IS 13358-4 (1993): Codes of cultural practices for aromatic plants, Part 4: Mentha (Japanese mint) and Mentha citrata (Bergamint) [PCD 18: Natural and Synthetic Fragrance Materials]

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(Reaffirmed 2000)

भारतीय मानक

सुगन्धित पौधों की खेती — रीति संहिता

भाग 4 मेन्था अरवेन्सिस और मेन्था सिट्रेटा

Indian Standard

CODE OF PRACTICE FOR CULTIVATION OF AROMATIC PLANTS

PART 4 *MENTHA ARVENSIS* (JAPANESE MINT) AND *MENTHA CITRATA* (BERGAMOT-MINT)

UDC 665·526·22

BUREAU OF INDIAN STANDARDS
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NEW DELHI 110002

September 1993

Price Group 1

FOREWORD

This Indian Standard (Part 4) was adopted by the Bureau of Indian Standards, after the draft finalized by the Natural and Synthetic Perfumery Materials Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

Natural perfumery materials like essential oils, are known to vary in olfactory and other physico-chemical characteristics depending on different agro-climatic conditions. Working on this premise, the committee had quite some time back published IS 6774 : 1972 'Classification of essential oil bearing aromatic plants'. This standard covers information relating to botanical identity, habitate, economic stage of growth, harvesting season and part of the plant used for essential oil production. These factors have long been recognized to govern the quality of the natural essential oils.

Realizing the importance of endemic variations of these factors including fertilizer, irrigation, modern technology and appropriate agronomic practices developed through a process of evaluation trials at recognized cultivation centres for aromatic plants in the country, the committee decided to amplify these efforts directionally and prepare specific codes for good cultivation practices for individual aromatic plants used for essential oil production. This series of Indian Standards for specific aromatic plants is expected to provide guidance to prospective cultivators, producers and users of the essential oils to obtain the optimum yield of the essential oil of an acceptable quality for the perfumery industry.

Mentha arvensis

The whole of oil of *Mentha arvensis* L. is primarily used all over the world as a raw material for the production of menthol. Its dementholized product which is partly exported is used in India for manufacture of menthol, liquid menthol, methone and mint terpenes by adopting appropriate processes and technology. The oil is used in pharmacy and also as a flavouring agent in oral care products like toothpastes, toothpowders and mouth washes.

Mentha Citrata

Oil of *Mentha citrata* is obtained from the fresh plants of *Mentha citrata* Ehrh, the so called 'Bergamot-Mint'. The commercial cultivation of *Mentha citrata* crop in India is of recent origin, centered chiefly in Rampur and in other parts of Uttar Pradesh especially Kashipur, Budaun, Moradabad and Haldwani.

The cultivation practices followed for *Mentha citrata* are similar to that of *Mentha arvensis* and *Mentha piperita*. It is planted in the month of January and two harvests are obtained in the month of May-June and July-August. The physico-chemical characteristics of the oil obtained from these crops are different from each other. Oil extracted from first crop is rich in linalyl acetate while in subsequent crops it goes down considerably. Generally oil obtained from second crop is used for manufacture of linalool and linalyl acetate.

In the preparation of this standard, assistance has been derived from R & D work of ICAR and CSIR laboratories besides State Directorates and Institutions for medicinal plants.

Indian Standard

CODE OF PRACTICE FOR CULTIVATION OF AROMATIC PLANTS

PART 4 *MENTHA ARVENSIS* (JAPANESE MINT) AND *MENTHA CITRATA* (BERGAMOT-MINT)

1 SCOPE

1.1 This standard (Part 4) prescribes a code of practice for cultivation of the aromatic plants for production of oil of Japanese mint botanically known as *Mentha arvensis* var. *piperascens* Holmes and Bergamot-mint botanically known as *Mentha citrata* Ehrh. Family Labiateae. These are natives of Mediterranean countries introduced into cultivation since last two decades. Of these Japanese mint is cultivated extensively in Rampur, Moradabad and Barabanki districts of U.P. and terai districts of Punjab. The cultivation of Bergamot-mint is limited and scattered in Budaon in U.P.

1.2 The requirements and methods of sampling and tests for oil of *Mentha arvensis* and *Mentha citrata* have been separately covered in IS 528 : 1989 and IS 13261 : 1991 respectively.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
528 : 1989	Oil of *Mentha arvensis* (*second revision*)
6597 : 1988	Glossary of terms relating to natural and synthetic perfumery materials (*first revision*)
13261 : 1991	Oil of *Mentha citrata*

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 6597 : 1988 shall apply.

4 VARIETIES/CULTIVARS

Mentha arvensis

There are few varieties known into cultivation for *Mentha arvensis* like M.S. 1, M.S. 2 and Sivalik, etc, which produce pungent smelling oil, bitter in taste, rich in menthol (75 percent and over).

Mentha citrata

Bergamot-mint has a common composite cultivar, as introduced from USA. The oil is rich in linalyl acetate (35 to 45 percent) emitting, characteristic bergamot-like odour.

5 CLIMATE AND SOIL

These mints are very hardy plants grow in wide range of the climate but prefer humid tropical and subtropical conditions with moisture and highly fertile soils up to 1 000 to 1 500 m elevation. The crops grow well in localities receiving varying rainfall (50 to 100 cm) and temperature (38-40°C). The crops require ample sun-shine with 14 hour sun-light during maturity. Frost is harmful.

