

## The Japanese Peppermint—*Mentha arvensis* L *Possibilities of cultivation in South India*

by

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Peppermint oil, and menthol crystals prepared from it, are very extensively used in medicine and are said to be excellent carminative, gastric stimulant, antiseptic and preservative. These find great use in the preparation of dental creams, mouth washes, tooth pastes and chewing gums, and as flavouring material in confectionery. All essential oils, like peppermint oil, are aromatic oils prepared from vegetable sources, and are capable of volatilisation without decomposition, and are practically insoluble in water but soluble in most organic solvents.

Peppermint oil is got by distillation from two species of plants—*Mentha piperita* and *Mentha arvensis*. *M. piperita* is grown in England, U. S. A., Canada, Germany and France, while *M. arvensis* is grown in Japan and China from where it has been introduced into other countries like U. S. A. and Brazil, and very recently to India. In England there are two varieties of *M. piperita* known as the black and white varieties; the black variety is said to be coarser and yields more oil though the oil is of a less delicate aroma. Peppermint oil can generally be kept for years without deterioration; in fact, the oil improves in smell as it gets older though it becomes darker and more viscid. The peppermint oil is colourless, yellowish or greenish in colour. It has an agreeable, refreshing odour and a cooling persistent taste.

There are nearly 250 species of *Mentha* growing wild or cultivated in different parts of the world; but very few yield any appreciable quantity of oil of economic value except the two species mentioned above. The total annual output of peppermint oil in the world is estimated to be somewhere near four million pounds, and China and Japan produce the largest quantity, nearly 70% of the world's production. The Japanese species of *Mentha* is *M. arvensis* L. — subspecies *haplocaly* Var. *piperascens*.

Guenther in his book on "Essential Oils", gives the chief differences between *M. arvensis* and *M. piperita* as follows;—"*M. arvensis* is a perennial herb spreading by rootstocks which creep along the ground or just under the surface and root at the nodes. The erect stem is 1–3 ft. high, usually branched, bearing clusters of flowers at the axils of the leaves. *M. piperita*, on the other hand, bears flowers in more or less interrupted, terminal, usually leafless, spikelike panicles. *M. arvensis* is covered all over with soft white hairs, while *M. piperita* is glabrous throughout and the hairs, if present, are sparse and are mostly near the

nodes at the lower part of the stem. The leaves of *M. arvensis* are lanceolate or oblanceolate with triangular blunt teeth, acuminate at the base of the petiole, while *M. piperita* leaves have sharper acuminate teeth and the base may be acuminate or acute with the petiole scarcely marginate. *M. piperita* rarely, ever produces seeds while *M. arvensis* produces seeds freely".

Peppermint oil industry is a very old one, the plants having been known in England as early as 1750 and much earlier in China and Japan; it was introduced from China into Japan about 1700 years ago. It has been known to grow wild in China very much earlier, as early as 984, and used for cooling beverages and as an eye-wash. The first organised cultivation was started in China only in 1913 and began to develop during the years 1931 — 1935. In China it is grown as a yearly crop with two harvests, yielding 1—2% of oil and 45% of menthol. Propagation in China is usually by means of runners. It is also done by vegetative cuttings from the herbaceous portions of the plant which are rooted in sand and then transferred to pots or planted directly in the field. Though the peppermint plant was introduced into Japan as early as 1700 years ago, it was only by about 1870 that large scale cultivation was done and the first lot of menthol was exported in 1883. The industry flourished well and by 1914 the output of oil and menthol amounted to half of the world's total production. Somewhere about 1923, Japanese mint was introduced into Brazil where it flourished for sometime and reached its highest development by 1845, but unfortunately by 1947 the acreage declined considerably. In Brazil it is grown as a mixed crop with rice, maize, cotton and peanuts, and not as a single crop.

**Menthol Cultivation in India:** There are three indigenous varieties of *Mentha* in India, viz., *M. arvensis* and *M. sylvestris* growing in Kashmir, and *M. viridis*, growing in South India, all the three known locally as "Pudina" and generally used for culinary purposes when green, and said to be useful in setting right stomach troubles. None of these, however, yield peppermint oil of quality or quantity and practically no menthol. India's annual requirement of peppermint oil and menthol is said to be of the value of 50 lacs of rupees and the entire quantity has to be imported from abroad, China, Japan and U. S. A. sharing the supply. During the period 1956—'57 India imported oil worth Rs. 6,01,527, in 1957 menthol worth Rs. 61,31,212 and oil worth Rs. 4,47,350 and in 1958 the import was Rs. 41,33,946 worth of menthol and Rs. 3,87,190 worth of oil. This foreign supply was greatly handicapped since the last World War owing to import restrictions and consequent prohibitive cost; the price of menthol has gone up to Rs. 50-60 a pound from Rs. 6-10 a pound during pre-war days.

