

## OAT IS A MULTIFUNCTIONAL CEREAL CROP

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### ABSTRACT

Oat is a multifunctional cereal crop which can be used for animal feed as well as human food. Oat is having numerous nutritional quality and health benefits also. It contains important amino acids, protein, beta-glucans, antioxidant, soluble fiber etc. These compounds are known for reducing risk of heart disease, lowering cholesterol, high blood pressure, diabetes etc. It is an expensive nutritious crop and used in multiple sector of food, pharmaceuticals, cosmetics etc. It is a cool season crop, belongs to gramineae family and mainly grown as a fodder crop but occasionally grown as grain crop.

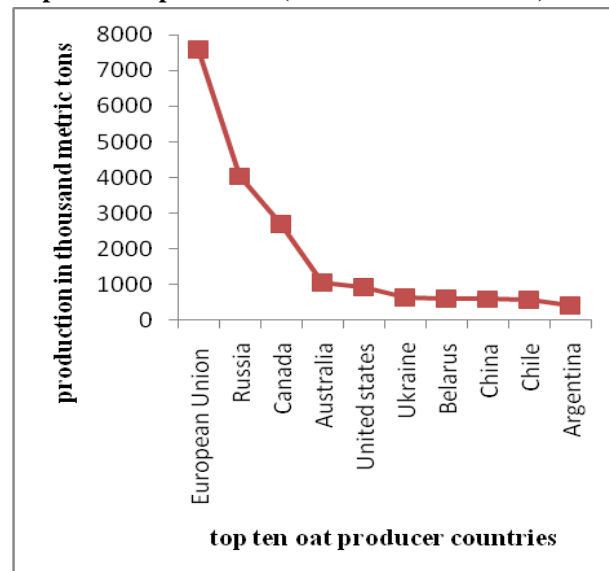
### INTRODUCTION

Oat (*Avena sativa* L.) is sometimes known as common oat. It is a popular fodder crop. It is well adapted to cooler environment. It requires optimum temperature 15-25°C with moist conditions and thrives best in loam to clay loam soil with adequate drainage. It produces satisfactory yields on heavy or light soils with proper moisture. Seed rate of 60-70 kg/ha is recommended for its cultivation. Low tillering varieties should be sown with 20-25 cm row spacing while higher tillering type should be sown 30 cm apart by dibbling method. Sowing time varies from one location to other. Normally, sowing should be started in early October to end of November in North-West to East Zone of the country. The average green fodder yield from single, double and multi-cut varieties of oat ranges from 30-45, 40-55 and 45-60 tonnes/ha respectively. If crop is left for seed, 25 tonnes/ha green fodder from first cut and 2.0-2.5 tonnes/ha seed and 2.5-3.0 tonnes/ha straw is obtained. Oat based cropping system are 1) Sorghum-oat-maize 2) Maize-oat-maize 3) Cowpea-oat + mustard-maize + cowpea, 4) Sorghum + cowpea-oat + lucerne.

Oats are an important source of livestock feed worldwide, both as a nutritious grain and as forage. It is a good source of protein, fiber, and minerals. Oats are the highest- protein cereal- grain crop and, until

replaced by soybeans for livestock feed, were considered the primary protein source in feed rations. Oat production currently ranks sixth in the world grain production statistics, following corn, wheat, barley, sorghum, and millet. It account for less than 2% of total grain production, with the bulk of it used on farms for feed. It is a cereal consumed at lower rates than wheat and rice all over the World. It is among the world healthiest grains. It is a good source of many vitamins, minerals and unique plant compound.

### Top ten oats producers (Thousand metric tons).



### Composition

In a 100 gram serving, oats provide 389 calories and are an excellent source (20% or more of the Daily Value, DV) of protein (34% DV), dietary fiber (44% DV), several B vitamins and numerous dietary minerals, especially manganese (233% DV). Oats has 66% carbohydrates, including 11% dietary fiber and 4% beta-glucans, 7% fat and 17% protein (Varma *et al.*, 2016).

Oat is an excellent cereal for human consumption with higher protein, Ca, fatty acids as compared to other cereal crop. It is a highly nutritional food which contains many of essential amino acids viz., methionine, cysteine, threonine, isoleucine, tryptophan, valine, leucine, histidine, phenylalanine and tyrosine which are essential for human body (Biel *et al.*, 2009). Oat also contains antioxidant properties due to presence of tocopherols, tocotrienols, and flavanoids. Oats and oats products are generally considered healthy and the consumption of oat bran is believed to lower LDL (lower density lipoprotein) cholesterol.

### Uses and nutritional properties of oat

Oats contain large amounts of unique soluble fibers called beta-glucans which has numerous health benefits such as lowering cholesterol; reducing blood sugar and insulin responses, relieved constipation and other improved immune function. Oat components such as protein and antioxidants can be used as stabilizers, emulsifiers, and food extenders in industrial food processes. Whole grain cereals such as oats are important sources of phenolic compounds. Phenolic compounds are of interest because of their high antioxidant capacity and potential health benefits. Especially in recent years, there has been renewed interest in oats and oat products as bioactive high-value sources for human health in industries such as food, pharmaceutical and cosmetic.

