

PEPPERMINT

CLASSIFICATION

Scientific name: *Mentha x piperita* Common names: Peppermint, black mint Family: Lamiaceae Of the members of the mint family under cultivation the most important are the several varieties of peppermint (*Mentha x piperita*), extensively cultivated for years as the source of the well-known volatile peppermint oil, used as a flavouring and therapeutic agent.

DESCRIPTION OF THE PLANT

Mentha x piperita L. is a sterile, perennial herb originating from a hybridisation between watermint (*Mentha aquatica*) and spearmint (*Mentha spicata*), and therefore must be propagated vegetatively. The entire plant has a very characteristic sharp, mint odour, because of the presence of the volatile oil.

SPECIES AND CULTIVARS

Two main selections are currently used in commercial essential oil production throughout the industry. 6 Black Mitcham is the original cross. It is highly valued but susceptible to a soil-borne fungal disease, Verticillium wilt. 6 Todd Mitcham is a more wilt-tolerant selection which currently forms the bulk of the world's production. Japan cultivates *M. arvensis*, var. *piperascens* which has a very high menthol percentage, but is inferior in quality to *M. x piperita*. The Chinese cultivate mostly *M. arvensis*, var. *glabrata*. 7.

CLIMATIC REQUIREMENTS

Temperature Peppermint is grown in cool to temperate regions. It needs long day lengths with warm to hot conditions and cool nights for the right balance of oil compounds to be produced during the growing phase. Less desirable compounds, particularly menthofuran, form when the conditions are too warm, especially at night.

Rainfall

Peppermint needs adequate rainfall on a regular basis in excess of 1 000 mm per season if planted on dryland. 8.

SOIL REQUIREMENTS

Peppermint will grow well in most soil types, including heavy, moist soils if drainage is sufficient. On lands that are under water in winter it will not perform vigorously and plants may even die off. The best soils are deep, well-drained, rich in humus, with good moisture retention. Soil samples are taken for analysis to determine base fertility levels before mint is planted. The soil pH should be kept between 5,5 and 7,0.

PROPAGATION

All commercial mint varieties are sterile hybrids and must therefore be propagated vegetatively. Propagation is usually done by using the underground stolons (runners or rootstock) from a nursery site. Dormant stolons are ploughed up. The stolons cannot be stored for more than a few days because they deteriorate rapidly owing to heat or dehydration. Stolons can be planted by hand or mechanically. Stolons should not have too much top growth. About 1 ha of mother material can supply a cropping area of 7 to 10 ha

SOIL PREPARATION

6 Have the soil analysed at a laboratory that will be able to check for mineral deficiencies and excesses, organic status and carbon ratios. 6 A soil analysis will guide the producer in correcting the nutrient status of the soil in order to provide the crop with optimum growing conditions such as a balanced mineral status and correct pH. 6 Soil fertility levels have to be within acceptable ranges before starting a soilbuilding programme. 6 Correct the soil pH according to analysis and soil type. 6 Fertiliser use has to be planned according to whether the crop will be grown inorganically or organically. 6 Soil preparation has to be done according to good cultivation practices. 6 Apply suitable soil preparation practices according to the farming operation. rip, plough, disc, harrow, contour, etc.) 6 If mechanical harvesting and weed control is envisaged, prepare row widths adapted to the machinery to be used.

PLANTING /SPACING

Young shoots are planted 40 to 90 cm between rows and 15 to 45 cm within rows lightly covered with soil. This practice will give a total of 55 000 to 75 000 plants per ha and will cover the soil quickly. A plantation lasts about 3 to 5 years, depending on cultivation, soil and climatic factors. The best yields are obtained from the second year.

PLANTING DATE

The plants are propagated in spring.

DESIGN

The young shoots are transplanted into new soil, in shallow furrows. Another way of planting is to spread the stolons over the land, using a modified manure spreader and then discing it in lightly.

FERTILIZATION

The soil should have at least 120 kg phosphorus and 500 kg potassium available per ha. If the soil sample indicates levels lower than what is recommended, fertiliser should be applied before planting. Peppermint has to be fertilised properly to achieve a good crop. Nitrogen fertilisation is essential for foliage stimulation and improving the flavour and quality of oil. Fertiliser rates are generally high in order to allow good vegetal growth and development of the maximum number of leaves. Frequent nitrogen applications are required throughout the growing season to maintain soil fertility. When manure or organic compost is used, it should be analysed for its properties to ensure correct application rates. The quality of the manure or compost has a great effect on the characteristics of the oil. In trials in the USA application of nitrogen at 200 kg/ha and organic mulch enhanced essential oil yield with improved water-use efficiency. Potassium application was found particularly useful against a form of chlorosis or 'rust' (*Puccinia menthæ*) (Mitchell, 1998).

IRRIGATION

Peppermint requires frequent and adequate irrigation, which is used to supplement rainfall. When the plants are fully developed they are watered at least three times a week. It is important to keep the soil constantly moist, although well drained. The crop has high water demands in summer. Care has to be taken to prevent a waterlogged soil, especially in winter, as this will influence growth. Peppermint can be grown under flood and sprinkler irrigation. Pivots and booms are the most labour-saving irrigation systems.

