List of phytochemicals in food

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While there is ample evidence to indicate the health benefits of diets rich in fruits, vegetables, legumes, whole grains and nuts, no specific food has been acknowledged by scientists and government regulatory authorities as providing a health benefit. Current medical research is focused on whether health effects could be due to specific essential nutrients or phytochemicals.[1]

The following is a **list of phytochemicals** present in commonly consumed foods.

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Terpenoids (isoprenoids)

Carotenoids (tetraterpenoids)

Carotenes

orange pigments

- α-Carotene – to vitamin A carrots, pumpkins, maize, tangerine, orange.
- β-Carotene – to vitamin A dark, leafy greens, red, orange and yellow fruits and vegetables.
- γ-Carotene - to vitamin A,
- δ-Carotene
- ε-carotene
- Lycopene Vietnam Gac, tomatoes, grapefruit, watermelon, guava, apricots, carrots, autumn olive.
- Neurosporene
- Phytofluene star fruit, sweet potato, orange.
- Phytoene sweet potato, orange.

Xanthophylls

yellow pigments

- Canthaxanthin paprika.
- Cryptoxanthin to vitamin A mango, tangerine, orange, papaya, peaches, avocado, pea, grapefruit, kiwi.
- Zeaxanthin wolfberry, spinach, kale, turnip greens, maize, eggs, red pepper, pumpkin, orange.
- Astaxanthin microalgae, yeast, krill, shrimp, salmon, lobsters, and some crabs.
- Lutein spinach, turnip greens, romaine lettuce, eggs, red pepper, pumpkin, mango, papaya, oranges, kiwi, peaches, squash, brassicas, prunes, sweet potatoes, honeydew melon, rhubarb, plum, avocado, pear, cilantro.
- Rubixanthin rose hip.

Triterpenoid

- Saponins soybeans, beans, other legumes, maize, alfalfa.

- Oleanolic acid American pokeweed, honey mesquite, garlic, java apple, cloves, and many other Syzygium species.
- Ursolic acid apples, basil, bilberries, cranberries, elder flower, peppermint, lavender, oregano, thyme, hawthorn, prunes.
- Betulinic acid Ber tree, white birch, tropical carnivorous plants *Triphyophyllum peltatum*, *Ancistrocladus heyneanus*, *Diospyros leucomelas* a member of the persimmon family, *Tetracera boiviniana*, the jambul (*Syzygium formosanum*), chaga, and many other Syzygium species.
- Moronic acid Rhus javanica (a sumac), mistletoe

Diterpenes

- Cafestol

Monoterpenes

- Limonene oils of citrus, cherries, spearmint, dill, garlic, celery, maize, rosemary, ginger, basil.
- Perillyl alcohol citrus oils, caraway, mints.

Steroids

- *Phytosterols* almonds, cashews, peanuts, sesame seeds, sunflower seeds, whole wheat, maize, soybeans, many vegetable oils.
  - Campesterol buckwheat.
  - beta Sitosterol avocado, rice bran, wheat germ, corn oils, fennel, peanuts, soybeans, hawthorn, basil, buckwheat.
  - gamma sitosterol
  - Stigmasterol buckwheat.
- *Tocopherols (vitamin E)*

Phenolic compounds

Natural monophenols

- Apiole parsley, celery leaf.
- Carnosol rosemary, sage.
- Carvacrol oregano, thyme, pepperwort, wild bergamot.
- Dillapiole dill, fennel root.
- Rosemarinol rosemary.

Polyphenols

Flavonoids

red, blue, purple pigments

- *Flavonols*
  - Quercetin red and yellow onions, tea, wine, apples, cranberries, buckwheat, beans, lovage.

