Shoolini University

ESU 009– Various oilseeds and their health benefits

Lecture 31

- Oilseeds are leading suppliers of superior quality and specialty vegetable oils to nutritional products, natural food and premium snack food worldwide

- Oil producing crops are corn, oat, cotton, soybean, mustard, sunflower, peanut, coconut, palm and olives.

- The major world sources of edible seed oils are soybean, sunflower, rapeseed, cotton and peanut.

- Oilseeds add important nutritional value to the diet due to high quality protein and or vegetable oil, together with oil soluble vitamins like vitamin A.

Table 1 Nutrient content of selected oilseeds (per 100 g)

	Cottonseed kernel*	Linseed/ flaxseed*	Peanut (plain)	Rapeseed**	Sesame seed	Soya (boiled in unsalted water)	Safflower seed	Sunflower seed	Olives (in brine)
Energy (kcal/kJ)	506/2117	492/2059	563/2337	452/1900	598/2470	141/590	517/2163	581/2410	103/422
Fat (g)	36.3	34.0	46.0	N	58.0	7.3	38.5	47.5	11
Saturated fatty acids	9.7	3.2	8.7	N	8.3	0.9	3.7	4.5	1.7
Monounsaturated fatty acids	6.9	6.9	22.0	N	21.7	1.4	4.8	9.8	5.7
Polyunsaturated fatty acids	18.1	22.4	13.1	N	25.5	3.5	28.2	31.0	1.3
Carbohydrate (g)	21.9	34.3	12.5	8.3	0.9	5.1	34.3	18.6	Tr
Protein (g)	32.6	19.5	25.6	22.0	18.2	14.0	16.2	19.8	0.9
Fibre (as NSP unless specified) (g)	5.5	27.9	6.2	7.2 (crude fibre)	7.9	6.1	N	6.0	2.9
Vitamin E (mg)	N	0.3	10.1	N	2.53	1.13	N	37.77	1.99
Niacin equivalent (mg)	3.01	1.4	19.3	N	10.4	2.7	2.3	9.1	0.1
Folate (microgram)	233	278	110		97	54	160	N	Tr
Sodium (mg)	25	34	2	5	20	1	3	3	2250
Potassium (mg)	1350	681	670	800	570	510	687	710	91
Calcium (mg)	100	199	60	400	670	83	78	110	61
Phosphorus (mg)	800	498	430	800	720	250	644	640	17
Iron (mg)	5.4	6.2	2.5	N	10.4	3.0	4.9	6.4	1.0
Magnesium (mg)	440	362	210	250	370	63	353	390	22
Zinc (mg)	6	4.2	3.5	N	5.3	0.9	5.1	5.1	N

- Oilseeds vary widely in their fatty acid composition but tend to be rich in MUFA (e.g. peanuts) or PUFA (e.g. sunflower seeds)

- Some seed oils contain significant amounts of the EFA and linoleic acid.

- Whole oilseeds are a source of fibre, phosphorus, iron and magnesium; many oilseeds are also a source of vitamin E (an antioxidant), niacin and folate

- Whole oilseeds also contain phytoestrogens, a group of substances including lignans and isoflavones

- Phytoestrogens may provide a protective effect against coronary heart disease as they have been shown to have a lowering effect on blood cholesterol.

- Plant sterols have a structure similar to cholesterol and hence reduce cholesterol absorption,therefore reducing the circulating levels of total and low density lipoprotein (LDL) cholesterol.

Health benefits of common oilseeds

Sesame seeds are rich source of Manganese, copper, iron, phosphorus, zinc and calcium.

- Manganese, phosphorous and calcium help promote bone health.
- Iron is necessary for the production of red blood cells and to carry oxygen through the bloodstream.
- Zinc promotes bone health and prevents osteoporosis.
- Sesame seed oil reduces hypertension and eases stress, fight free radicals, promoting youthfulness and strengthening the immune system.

SUNFLOWER OIL

- Sunflower oil is rich source of vitamin E which neutralizes free radicals and has significant anti-inflammatory effects.

- Sunflower seeds are also a good source of selenium, which has been shown

  - To induce DNA repair and synthesis in damaged cells
  - To inhibit the proliferation of cancer cells
  - To induce their apoptosis, the self-destruction mechanism the body naturally produces to eliminate worn out or abnormal cells.

- Sunflower seeds are also rich in magnesium, which is necessary for strong bones and helps lower blood pressure,

Corn germ Oil

- Corn oil have few therapeutic properties such as
- Anticholesterol
- Immunostimulant: Corn oil provides essential fatty acids like linoleic acid (omega – 6) which is required for some immune system functions.
- Tonic – Linoleic acid is required for proper functioning of kidneys, liver, heart, reproductive system and digestive system
- Hypotensive
- Antioxidant

Cottonseed oil

- Cottonseed oil include various fatty acids such as palmitic acid, myristic acid, palmitoleic acid, stearic acid, oleic acid, linoleic acid, and linolenic acid

- Cottonseed oil have cholestrol lowering properties.

- Cottonseed oil contains Vitamin E which is a potent antioxidant that plays a role in the prevention of diseases, such as Alzheimer's disease, cardiovascular disease, and prostate cancer

Soyabean oil

- Soybean contains roughly ~19% oil of which the triglycerides are the major component.

- Soy oil is characterized by relatively large amounts of the polyunsaturated fatty acids (PUFA), i.e.,~55% linoleic acid and ~8% α -linolenic acid, of total fatty acids.

- Linoleic acid in soy oil is an essential fatty acid (EFA) belonging to the ω-6 family of PUFAs, which exerts important nutritional and physiological functions.

- α-linolenic acid is also an EFA belonging to ω-3 fatty acid family, and plays an important role in the regulation of a number of metabolic pathways.