WEED CONTROL

Weed control programmes should be maintained strictly as weeds compete with mint for available nutrients, thereby reducing yields. Care should be taken when harvesting to avoid inclusion of weeds, which could result in volatile compounds being extracted and reducing the oil quality. Certain weed species are more harmful and can reduce the marketability of the oil. *Amaranthus* spp. (pigweed) and *Datura* spp. (thorn-apple) can reduce oil quality severely. Hand removal of weeds may be necessary. Always remove the weeds in time before they form seed. Annual grasses can be a problem and

have to be removed before they grow too tall. Perennial weeds are sometimes a bigger problem, especially the *Cyperus* spp. (nut sedges). It is more difficult to control these when the crop is established because the chemicals to be used will affect essential oil quality.

PEST CONTROL

Pests on peppermint include cutworms, loopers, mites, weevils, aphids, grasshoppers and soil nematodes. Most pests are troublesome on older mint fields, especially nematodes. Using rootstocks from old lands for planting new lands can introduce pest problems into the new lands. For prospective producers of herbal and essential oil crops, the following pest control guidelines are recommended:

PEST CONTROL GUIDELINES

- Natural pest control measures should be used as first choice.
- Follow a pest management programme.
- Regular scouting of the crop is needed.
- Early detection and management of pest problems can prevent major problems.
- Correct identification of pests and natural beneficial predators is essential. 6 Introduce and use biological control measures, natural predators, parasites, nematodes, fungi, bacteria and beneficial microorganisms. Avoid using chemicals that kill such organisms.
- Other organic methods such as reflective mulches, insecticidal soaps, plant extracts, traps and handpicking of pests, water sprays and vacuum, can be used.
- Use controls that target specific taxonomic groups, eating habits, or life stages: insecticidal soaps, horticultural oils, pheromones, and growth-regulating natural substances such as neem oil.
- The knowledge of certain herbs that repel or attract insects can be used in companion planting for pest control.
- If organic practices are to be applied, make sure that products are certified for use.

DISEASE CONTROL

Peppermint is susceptible to several diseases of which rust, Verticillium wilt, leaf spot diseases and anthracnose are important.

VERTICILLIUM WILT

is a fungus which is soil-borne and can survive in the soil indefinitely once spores build up in the soil. Infection occurs through natural openings and wounds on roots. Crop rotation is only effective if it has been followed from the beginning, before the pathogen is well established. It is good to rotate, using a nonsusceptible crop every 3 to 4 years. Onions, maize and soya-beans are good crops to rotate with mint to reduce the likelihood of buildup of verticillate propagules in the soil. Todd's Mitcham peppermint is less susceptible than Black Mitcham peppermint.

MINT RUST

is considered a severe problem. The symptoms include light-yellow, blister-like lesions on young shoots in the spring, and brownish-red spots surrounded by a yellow halo on the leaves later in the season. Affected leaves fall off and defoliation can be severe. It is important to plough the mint beds to bury overwintering spores. Elimination of volunteer mint plants will also reduce the available rust inoculum.

ROOT LESION NEMATODE

(*Pratylenchus penetrans*) and other plant parasitic nematodes such as *Trichodorus* are frequently found on peppermint and nematodes are soil-inhabiting pests that feed on the roots and stunt plant growth. Nematodes have a synergistic relationship with *Verticillium* wilt in that they will increase the number of wounds through which the *Verticillium* can infect the plants, thereby causing the plant to express more severe wilt symptoms.

OTHER CULTIVATION PRACTICES

Mint is sometimes cultivated as a fresh herb or processed in dried form for tea and culinary use.

HARVESTING

Maturity time and methods Timing of harvest is critical to the quality of the oil.

Preharvest sampling can be done to ensure that harvesting occurs when oil quality is best. In this sampling changes in oil composition from early January onwards are examined. Optimum oil yield and quality is usually obtained when 10 % of the crop is in the flowering stage. Harvesting should be carried out on a dry, sunny day, in the late morning, when all traces of dew have disappeared. The crop is cut, using conventional hay mowers. It is very important to make a clean cut without splintering the stems or shattering of the leaves as this will result in lower oil yields and inhibit regrowth of the plants. The cut mint is left in the field to wilt, after which it is chopped up with a forage harvester into a mobile distillation pot or trailer to be transported to the stationary distillation facility. Lower moisture content ensures economic oil extraction. Even under the best conditions of wilting, there is a certain loss of essential oil from lying in windrows or heaps for any length of time. Fermentation can occur if not checked, reducing the quality and quantity of the oil. Some producers prefer to distil the crop fresh as soon as cut. If the crop is well irrigated and matured in time, a second crop can be obtained in the same year. Unlike other essential oil plants, oil yield of peppermint will decrease rapidly if the plant is subjected to either physiological or pathological stress.