Oatmeal is inexpensive nutritious food which is widely used in present days. Oatmeal is also consumed as whole like other grains such as wheat, rice etc. A number of oat products are available commercially like oatmeal for porridge and ready to eat cereals such as muesli and granole remain the most popular consumer product in market. The nutritional benefits of oat increased interest of food industry in using oats as food ingredient in various food products including infant food, oat milk, beverages, breakfast cereals, and biscuits. Muesli and granola are common food items made with oat flakes and are eaten without further cooking. Oat milk is another product which is a tasty,

nutritious and cheaper alternative to dairy milk. Western herbalists regard oats as a tonic for the nervous system. It has high fiber, zero fat, vitamin E, folic acid, phytochemicals ( $\beta$ -carotene), cholesterol and lactose free. Oats have micronutrient such as vitamin E, folate, zinc, iron, selenium, copper, manganese, carotenoids, betaine, choline, sulphur containing amino acid, phytic acid, lignins and alkyl resorcinols.

### Role of oat in human health

In last few years scientist has focused on phenolic amides from plant based food which is good for human health. These phenolic amides have antioxidant properties and potential therapeutic benefits including antiinflammatory, antiproliferative, and antigenotoxic effects (Boz, 2015). In oats phenolic amides are present in form of AVAs (anthranilic acid amides). Avenanthramides are a group of naturally occurring phenolic amides found only in oats. The antioxidant activity of avenanthramides is 10–30 times higher than those of the typical cereal components such as phenolic acids. Oat also contains linkage  $\beta$ -glucan which may help lower blood and low density lipoprotein (LDL-C) cholesterol. Oats are therapeutically active against diabetes, high blood pressure, inflammatory state rather than other grain which are predominantly insoluble in other grain such as wheat or rice. This makes oat a unique cereal. The antioxidants are concentrated in the outer layer of the kernel in the bran fraction of the oat grain.

### Soluble fiber

Oat bran is the outer casing of the oat. Its daily consumption over weeks lowers LDL ("bad") and total cholesterol, possibly reducing the risk of heart disease. Beta-glucans one type of soluble fiber present in oats are known to lower cholesterol. Beta-D-glucans, usually referred to as beta-glucans, comprise a class of indigestible polysaccharides widely found in nature in sources such as grains, barley, yeast, bacteria, algae and mushrooms. In oats, barley and other cereal grains, they are located primarily in the endosperm cell wall. The oat beta-glucans health claim applies to oat bran, rolled oats, whole oat flour and oatrim, a soluble fraction of alpha-amylase hydrolyzed oat bran or whole oat flour. Oat beta-glucans is a viscous polysaccharide made up of units of the monosaccharide D-glucose. Oat beta-glucans is composed of mixed-linkage polysaccharides. The percentages of beta-glucans in the various whole oat products are: oat bran, having from 5.5% to 23.0%; rolled oats, about 4%; and whole oat flour about 4%.

### Fat

Oats have the highest lipid content (>10%) after maize. The polar lipid content of oats (about 8–17% glycolipid and 10–20% phospholipid or a total of about 33% is greater than that of other cereals, since much of the lipid fraction is contained within the endosperm.

### Protein

Oats are the only cereal containing a globulin or legume-like protein, avenalin, as the major (80%) storage protein. Globulins are characterised by solubility in dilute saline as opposed to the more typical cereal proteins, such as gluten and zein, the prolamines (prolamins). The minor protein of oat is a prolamine, avenin. Oat protein is nearly equivalent in quality to soya protein, which World Health Organization research has shown to be equal to meat, milk and egg protein. The protein content of the hull-less oat kernel (groat) ranges from 12 to 24%, the highest among cereals.

### Processing of oat

Oats are processed to make it palatable and also to improve nutrient availability. Oat kernel is largely non digestible and is thus milled to make it suitable for human consumption and absorption

Important steps followed for milling oats:

1. **Dehull** – It helps to expose the groat (whole oat grain). Groats are whole grains that include the cereal germ and fiber-rich bran portion of the grain, as well as the endosperm (which is the usual product of milling).
2. **Exposure to heat** – The heat processing helps to inactivate the enzymes that cause rancidity and help in developing flavor
3. **Cut/flake/roll/grind** – Oat groats are cut, rolled, ground, or flattened. These groats of varying sizes are used to make oat flakes/oat flour/oatmeal or as an ingredient in products such as cookies/bread/ bars, etc.

### CONCLUSION

The longer- term outlook for oat production and usage is tied to improvement of nutritional value and expansion of oats in the food sector. Oat compounds provide various opportunities for incorporating oats in functional food products. There is a great need to determine the bioavailability of antioxidants from oat and other food sources and to determine various effects on human and animal health. Oats contain very unique components including antioxidants and beta-glucan. Oat, being a convenience food material consumed by humans irrespective of the age, requires more scientific attention to justify and modify its nutraceutical status in geriatric as well as paediatric diets. Further research and development are needed to determine novel functional compounds in oat to extract these components in fractions that can be incorporated in food products.

### REFERENCES

- Biel, W., K. Bobko and R. Maciorowski. 2009.** Chemical composition and nutritive value of husked and naked oat grains. *Journal of Cereal Science*, **49**: 413-418.
- Boz, H. 2015.** Phenolic amides (avenanthramides) in oats - A review. *Czech Journal of Food Sciences*, **33**: 399-404.
- Varma, P., H. Bhankharia and S. Bhatia. 2016.** Oats: A multi-functional grain. *Journal of Clinical and Preventive Cardiology*, **5**: 9-17.

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