        - Kaempferol tea, strawberries, gooseberries, cranberries, grapefruit, apples, peas, brassicates (broccoli, kale, brussels sprouts, cabbage), chives, spinach, endive, leek, tomatoes.
        - Myricetin grapes, red wine, berries, walnuts.
        - Fisetin strawberries, cucumbers.
        - Rutin citrus fruits, oranges, lemons, limes, grapefruit, berries, peaches, apples, pagoda tree fruits, asparagus, buckwheat, parsley, tomatoes, apricots, rhubarb, tea.
        - Isorhamnetin red turnip, goldenrod, mustard leaf, ginkgo biloba.
    - *Flavanones*
        - Hesperidin citrus fruits.
        - Naringenin citrus fruits.
        - Silybin milk thistle.
        - Eriodictyol
    - *Flavones*
        - Acacetin Robinia pseudoacacia, Turnera diffusa.
        - Apigenin chamomile, celery, parsley.
        - Chrysin Passiflora caerulea, Pleurotus ostreatus, Oroxylum indicum.
        - Diosmetin Vicia.
        - Tangeritin tangerine and other citrus peels.
        - Luteolin beets, artichokes, celery, carrots, celeriac, rutabaga, parsley, mint, chamomile, lemongrass, chrysanthemum.
    - *Flavan-3-ols (flavanols)*
        - Catechins white tea, green tea, black tea, grapes, wine, apple juice, cocoa, lentils, black-eyed peas.
            - (+)-Catechin
            - (+)-Gallocatechin
            - (−)-Epicatechin
            - (−)-Epigallocatechin
            - (−)-Epigallocatechin gallate (EGCG) green tea.
            - (−)-Epicatechin 3-gallate
        - Theaflavin black tea.
            - Theaflavin-3-gallate black tea.
        - Thearubigins
        - Proanthocyanidins
    - *Flavanonols*
    - *Anthocyanidins (flavonals) or Anthocyanins* red wine, many red, purple or blue fruits and vegetables.
        - Pelargonidin bilberry, raspberry, strawberry.
        - Peonidin bilberry, blueberry, cherry, cranberry, peach.
        - Cyanidin red apple & pear, bilberry, blackberry, blueberry, cherry, cranberry, peach, plum, hawthorn, loganberry, cocoa.
        - Delphinidin bilberry, blueberry, eggplant.
        - Malvidin malve, bilberry, blueberry.
        - Petunidin

Isoflavonoids

- *Isoflavones (phytoestrogens)* use the 3-phenylchromen-*4-one* skeleton (with no hydroxyl group substitution on carbon at position 2).
    - Daidzein (formononetin) soy, alfalfa sprouts, red clover, chickpeas, peanuts, kudzu, other legumes.

    - Genistein (biochanin A) soy, alfalfa sprouts, red clover, chickpeas, peanuts, other legumes.
    - Glycitein soy.
- Isoflavanes
- Isoflavandiols
- Isoflavenes
- Pterocarpans or *Coumestans (phytoestrogens)*
- Coumestrol red clover, alfalfa sprouts, soy, peas, brussels sprouts.

Aurones

Chalconoids

Flavonolignans

- Silymarin artichokes, milk thistle.

Lignans

A **phytoestrogens** seeds (flax, sesame, pumpkin, sunflower, poppy), whole grains (rye, oats, barley), bran (wheat, oat, rye), fruits (particularly berries) and vegetables.[2]

- Matairesinol flax seed, sesame seed, rye bran and meal, oat bran, poppy seed, strawberries, blackcurrants, broccoli.
- Secoisolariciresinol flax seeds, sunflower seeds, sesame seeds, pumpkin, strawberries, blueberries, cranberries, zucchini, blackcurrant, carrots.
- Pinoresinol and lariciresinol [3] sesame seed, Brassica vegetables.

Stilbenoids

- Resveratrol grape (skins and seeds, grape wine), nuts, peanuts, Japanese Knotweed root.
- Pterostilbene grapes, blueberries.
- Piceatannol grapes.
- Pinosylvin

Curcuminoids

- Curcumin (Oxidizes to vanillin) turmeric, mustard.

Tannins

Hydrolyzable tannins

- Ellagitannins
    - Punicalagins tea, berries.
    - Castalagins
    - Vescalagins
    - Castalins

    - Casuarictins
    - Grandinins
    - Punicalins
    - Roburin As
    - Tellimagrandin IIs
    - Terflavin Bs
- Gallotannins
    - Digalloyl glucose
    - 1,3,6-Trigalloyl glucose

Condensed tannins

- Proanthocyanidins horse chestnut Aesculus hippocastanum, cranberry juice, peanut skin.
- Polyflavonoid tannins
- Catechol-type tannins
- Pyrocatecollic type tannins
- Flavolans

Phlorotannins

extracted from brown alga species (Ecklonia cava, Sargassum mcclurei), sea oak (Eisenia bicyclis, Fucus vesiculosus).

Flavono-ellagitannin

extracted from Mongolian Oak (Quercus mongolica).