In the latter part of the nineteenth century attempts were made to grow the European mint, *M. piperita* in places like the Nilgiris, Mysore

and Delira Dun; but the experiment was given up as the oil and menthol from the crops did not come up to the official standard. Even in Europe it is said that the standard does not satisfy the British and the U. S. A. pharmacopoea. The indigenous variety of *M. arvensis* in Kashmir does not yield sufficient oil with good menthol content; but the Japanese variety, *M. arvensis*, sub-species *haplocaly*, var. *piperescens*, is found to yield about 30-60 pounds of oil per acre and give 1-3%, with a menthol content ranging from 65-80%. So the Japanese mint has been introduced into Kashmir and cultivated there by the Regional Research Laboratory, is reported to be thriving well, and yields oil with menthol content comparing very favourably with the figures in Japan and Brazil.

**Japanese Mint in South India:** Peppermint oil and menthol are very much in demand in the preparation of scented betel nuts and the difficulty of obtaining these easily, and at convenient prices seems to affect the industry. Mr. M. K. Krishna Chetty, the proprietor of the famous "Asoka" betelnut factory at Coimbatore, visited the last "India Exhibition, 1958" and saw a demonstration by the Regional Research Laboratory, Jammu and Kashmir of the cultivation of the Japanese mint and the preparation of peppermint oil and menthol and on his return to Coimbatore, we had a discussion as to whether we could try the cultivation in South India and we decided to make a trial. The Regional Research Laboratory was contacted and on receipt of detailed information on the subject it was found that Coimbatore might afford favourable conditions for trying the crop and a small plot of ground was got ready as per instructions from Kashmir Laboratory and three dozen rooted suckers were got down and planted in March 1959. On account of the warm dry weather prevailing at the time, the growth of the plants was not very good; but with the receipt of a few showers in April, the crop picked up and gave us hopes and we decided to get a further consignment of 400 suckers. This lot was planted in an adjoining plot in the factory compound and all the plants came up. The two lots are flourishing well. The March crop came to harvest by the end of August and the second crop (planted in June) by October and the two together yielded about 67 lbs. of leaves which were used for the distillation of the oil, which gave 2.5%, very well comparable to 1.6-2.4% obtained in Kashmir and other places. Sri Nabhar, Special Officer, Medicinal Plants Organisation of the I. C. A. R. and Sri Rhandhawa, Vice-Chairman, I. C. A. R., who visited the plots, remarked that the performance of the crop compared very well with the condition of the crop in Kashmir. Trials in other places round about Coimbatore with root suckers from our crop are equally encouraging. The crop has been seen to thrive in other places in South India, such as Bangalore, Mysore, Ramnad, Trichinopoly and Tanjore districts and is also coming up well. Observations of plants attempted at various elevations in the Nilgiris indicate that the higher elevations are not so well suited for the growth of the crop as the lower ones; the

trials are being continued. It is proposed to try the crop on a bigger scale in a few places with suitable conditions of soil, climate, rainfall, etc., to work out the economic aspect before launching on a commercial scale. It is a satisfaction to see that the crop will thrive well in South India with good yield of oil and menthol.

The following information about the cultivation of menthol plant, gathered from our own experience and available literature on the subject, will, it is hoped, be useful to those who are interested in the venture.

**Soil:** Peppermint is a water-loving plant and the growth of the crop and the yield of the oil and menthol are greatly influenced by the nature of the soil and climatic conditions. A good light, sandy or loamy, well-drained soil, rich in humus, with little rain during the harvesting season is ideal for the crop. Virgin forest lands on mountain slopes with an altitude of 250–400 ft. is said to offer very good conditions. Liberal irrigation after planting and after each harvest enables healthy growth. A place with good sunshine in summer produces high menthol content. The presence of weeds has a harmful effect on the quality of the oil.

**Cultivation:** After the plot has been well ploughed and well manured, rooted fleshy suckers taken from old and healthy plants and cut into pieces 3–4 in. long, are planted, end to end, in rows 2–3 ft. apart and covered with a thin layer of soil. The crop responds to organic manures well and farmyard manure or compost at the rate of 12–15 tons per acre may be applied before planting. Subsequent dressings of inorganic fertilisers like ammonium sulphate, superphosphate or potassium sulphate at the rate of 200 lbs. per acre may be advantageous. Though the plants are slow in establishing at first, taking sometimes two or three weeks, with proper irrigation and care, the growth later on is very rapid and the crop generally comes to flower in 3 or 4 months when it is ready for harvest. In another three or four months later a second harvest can be had and a third one in another 3 or 4 months, and generally it is possible to take three harvests in a year if the crop is in good condition. A crop can be kept for three years at a stretch and then replantation is necessary. If the same field is to be used again, a rotation with some leguminous crop may be given before planting mint again. In the second year the crop grows vigorously, the rows disappear and the field looks even and is then known as meadow mint as distinguished from the ridge mint as it is known in the early stages. For aerating the soil then intercultivation by a cultivator may be necessary.

