



FACULTY OF AGRICULTURAL SCIENCES AND ALLIED INDUSTRIES

Mints (*Mentha* sp.) -Importance, chemical composition, origin, distribution, area, production, climate and soil requirements, propagation techniques, planting and after care, training and pruning, nutritional requirements, plant protection, harvesting and processing

Mints are a group of perennial herbaceous plants, belonging to the family Lamiaceae; which yield essential oil on distillation. The various species of mints which are commercially cultivated in different parts of the world are: Japanese mint or corn mint or field mint (*Mentha arvensis*) peppermint (*M. piperita* L.), spearmint or lamb mint (*M. spicata* L.) and bergamot mint or orange mint (*M. citrata* Ehrh.).

Origin and distribution

- Mint is believed to have originated in the Mediterranean basin and, from there, spread to the rest of the world by both natural and artificial means.
- USA is the major producer of peppermint and spearmint.
- Bergamot mint is a native of Europe and has been naturalized in eastern USA.
- It grows successfully in the temperate and subtropical region of India.
- In India, Japanese mint is grown mainly in the Terai region, extending to parts of the Indo-Gangetic Plains and parts of Punjab in North-western India.

- The total area under mint cultivation, which is mostly confined to Uttar Pradesh and the Punjab, is around 10 000 ha.

Area and production

- *M. arvensis* is cultivated in about one lakh hectares in India predominantly in UP, Terai region and the annual production of menthol from India is 8000 ton.

Description of the Species of Mint

- ***M. arvensis*** (Japanese mint) is a downy, perennial herb, spreading by root-stocks which creep along the ground or just under the surface and root at the nodes. There are three horticultural varieties in this species.
- ***M. piperita*** spreads by a system of branching, underground rootstocks and grows to a height of 45 to 90 cm (1.5 to 3 ft).
- ***M. citrata*** grows up to 30-60 cm height, with decumbent branches and erect ends. The leaves are 1.25-5.0 cm long, thin, bronzy-green, petiolate; smooth. ***M. citrata*** is a hybrid between ***M. aquatica*** and ***M. viridis***.
- ***M. spicata*** propagates by stolons, from which 30-60 cm erect, ascending branches arise. The leaves are sessile, smooth above and glandular below, the apex is acute and up to 6.5 cm long
- Another variety of spearmint known as scotch spearmint (*M. cardiaca* . (S.F. Gray Baker)) is cultivated in the USA to a limited extent.

Chemical composition and uses

- **Japanese mint (*M. arvensis*)**
 - Japanese mint is a primary source of menthol. The fresh leaves contain 0.4-6.0% oil. The main constituents of the oil are menthol (65-75%), menthane (7-10%) and menthyl acetate (12-15%) and terpenes (pinene, limonene and camphene). The menthol content of the oil varies, depending on the climatic conditions. Generally, it is higher in tropical regions.
 - Menthol is used in the flavouring of a large number of pharmaceutical and oral preparations like toothpastes, dental creams, confectionery, beverages and other items like tobacco, cigarettes and paan masala. Medicinally, it is an' excellent carminative and gastric stimulant. When applied externally, it acts as a mild analgesic.
- **Peppermint (*M. piperita*)**
 - The fresh herb contains essential oils ranging from 0.4 to 0.6%. The constituents of peppermint oil are almost similar to Japanese mint oil. However, the menthol content is lower in peppermint oil and varies between 35-50%. The other constituents are menthyl acetate (14-15%), menthone (9-25%) menthofuran and terpenes like pinene and limonene.
- **Bergamot mint (*M. citrata*)**
 - Linalool and linalyl acetate are the main constituents of Bergamot mint oil. The oil is used directly in perfumes. Cosmetic preparations like scents, soaps, after-shave lotions and colognes also contain this oil.
- **Spearmint (*M. spicata*)**
 - The principal constituent of spearmint oil is carvone (57.71%) and the other minor constituents are phellandrene, limonene, L-pinene and cineole. The oil is used mostly as a flavouring in toothpastes and as a food flavouring in pickles and spices, chewing gum and confectionery, soaps and sauces.
- **Seasons**

- In the plains, planting is done during the winter months, whereas in temperate climates, planting is done in autumn or spring from the last week of December to the first week of March or from the first week of January to the third week of February. Late planting always gives poor yields.
- **Soil**
- Medium to fertile deep soil, rich in humus is ideal for the cultivation of mint. The soil should have a good water-holding capacity but water-logging should be avoided. A pH range of 6-7.5 is best.
- **Climate**
- Japanese mint can be grown in all tropical and subtropical areas under irrigation. However, it does not tolerate damp winters which cause root-rot. A temperature of 20-25°C promotes vegetative growth, but the essential oil and menthol are reported to increase at a higher temperature of 30°C under Indian conditions. Peppermint and spearmint cannot be grown profitably in tropical and subtropical areas, especially those areas with very high summer temperatures (41°C) and the ideal yield is obtained only in humid and temperate conditions like in Kashmir and the hills of Uttar Pradesh and Himachal Pradesh. Open, sunny situations without excessive rains during the growing period are congenial for the good growth and development of the oil.
- Bergamot mint can be grown both in temperate as well as sub-tropical areas. However, the yield is higher in temperate climates.
- **Land preparation**
- Mints require thoroughly ploughed, harrowed, fine soil. All the stubble of weeds should be removed before the crop is planted. Manuring may be done at the time of land preparation by adding FYM @ 25 to 30 t/ha. Green manuring may also be done before the mint is planted. Sun-hemp (*Crotalaria juncea* L.) is an ideal green manure crop. Mints are planted on flat land or ridges. Hence, flat beds of convenient sizes or ridges are made according to the spacing recommended.
- **Propagation**
- Mints are propagated through the creeping stolons or suckers. In the case of peppermint and bergamot mint, even runners are planted. Stolons are obtained from the previous years planting. A hectare of well-established mint, on an average, provides enough planting material for ten hectares. About 400 kg stolons are required for planting one hectare of land. The best time for obtaining stolons is during the months of December and January.
- **Planting**
- The stolons are cut into small pieces (7-10 cm) and planted in shallow furrows about 7-10 cm deep with a row-to-row distance of 45-60 cm, manually or mechanically. While planting on ridges, the stolons are planted half-way down on the inner sides of the ridges. The plot is irrigated immediately after planting.