Aromatic acid

Phenolic acids

- Salicylic acid peppermint, licorice, peanut, wheat.
- Vanillin and Vanillic acid açaí oil, vanilla beans, cloves.
- Gallic acid tea, mango, strawberries, rhubarb, soy.
- Ellagic acid walnuts, strawberries, cranberries, blackberries, guava, grapes.
- Tannic acid nettles, tea, berries.

Hydroxycinnamic acids

- Caffeic acid burdock, hawthorn, artichoke, pear, basil, thyme, oregano, apple, olive oil.
- Chlorogenic acid echinacea, strawberries, pineapple, coffee, sunflower, blueberries.
- Cinnamic acid cinnamon, aloe.
- Ferulic acid oats, rice, artichoke, orange, pineapple, apple, peanut, açaí oil.
- Coumarin citrus fruits, maize.

Phenylethanoids

- Tyrosol olive oil.
- Hydroxytyrosol olive oil.
- Oleocanthal olive oil.
- Oleuropein olive oil.

Others

- Capsaicin chilli peppers.
- Gingerol ginger.
- Alkylresorcinols wholegrain wheat, rye and barley.

Glucosinolates

The precursor to isothiocyanates

- Sinigrin (the precursor to allyl isothiocyanate) broccoli family, brussels sprouts, black mustard.
- Glucotropaeolin (the precursor to benzyl isothiocyanate)
- Gluconasturtiin (the precursor to phenethyl isothiocyanate)
- Glucoraphanin (the precursor to sulforaphane) brassicas: broccoli, cauliflower, brussels sprouts, cabbages.

Aglycone derivatives

- **Dithiolthiones (isothiocyanates)**
  - Sulforaphane brassicas: broccoli, cauliflower, brussels sprouts, cabbages.
  - Allyl isothiocyanate
  - Phenethyl Isothiocyanate
  - Benzyl Isothiocyanate
- Oxazolidine-2-thiones
- Nitriles
- Thiocyanates

Organosulfides/ Organosulfur compounds

- **Polysulfides (allium compounds)**
  - Allyl methyl trisulfide garlic, onions, leeks, chives, shallots.
- Sulfides
  - Diallyl disulfide garlic, onions, leeks, chives, shallots.

Indoles

- Indole-3-carbinol cabbage, kale, brussels sprouts, rutabaga, mustard greens, broccoli.
- 3,3'-Diindolylmethane or DIM broccoli family, brussels sprouts, cabbage, kale.
- Allicin garlic.
- Alliin garlic.
- Allyl isothiocyanate horseradish, mustard, wasabi.
- Piperine black pepper.

- Syn-propanethial-S-oxide cut onions.

Betalains

- Betacyanins beets, chard, Amaranthus tricolor.
  - betanin
  - isobetanin
  - probetanin
  - neobetanin
- Betaxanthins (non glycosidic versions)
  - Indicaxanthin beets, sicilian prickly pear.
  - Vulgaxanthin beets.

Chlorophylls

- Chlorophyllin

Other organic acids

- Saturated cyclic acids
  - Phytic acid (inositol hexaphosphate) cereals, nuts, sesame seeds, soybeans, wheat, pumpkin, beans, almonds.
  - Quinic acid
- Oxalic acid orange, spinach, rhubarb, tea and coffee, banana, ginger, almond, sweet potato, bell pepper.
- Tartaric acid apricots, apples, sunflower, avocado, grapes, tamarind.
- Anacardic acid cashews, mangoes.
- Malic acid apples.
- Caftaric acid
- Coutaric acid
- Fertaric acid

Amines

- Betaine beetroot.

Carbohydrates

Monosaccharides

- Hexose wheat, barley.
- Pentose rye, oat.

Polysaccharides

- Beta-glucan

    - Chitin fungi includes other edible mushrooms.
    - Lentinan fruit body of shiitake (Lentinula edodes mycelium (LEM)) and other edible mushrooms.
- Fructan
    - Inulins diverse plants, e.g. topinambour, chicory.
- Lignin stones of fruits, vegetables (filaments of the garden bean), cereals.
- Pectins the fruit skin (mainly apples, quinces), vegetables.

Protease inhibitors

- Protease inhibitors soybean, seeds, legumes, potatoes, eggs, cereals.

See also

- Nutrient
- Essential nutrient
- List of macronutrients
- List of micronutrients
- Underweight

References

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