Organic well drained soil loam, sandy-loam to clay-loam in texture, with *p*H varying from 6 to 8·5 produce good yields. However, clayey soils are unsuitable due to impeded drainage.

6 PROPAGATION AND PLANTING

These crops do not produce seed and are raised from underground parts like stolons (and other vegetative parts like aerial cuttings runners, etc). The stolons are produced during winter season and are thick juice underground stems. The ideal season for planting extend from January to February, but goes up to March month depending upon mean day and night temperature. A piece of 5 to 8 cm long fresh juicy stolon with 2 or more growing points is considered suitable for planting in rowed furrows at 1 to 2 cm deep. The usual spacing is 40 to 60 cm between rows and 10 cm in the rows; it can vary upon the soil fertility and interculture implements (tractor/bullock drawn) used. The seed rate is 400 kg stolons/ha.

7 MANURES AND FERTILIZERS

Mentha species are leafy crops, respond favourably to higher doses of manures and particularly nitrogenous and phosphatic fertilizers. In general 100 to 120 kg of nitrogen, 60 kg of P_2O_5 and 40 kg of K_2O is recommended for medium soils. About 1/6 of total nitrogen, along with entire quantity of phosphatic and potash fertilizers is applied at planting whereas the remaining nitrogen is divided into two equal splits and given as top dressing in moist soil in April and July months when the plants are 8 to 12 cm high.

8 WEEDING AND INTER-CULTURE

These mints maintain rows before the first harvest is taken and allow wheel hoe, tractor-tillers,

bullock drawn interculture and hand hoes, used in rows in early growth stage. Usually two weeding cum hoeings are given before the first crop is harvested in mid-June. The crop sprouts in a fortnight and spread all over the field during rainy season, forming thick growths. Incessant rains (because of high soil moisture thick growth) limit mechanized interculture. Only two or three hand weedings are possible. Pre-emergent use of chemical weedicides like *Sinbar* (Terbacil) at 1·5 kg in 800 litres of water/ha is recommended to control weed growth.

9 IRRIGATION

These are water loving plant and demand heavy irrigation during summer months when rainfall is not well distributed throughout the growing season depending upon texture of soil and prevailing temperature of the locality, these crops require 12 to 15 irrigations of 3 to 5 cm depth. A large number of shallow irrigations are found more productive than few deep irrigations, spaced at longer intervals. Drought conditions cause general dry look, stunted growth, yellowing and falling of leaves, which reduces yield. The second crop, harvested in October needs 2 or 3 irrigations/month after ceasation of rains.

10 HARVEST AND YIELD

The crops are cut over ground as harvest when it commence bearing flowers. In case of Sivalik, proper harvest time is when crop is in full bloom. The mature crops possess between 0·40 to 0·68 percent oil as fresh weight basis. The crop is cut 10 cm above ground level on bright sunny days as cloudy to rainy season tend to decrease the methol content as well as yield of oil in mints. A second cutting is taken in October. The first crop has leaves and stalks in equal proportions whereas leaves are one and a half times more than the stalk in the second harvest whenever the rains are scattered and not continous; thus weight to weight oil yield is more from second harvest. The harvested crop is left in the field for 15 to 20 hours to allow it to wilt and reduce its bulk. The wilted crop is carried to distillation site but is not heaped in lots which otherwise leads to fermentation resulting in loss of oil yield, some time up to 50 percent.

On an average, depending upon fertility of soil and crop management 10 to 15 tons of herbage is obtained in 2 cuttings [the average yield of oil thus is 100 kg/ha for the Japanese mint crops and about 80 kg/ha for Bergamot-mint (depending upon oil content in the species)].

Usually wheat, potatoes, peas and toria follow mint in the winter. Elsewhere, potatoes/paddy or sunflower is taken in rabi followed by mint again. No inter crops are recommended.

11 DISTILLATION

Usual steam or water-steam (hydro) distillation is used and the crop is distilled in 90 minutes. The Japanese mint oil is golden yellow, mobile liquid, cooling to senses and bitter in taste with 75 percent or over menthol. Presence of moisture in stored mint should be avoided as its presence affects the stability of oil leading to deterioration of quality of oil. The mint oils are slightly acidic in nature and galvanized steel drums are used for storage.

12 DISEASES AND PESTS

Stolon root, caused by *Macrophomina phaseoli* (Maubl) Hobby is a serious disease affecting underground parts and is most common in U.P. region. The infected stem show brown lessions, turning black and later results into soft decay. This causes yellowing of leaves, stunted growth and wilting. The stem be treated with 0·1 percent solution of suitable pesticide before planting. Once disease occurs, the infected plants be segregated, pulled and burnt. Leaf blight is caused by *Alternaria spp.* which is another disease known for sizeable losses for some years in India. It forms oval brown spots which coalesce and become bigger. Spraying of copper fungicides like cuprous oxide and copper oxychloride in early stages of infection, control the disease.

Common termite *Odontitermes obesus* (Ram) attacks growing mint plants in drier tracts causing substantial losses to standing crops. Application of Heptachlor dust (13 percent) at 45 to 55 kg/ha or BHC (5 percent) at 25 kg/ha or aldrin at land preparation prevent termite damage. Bihar has caterpillar as a serious pest of mints, causing extensive damage by eating away the entire palisade tissue between veins of most lower leaves. Repcated spraying of Folidole (0·2 percent) in early stage of damage bring the pest under control. Caterpillars of *Hietographa nigrisigna* chew up the leaves and causes holes, for which DDT spraying is effective.

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Amendments Issued Since Publication

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