**Harvesting:** This is generally done when the crop is in full bloom, or, better, when the buds are still tight but ready to blossom, on a bright sunny day, after the dew has disappeared. It has to be done carefully so that the quality of the oil may not be affected. The cut plants are bundled and hung up in open air or in shade for drying until they weigh

about 1/3 or 1/4 of the original green weight; they should not be completely crisp nor should they be allowed to ferment. The leaves may be separated from the stems which constitute nearly half the quantity as the latter contain only traces of oil.

**Distillation:** An ordinary still, generally used for the distillation of other essential oils like Eucalyptus oil is used. The still is charged with the dry herb and heat is applied directly or by steam; steam distillation is preferable as it prevents the charring of the material. The whole process takes about 2-2 1/2 hours for one charge. The oil contains at first a lot suspended impurities which have to be filtered away. The golden yellow oil, with the characteristic peppermint smell and slightly bitter taste, contains 79-80% of menthol which can be separated in crystal form on cooling the oil to low temperature by repeated chilling and freezing. Nearly 40-50% of the menthol can thus be separated in trays and dried at ordinary temperature and traces of the adhering oil removed. The remaining oil that is known as dementholised oil can be used for the same purposes as peppermint oil.

From the excellent performance of the mint crop we have seen so far, it is hoped that when grown with greater attention with the experience gained, the industry will prove very encouraging and attract more people for greater and more extensive cultivation of the crop, relieving the country of the present crisis in menthol supply, not only making India self-sufficient in the commodity but even able to export to other countries in the long run.

**NOTE:** One acre of the crop is expected to yield 175 to 209 maunds of green leaves in a year, which when dried, will give 25 to 80 maunds of dry material for distillation of peppermint oil. At the rate of 2%, this material is expected to yield 37½ lbs. of peppermint oil proper, or when crystallised, 18¾ lbs. of menthol and 18¾ lbs. of dementholised oil. The prevalent price of peppermint oil is Rs. 25/- per pound, that of menthol Rs. 66/- a pound, and of dementholised oil Rs. 15/- a pound.

		First Year					
Expenditure	Rs.	A.	P.	Income	Rs.	A.	P.
3400 suckers @ Rs. 2/- a doz.	536	0	0	37½ lbs. peppermint oil	937	8	0
3 ploughings @ Rs. 10/- each	30	0	0	Profit	75	8	0
12 tons of F. Y. manure	120	0	0		-----		
1 cwt. of Ammonium sulphate	50	0	0	or			
1 cwt. of superphosphate	30	0	0	18¾ lbs. menthol	1,218	12	0
Labour for planting	15	0	0	18¾ lbs. Dementholised Oil	281	4	0
12 irrigations	36	0	0		-----		
3 harvests (labour)	15	0	0	Total	1,500	0	0
Distillation & crystallisation	30	0	0	Profit	638	0	0
Total	862	0	0		-----		

**Second Year**

NOTE: During the second and third of the crop there is no expense on account of suckers, preliminary ploughing and farmyard manure.

<i>Expenditure</i>		<i>Income</i>	
	Rs. A. P.		Rs. A. P.
1 cwt. of Ammonium Sulphate	50—0—0	Peppermint Oil as before	937—8—0
1 cwt. of superphosphate	30—0—0	Net profit	<u>776—8—0</u>
12 irrigations	30—0—0		
3 harvests	15—0—0	or	
Distillation & crystallisation	30—0—0	Menthol and Dementholised	
		Oil as before	1,500—0—0
<b>Total</b>	<u>161—0—0</u>	Net profit	<u>1,339—0—0</u>

**Third Year**

	Rs. A. P.		Rs. A. P.
Expenses as in 2nd year	161—0—0	Income as in 2nd year as	
		Peppermint oil	937—8—0
		Net profit	<u>776—3—0</u>
		or	
		Menthol and Dementholised	
		oil	1,500—0—0
		Net profit	<u>1,339—0—0</u>

Net profit for the three years together:

A. As peppermint oil	1,628—8—0	Annual profit	542—13—4 or
		Roughly	<u>540—0—0</u>
B. As menthol and dementholised oil	3,316—0—0	Annual profit	1,105—5—4 or
		Roughly	<u>1,100—0—0</u>

**LITERATURE CITED:**

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