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Oat (*Avena sativa* L.)

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INTRODUCTION

Oats rank around sixth in the world cereal production statistics following wheat, maize rice, barley and sorghum. Oat grain has always been an important form of livestock feed. Oats are an annual plant and can be planted either in autumn (for late summer harvest) or in the spring (for early autumn harvest). Known locally as "**jau**", oats are grown on the foothills of Himalayas, such as in the India State of Himachal Pradesh. Oats remain an important grain crop for people in marginal ecologies throughout the developing world, and in developed economies for specialist uses. In many parts of the world oats are grown for use as grain as well as for forage and fodder, straw for bedding, hay, silage and chaff. Livestock grain feed is still the primary use of oat crops. They are mostly grown in cool moist climates and they can be sensitive to hot, dry weather from head emergence through to maturity. For these reasons, world oat production is generally concentrated between latitudes 35 to 65°N, including Finland and Norway, and 20 to 46°S. Most of the world's production comes from spring sown cultivars, but autumn sowing is practiced along the higher altitude regions, including the Himalayan Hindu Kush range and in regions where summers are hot and dry. Where winters are nutritious grain cereals, high in protein and fibre. The protein of rolled (flakes) oats is generally greater than that found in other cereal grains. Oats are better adapted to variable soil types and can perform better on acid soils than other small grain cereals crops. They are mostly grown in cool moist climates and they can be sensitive to hot, dry weather from head emergence through to maturity. For these reasons, world oat production is generally concentrated between latitudes 35 – 65°N, including Finland and Norway, and 20 to 46°S. Most of the world's production comes from spring sown cultivars, but autumn sowing is practiced along the higher altitude regions, including the Himalayan Hindu Kush range and in regions where summers are hot and dry.

Where winters are severe, such as in Scandinavia, northern states of the US, Canada, and higher altitude regions in the tropics, short season to mid maturing oat cultivars are generally sown. In regions with temperate climates, oats are variously spring, winter and/or autumn sown depending on regional climatic conditions, crop rotation requirements, end use and other farming practices. In warmer regions, spring type oats can are sown in autumn to avoid summer heat and drought. Russia, countries of the former Soviet Union, the US, Canada, Germany and Poland account for about 75% of the world supply of grain oats, seed and industrial grade oats. Since the 1960s the proportion of oats used for feed has declined in the US and Canada, remained unchanged in the former Soviet Union countries and Poland, and increased slightly in Germany. Oats are grown for use as grain as well as forage and fodder, straw for bedding, hay, silage and chaff. Food uses for oats include oatmeal, oat flour, oat ban and oat flakes for use as breakfast cereals and ingredients in other food stuffs. Oats are one of the most nutritious grain cereals, high in protein and fibre. The protein of rolled (flakes) oats is generally greater than that found in other cereal grains. Many of the vitamins and minerals found in oats are combined in the bran and germ. Most oat food products use the entire grow at making it a nutritious cereal grain. Modern plant breeding/oat development focused primarily on oats grown for grain production, not fodder production. This development and investment bias toward grain cultivars is continuing with few exceptions, resulting in very few specific global references in the literature to fodder oats.

'Winter oats', not to be confused with 'winter hardiness', is frequently used in a generic sense, for example spring oats planted in the winter. Winter hardy oats may have a place in the higher cooler reaches of the Himalayan ranges, but it could be difficult to identify winter hardy types specifically for the TAPAFON trialing network. Breeding and selecting for improved winter hardiness is difficult. The trait is genetically complex and field selection is difficult in most environments as it is either too warm or excessively cold for effective selection. Laboratory methods can be used but these are expensive, and not precise. Despite these difficulties progress, intentional or otherwise, has been made in developing oat germplasm with greater winter hardiness.

Oat milk

Oat milk 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 (β-carotene), cholesterol and lactose free.

Industrial benefits

Industrial benefits Viscosity properties of β-glucan can be used in the Bakery industry in products such as biscuits and pastas. Its use could also include frozen desserts, breakfast foods, beverages, meats, on-dairy creamers, and canned soups, especially as fat replacer. The cheese industry can benefits from β-glucan which optimize the process of raw material and improves the cheese structure. The combination of insulin and β–glucan also has very interesting properties that can be used as fat-replacer in products such as low-fat ice-creams. This has been proved to be very successful dietary sources of the soluble fibre β-glucan and has been associated with a reduced risk for many diseases.

Other benefits

Medicinally oats have been used to prevent heart disease and cancers, to enhance immune response to infection and to stabilize blood sugars. They have also been used to treat rheumatism, chronic neurological pain and atonia (weakness) of the bladder. They have been used to treat insomnia, stress, anxiety, depression and nervous exhaustion. Interestingly, an extract of oats was used in

traditional Ayurvedic medicine to cure opium addiction. A case report showed 6 out of 10 opium addicts gave up the drug after a treatment period of 27 to 45 days using a decoction of green oats.

Yield of Oats Crop

Oats are cultivated for fodder purpose, an average fodder yield of 220 to 300 quintals per hectare and an about 5 quintals grain/ha can be obtained.