- The minor components of crude soybean oil are phospholipids, collectively called lecithin, as well as phytosterols, and tocopherols.

Peanut oil

- Peanut oil, as the name implies, is a type of vegetable oil commonly used in cooking that is derived from peanuts, which are legumes.

- The health benefits of peanut oil include its ability to reduce cholesterol levels, protect heart health, prevent cancer, improve the nervous system, strengthen the immune system, lower blood pressure, and protect the skin.

- Most of the health benefits of peanut oil come from its diverse types of fatty acids, such as oleic acid, stearic acid, palmitic acid, and linoleic acid

Functional sea foods

- Seafoods are inherently functional and possess many components that are good for human health.

- Seafoods and their byproducts are an excellent source of nutraceuticals and bioactives, and these can be extracted/isolated and added to a range of foods thereby enhancing functionality of the foods in terms of human health.

- Fish is an important dietary constituent of several population groups

- Fish contains high quality proteins, vitamins, minerals and lipids, besides being the largest source of w-3 series polyunsaturated fatty acids, especially the eicosapentaenoic (EPA) and docosahexaenoic (DHA), which bring several benefits to human.

- The composition of the eatable portion of fish varies as a function of many factors, such as specie, size, place of capture, water temperature, type of feeding and season

Figure 1: Potential health benefits of seafood

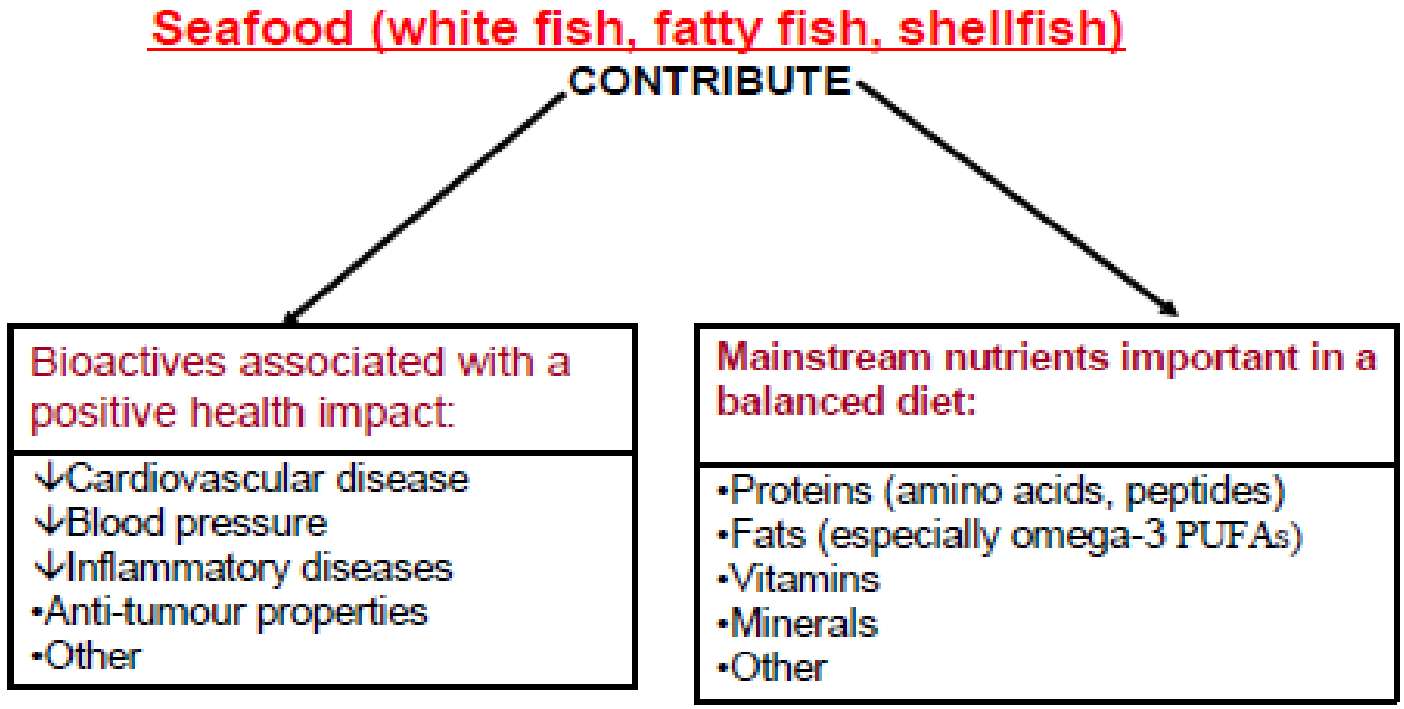

Table 2 - ω-3 fatty acids (EPA and DHA) found in marine species.

Species	ω-3 Fatty Acids
Sardine oil	10 - 20% EPA
Tuna oil	5 - 6% EPA
Whale oil	10 - 15% EPA
Eel oil	8 - 12% EPA
Mackerel oil	10 - 15% EPA
Xerelete oil	7 - 10% EPA
Salmon eggs oil	15 - 30% EPA
Nissin oil	6 - 10% EPA
Samma oil	8 - 12% EPA + 30% DHA
Bonito oil	8 - 12% DHA
Herring oil	14.6% EPA + DHA
Blue small whiting oil	28.9% EPA + DHA
Shark oil	20.6% EPA + DHA
Dogfish oil (head only)	20.3% EPA + DHA
Salmon oil	21.4% EPA + DHA
Cod liver oil	10% EPA + DHA
Oyster (eatable part)	26.8% EPA + DHA

Adapted from Belda and Pourchet-Campos (1991) and Park et al. (1997).

Thank you

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