



ROLE OF OILSEED NUTRITION IN HUMAN HEALTH

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Abstract

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, camelina, crambe, safflower, sunflower, peanut, rapeseed, coconut, oil palm and olives. Oilseeds produced in most of the countries are mostly used for oil extraction. The oil content of small grains for example, wheat is only 1 to 2%, but that of oilseeds ranges from about 20% for soybean to over 40% for sunflower and rapeseeds like canola. The major world sources of edible seed oils are soybean, sunflower, rapeseed, cotton and peanut. Seed oils from flax (linseed) and castor bean are used for industrial purposes. They do not contain an appreciable amount of carbohydrate but contain high level of B vitamins. 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. Oilseeds, are the largest source of vegetable oils even though most oil-bearing tree fruits provide the highest oil yields

Key Words: Oil Seed, Nutrition, Crop, Seed Oil, Vegetable Oil, Soyabean, Sunflower, Yields, Carbohydrates

Introduction

Oilseeds, such as soybean, cottonseed, rapeseed (canola), sunflower seed and peanut, are annual plants They are the largest source of vegetable oils even though most oil-bearing tree fruits provide the highest oil yields (e.g. olive, coconut and palm trees) Oilseeds are also used in animal feed because of their high protein content. Their seeds contain energy for the sprouting embryo mainly as oil, compared with cereals, which contains the energy in the form of starch . This article reviews the main types of oilseeds; their production and processing into oil. It focuses on the role of oilseeds and their byproducts in human health and disease, and highlights new developments that may

provide even more benefits for health in the future. Although oilseeds can be eaten whole, the majority are crushed to produce oil. About one-sixth of production is retained as seed for planting and for food (animal and human) (1). Most oils are obtained from oilseeds using a two-step process (extraction and refining). The aim is to obtain a clean product consisting mainly of triglycerides (a glycerol molecule backbone with three fatty acid molecules branched off it). Before extraction, the seeds are cleaned using sieves, aspirators and magnets to remove foreign matter. Some oilseeds are then dehulled or decorticated –, e.g. sunflower seeds and cottonseed – before being conditioned (cooked) and ground. Conditioning inactivates enzymes and gives the seeds an optimal plasticity, while grinding reduces the size of the oilseed particles. Oil can be extracted from seeds either by pressing (using a screw press) or by the use of solvents (mainly by percolating the solvent through the prepared seeds). The oil produced then goes through a series of refining processes to remove unwanted components which may affect taste, smell, appearance or storage stability (2). Examples include:

- Degumming, which removes a range of substances from the oil which would separate out on storage.
- Neutralisation, which reduces free fatty acids (FFA) and the oxidation products of FFA.
- Deodorisation, which reduces the level of FFA and removes odours, off-flavours and other volatile components from the oil to ensure the oil has an acceptable taste and shelf-life. Crude oil can also be refined using physical methods but this is not suitable for all oilseeds, e.g. cottonseed contains a thermally unstable compound called gossypol which would turn the oil black. Refining removes most of the contaminants that might be in the oil, including pesticides and aflatoxins. If the refining process is carried out correctly, there is almost no change in the fatty acid composition of the oil. Three main processes can be used to modify the composition of oils:
 - Fractionation can be used to provide more functional products, e.g. high-stability oils. This physical process makes use of the different melting points or solubility of triglycerides to separate them into fractions.
 - Hydrogenation, sometimes called hardening, is used to reduce the degree of unsaturation by the addition of hydrogen. During the process hydrogen is added to the vegetable oil in the presence of a catalyst; some of the cis double bonds in the oils are isomerised to trans double bonds. Hydrogenation is used to either change the physical form of the oil to improve product functionality or to improve oxidative stability. Margarine can be made using hydrogenation, although many of the high PUFA margarines are produced using emulsifier technology .
 - Interesterification changes the physical properties of the oil (e.g. different melting and crystallisation characteristics) by changing the order of distribution of the three fatty acids within the triglyceride molecules. This process does not change the fatty acid composition. Commercially this process is used for the production of confectionary fats, cooking oils, frying fats and shortenings (3).

Results and discussion

Oilseed crops generally are one of the most important crops in the world. Their role in human diet and industrial application cannot be under-estimated. The major oilseed crops include soyabean, coconut, oil palm, sesame, rapeseed, sunflower, safflower, olive seed, etc. The by-products (hull, meal and oil) of oilseed crops had been integrated into human and animal diets due to its nutrient compositions. Majority of the oilseed meal consists of proteins and high contents of essential amino acid which are beneficial to human health and wellbeing. Likewise, the fat yields of oilseed crops are generally high, though varied from crop to crop (specie), and methods of extraction; high polyunsaturated fatty acids contents also prevent against coronary heart disease (4). Apart from the food value of oilseeds, several industrial products such as biodiesel, fertilizer, medicine, cosmetics, animal feeds, fibers, paint, button etc. have also been reported. Oilseed crops are promising crop with high potentials to improve human diets, prevent malnutrition and food insecurity and to provide employment through income generation in the society. Several researches had been carried out on the extraction of oil from oilseeds using different methods, production of improved breed of oilseed and detoxification of oilseed meals. This paper focuses on the role of oilseed crops in the human diet and industrial utilization. Oilseed crops are grown across the globe for the valuable edible oil that they produce. Additionally, the meal fraction from many oilseeds, that part of the seed after the oil is removed, is used as an important high-protein animal feed product. The uses for the oil from these crops are becoming increasingly diversified for human, animal, and industrial applications. The biodiesel industry in particular is taking an increasing proportion of vegetable oil production. Increased production and improved quality through better farming techniques and plant breeding are helping to keep pace with this increasing demand (5,6).

Conclusion

Besides cereals and pulses which form important sources of protein in the diet, oilseeds and oilseed meals represent an abundant and an important source of proteins which have not been fully utilised so far for supplementing human diet. To combat malnutrition, oilseeds can be supplemented in the food products. Incorporation of oilseeds in small amounts can be an effective measure in treating various diseases. Supplementing the routine diet with oilseeds will surely make us healthier (7).

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