

Cereals and Vegetables Based Functional Foods

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Phenolics and Polyphenolics as Antioxidants

- **Fruits:** Phenolics and polyphenolics is mainly in the leaves, skin and seeds
- **Cereals and legumes:** Bran portion is also dominant in phenolics as compared to the endosperm

They plays important role due to their efficacy in scavenging free radicals, chelating pro-oxidant metal ions or acting as reducing agents.

Phytochemicals

Health benefits of phytochemicals are:

- Substrate for biochemical reactions
- Cofactors of enzymatic reactions
- Inhibitors of enzymatic reactions
- Absorbents that bind to & eliminate undesirable constituent in the intestine
- Scavengers of reactive or toxic chemicals
- Enhance the absorption and / or stability of essential nutrients
- Selective growth factor for beneficial bacteria
- Fermentation substrate for beneficial bacteria
- Selective inhibitors of deleterious intestinal bacteria

Sources & Health Benefits of Phytochemicals

Phytochemicals	Source	Role
Tocotrienols & tocopherols	Grains	Suppressed the growth of diverse tumors cell lines via initiation of apoptosis
Carotenoids	Fruits & vegetables	Antioxidants, protects against uterine, prostate, colorectal, lung and digestive tract cancers, and protection to other antioxidants.

Limonoids	Citrus fruits	Inhibiting phase I enzymes & inducing phase II detoxification enzymes in liver, provide protection to lung tissue.
Phytosterols	Various Plants	Exhibit anti-inflammatory, anti-neoplastic, anti-pyretic & immune- modulating activity, decrease cholesterol
Phenolic constituents	Various plants, wholegrains	Antioxidants, lowers the risk of CHD, diabetes, hypertension etc.

Anthocyanidins	Fruits & flowers	Antioxidants & anti-mutagenic properties
Glucosinolates	Cruciferous	Activators of liver detoxification enzymes, inhibit the neoplastic effect of various carcinogens
Fiber	Various vegetables, fruits,	Protects against colorectal diseases,

Cereals or Their Fractions with Their Antioxidant Activity (Shahidi, 2012)

Material	Total Phenolics (mg ferulic acid equivalents/g)	Antioxidant Activity (μmol)
Wheat (Soft, bran)	66.91	55.80
Wheat (Soft, flour)	24.11	27.10
Barley (outermost layer)	6.26	59.70
Barley (Innermost layer)	0.51	0.45
Millet (Kodo, whole grain-soluble)	32.40	95.70
Millet (Kodo, dehulled grain- soluble)	6.86	41.00
Millet (Kodo, whole grain-bound)	81.60	79.30