- **Fertilizer application**

- Mint responds very well to a heavy application of nitrogenous fertilizers. The increase in herbage by the application of phosphorus is not as remarkable as in case of nitrogen. Generally, nitrogenous fertilizers @ 80-120 kg; P and K at 50 kg are required for a good crop of mint. However, in *M. arvensis* an increase of up to 160 kg N/ha and, in *M. piperita*, 125 kg N/ha has given increased fresh herbage and essential oil-yield. Potassium application has no significant effect on herb and oil-yield. In *M. spicata*, the maximum herb-yield is obtained with the application of 100-120 kg N/ha. Nitrogen may be applied in three split doses at 1 and 3 months after planting and the third dose after the first harvest of the crop. Boron deficiency reduces both the yield of green herb and the essential oil in peppermint. Increased yields of herb, menthol content and essential oil content in peppermint have been obtained by using a combination of boron and zinc fertilizers.

- **Irrigation**

- The water requirement of mint is very high. Depending upon the soil and climatic conditions, the crop is irrigated 6-9 times before the first monsoon. The crop requires three irrigations after the monsoons during September, October and November. Sometimes irrigation is required during winter, if the plant is dormant and there are no winter rains to encourage proper growth of the underground stems.

- **Intercultural and weed control**

- Uninterrupted weed growth causes about 60% reduction in herb and oil-yields. Hence, mints require weeding and hoeing at regular intervals in the early stages of crop growth. One hand-weeding is required after the first harvest. Combining organic mulch with a combination of 0.5 kg/ha of Oxyfluorfen herbicide and weeding give excellent weed control throughout the crop growth.
- In low temperature areas, the plant becomes dormant in November. In order to give a perennial crop (of 3 years only) in peppermint, replanting is done either in autumn (November-December) or in spring (March-April).

- **Crop rotation**

- The following crop rotations are in practice in Uttar Pradesh (a) Mint-maize-potato (b) Mint early paddy and potato and (c) Mint-late paddy and sweet pea. Whereas, in Punjab, the farmers practice mint-maize and rape seed/mustard and mint-maize and 'potato or mint and paddy rotation. The recommendation for the Terai region of Uttar Pradesh is a 2-year rotation of mint-summer fallowing or millet (fodder) followed by mint on poor fertility lands and mint-wheat-paddy and mint on medium-fertile lands.

Pests and diseases

- **Pests**

- A large number of insect pests attack mints. Among them, the important ones are the leaf-roller, pyralid, the hairy caterpillar and termites.

The attack of the hairy caterpillar (*Diacrisia obliqua* Walk) during the months of April-May causes rapid defoliation. This can be controlled by spraying 5% Dipterex. During the dry months, termite attacks are often observed. These can be effectively controlled by the application of 3% Heptafan @ 50 kg/ha to the soil before planting. Other pests like cut-worm (*Aulucophora favigollis*) also cause damage to the crop. They can be controlled by spraying Thiodon.

Nematodes severely damage the foliage yield of mints. The nematodes can be effectively controlled by the application of neem cake @ 250 kg/ha to the soil.

Diseases

Rust, powdery mildew, wilt, leaf-blight and stolon-rot are the five fungal diseases which have been reported to affect mint to a significant extent under Indian conditions.

Harvesting

- Japanese mint is generally harvested after 100-120 days of planting, when the lower leaves start turning yellow.
- If the harvesting is delayed the leaves start falling, resulting in loss of oil. Further, harvesting should be done in bright sunny weather.
- Harvesting consists of cutting the green herb by means of a sickle 2-3 cm above the ground. A second harvest is obtained about 80 days after the first harvest and the third one after about 80 days

from the second harvest.

- Whereas, in peppermint, spearmint and bergamot mints which are grown in temperate climates, the first crop is ready by the end of June and the second in September or October.
- A good crop of Japanese mint can give as high a yield as 48 t/ha of fresh herb. However, the average yield of mints from three cuttings is 20-25 t/ha. The fresh herb contains 0.4 % oil.

Distillation and storage of oil

- Mint oil is obtained by distilling either the fresh or the dry herb. The distillation is done both in primitive and modern stills; in the former the principle of water and steam-distillation is followed, while in the latter steam generated in a separate boiler is employed. The stems are removed from the dried material prior to distillation, because they constitute 30 to 50 % of the material and contain only traces of the oil.

The average yield of oil is 50-70 kg/ha. Although bergamot mint as well as Japanese mint gives an average yield of 70-100 kg/ha, the yield of peppermint oil is lower with an average of 50 kg/ha.

Storage of oil

Mint oil is a light and golden-coloured, motile liquid and it should be completely free from moisture before storage. It is stored in large steel, galvanized steel or aluminum containers, filled up to the brim to protect against any air remaining inside and placed in a cool storage godown, away from light and humidity.

