community, or family owned business with the goal to earn extra money for the family, or to improve the diet of the families because generally, the poor citizen doesn't consume vegetables in his/her diet.
>>Right, that's true.
>>And vegetables are rich in minerals and vitamins.
>>They are important for nutrition.
>>So, this can be an advantage to children especially, uh…to pregnant mothers uh…since it provides them with good nutrition.
>>Yes, that's true. Is there another project that you've done recently?
>>Well, there's a very interesting project which is very successful in this country done by a group of ladies who are in a area called Villa el Salvador. They produce at a commercial level and with the money they earn they practically pay their own salaries.
>>And what do they grow? What type of vegetables?
>>They grow lettuce. They produce approximately 30,000 plants of lettuce a month
>>Incredible! Through the water culture system?
>>Through the water culture system.
>>Sounds very interesting I would like to meet them.
>>Yeah, let's go…

>>What we've done is first of all um…to take a little bit from the technique, the technique which is within our reach, taught to us by the professor, and have applied it to our situation, in this place we live in, which is a small space.
>>Right.
>>And have made it affordable for us, so that we can financially support our families. For me, it's been a very good experience because I've seen many women like me

um…feel productive, successful, and to see with great joy how we produce something, which for us is something new.
>>Right, a technique you were not familiar with.
>>A technique that we were not familiar with. And today we have become experienced and we do it with ease, as you can see.

>>And I see that this method is very convenient for you since you can produce much more lettuce much faster. Right?
>>Yes, an infinite variety of lettuce and in 2 months we have lettuce ready for the table,
>>Yes, And you can sell more
>>Yes, fresh, delicious lettuce that clients from Via el Salvador especially can consume and obtain great nutritional value.
>>Yes.
>>It's not the same as growing on soil, or traditional agriculture, which are not irrigated with boiled water, instead here we are very hygienic, and the lettuce is rich in nutrients and well taken care of.
>>And I imagine that you also consume it?
>>Yes, we consume it. In fact, we eat it everyday at home.
>>Sure.
>>It's very delicious and especially for hyperactive children it acts as a relaxant. A salad with egg and a potato, that's it. It calms them down.
>Ah, "papa a la Huancaina" very delicious.
>>Yes, delicious. I don't know how long you are staying but I'd like to invite you for some.
>>Yeah… that would be great. Thank you!
>>Papa a la Huancaina with lettuce. Yes, they are very delicious.
>>Yes, very delicious indeed. Well ma'am, thank you so much…

>>Wow, who knew you could grow so many vegetables with hydroponics? I'd like to give it a try someday. But before we go, let's just review a few of the things we can do to make sure we are successful in hydroponics. First, be sure to be exact with the proportions when you make your nutrient solution. Too much will burn the plants, and too little, well you get the picture. Next, remember the water-culture method is the best way to get a quick harvest of lettuce and other leafy greens. Also, remember that the medium you use for the aggregate system needs to be inert and capable of retaining moisture. And finally, be sure to stir the solution with an eggbeater two times a day, so the plants get all the oxygen they need. And that's all the time we have for today, but for more information on this and other episodes of HomeGrown, or to order a copy of the series, be sure to log onto HomeGrown at www.byubroadcasting.org. Thank you for watching, and remember, everything is better HomeGrown! Goodbye.

>>On an upcoming episode of HomeGrown, we'll learn how to grow a square-foot garden. Since he first introduced the technique over 20 years ago, Mel Bartholomew has literally traveled the globe, teaching his revolutionary gardening system to millions of gardeners. We'll meet up with Mel and learn firsthand how to start our own square-foot garden. Be sure to check it out!

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