MENTHA SPIGATA complex

MENTHA SPIGATA is a variable species and a number of taxa which differ morphologically are grouped under this. A number of mints grown in the gardens in India, Europe, America and other parts of the World and used in saucages and chutanies belong to this complex. M. SPIGATA Linn. is considered indigenous to Europe, from where it has been introduced into Asia and other parts of the world. But Ikeda et al. (1960) have expressed their doubts about the origin of M. SPIGATA var. crispa called as crisp mint. This particular variety is very common in India and is grown in gardens for its use in chutanies. It has naturalized and is found running wild along the water courses. M. SPIGATA has also naturalized in Japan, China, America and other parts of the world (Bailey 1957).

The following taxa which were quite distinct morphologically were studied.

<table>
<thead>
<tr>
<th>Name</th>
<th>Introduction No.</th>
<th>Locality</th>
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<tbody>
<tr>
<td>M. SPIGATA Linn.</td>
<td>1200/61</td>
<td>R.B.G.Kew</td>
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<tr>
<td>M. spicata Linn.</td>
<td>1041/60</td>
<td>R.B.G.Kew</td>
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<td>M. piperita var. officinalis</td>
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<tr>
<td>M. SPIGATA Linn. var. crispa Benth.</td>
<td>249/60</td>
<td>Jammu</td>
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<td>(= M. cordifolia Ophiz.)</td>
<td>250/60</td>
<td>Delhi</td>
</tr>
<tr>
<td>1207/61</td>
<td>R.B.G.Kew</td>
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<tr>
<td>300/60</td>
<td>Srinagar</td>
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A number of clones of *M. spicata* Linn. var. *crispa* Benth. were collected from different places in India. One clone was introduced from Royal Botanical Gardens Kew, England under the name of *M. cordifolia* Ophiz. In the case of *M. spicata* Linn. var. *laciniata* one clone was introduced from Agricultural College Lyalpur now in West Pakistan. This clone was collected by late Mr. Luthra the Principal at that time of the College, from Murree hills as an escape. An other clone was received from Royal Botanical Gardens Kew.

1205/61. *Mentha spicata* Linn.:

It is an erect plant with the purple stems. Leaves are sessile, glabrous, oblong or lanceolate, acute, entire or serrate, serrations very distant; dark green; flowers purplish, in whorls, which in turn are arranged in spike like elongate structures. Whorls are small with long internodes. Sterile, no seed formation. (pH. 64)

The somatic chromosome number studied from the root-tip cells was found to be 2n = 36 (Fig. 13).

Meiosis was studied from the P.M.C. and mostly 12 bivalents with 12 univalents were found at diakinesis and 1st metaphase (Fig. 14). The different associations of chromosomes observed at diakinesis and 1st metaphase in 10 P.M.C. are given in table 2.
At metaphase the bivalents as well as univalents congress at the Centre and at the beginning of 1st anaphase chromosomes start moving towards two poles. The homologous chromosomes move to the opposite poles. Univalents also move to the opposite poles at random. There may be movement of six and six; seven and five or eight and four univalents to the two poles. At telophase only two nuclei are formed. II anaphase is regular and tetrads formation is also normal resulting in four pollen grains which are shrivelled and sterile.

Cytological behaviour seems to indicate that it is a hybrid between a diploid and tetraploid taxa.

1207/61 M. spicata Linn. var. crispa Benth.
   = (M. cordifolia Ophiz ex Fressen.)

249/60 M. spicata Linn. var. crispa Benth.
   = (M. viridis Linn.)

250/60 M. spicata Linn. var. crispa Benth.
   = (M. viridis Linn.)

300/60 M. spicata Linn. var. crispa Benth.
   = (M. viridis Linn.)

All the four clones introduced under different names were similar without any difference in their morphology.
The plants are perennial propagated vegetatively by suckers. Stems, purple, thin; leaves oblong, cordate at the base, petiolate, prominent, obtuse, verrucose nerves dark green; hairs unbranched, a few along the midrib; flowers purplish, pedicillate, in thick whorls, internodes short, whorls close thus forming terminal spike like structures. Stems purple and protruding, fertile, stigma bifid. Fruit with 1 to 4 dark brown nutlets in each (ph. 4).

There are 48 somatic chromosomes found in the root-tip cells (Fig. 15).

Meiosis has been studied from the pollen-mother cells and 24 bivalents found always at diakinesis and 1st metaphase (Fig. 16). Two bivalents are always associated with the nucleolus at diakinesis. Chiasmata are terminal usually one per bivalent. Anaphase separation is regular and 2nd division is also regular. Tetrads formation is normal resulting in four pollen grains which are usually fertile.

1041/60. Mentha spicata Linn.

The plant was introduced from Royal Botanical Gardens Kew under the name M. piperita Linn. var. officinalis. The plant is perennial; stems are erect and green. Leaves are ovate, glaucous, sessile, serrate and acute, light green; flowers are light purplish, with a little deeper purplish specks; pedicillate, arranged in whorls which in turn form terminal spike like structures. Internodes are long
and whorls appear quite distant particularly first few
whorls. Stamens white with white anthers; protruding,
fertile. Stigma bifid. Fruit 1 to 4 dark brown nutlets
in each (ph. 7.)

43 somatic chromosomes are found in the root-tip
cells. (Fig. 17.)

Meiosis was studied from the pollen-mother cells.
24 bivalents are met in each cell at diakinesis and 1st
metaphase (Fig. 18). Chiasmata are terminal and single
in each bivalent. Two bivalents are associated with the
nucleolus. Anaphase and 2nd division is regular. Tetrad
formation is normal resulting in four pollen grains
which are fertile.

1205/61 Mentha spicata Linn. var. laciniata

Two clones, one introduced from R.B.G.Kew and another
introduced from Agriculture College Lyallpur (now in West
Pakistan) were similar without any difference in their
morphology. The plants are perennial, propagated vegeta-
tively by suckers. Stems are erect, thin, purple. Leaves
are semi-sessile with small petiole; ovate, serrate,
serration quite deep, acute, surface verrucose, dark green,
glabrous. Flowers pedicillate, arranged in whorls each
with a few flowers. These whorls are again arranged into
terminal spike like structures which are pointed. Stamens
purple, protruding and fertile, Stigma bifid. Fruit with

Also by

Sheets

K/B/36...
1 to 4 dark brown nutlets in each (ph. 8).

48 somatic chromosomes are found in the root-tip cells (Fig. 19).

Meiosis was studied in the pollen-mother cells. 24 bivalents are found in each P.M.C. at diakinesis or 1st metaphase (fig. 20). The two of the bivalents are mostly associated with nucleolus. Chiasmata are terminal and single per bivalent. Anaphase and 2nd division is regular with normal tetrad formation resulting in four fertile pollen grains.

Meiosis was examined in four taxa in M.spicata complex and in one taxon from Sanasar, only chromosome number 2n = 48 was found. In all these 48 chromosome forms the meiosis was regular with 24 bivalents and the taxon with 36 chromosomes showing 12 bivalents and 12 univalents at diakinesis and 1st metaphase was evidently a hybrid between a tetraploid form of M.spicata and a diploid taxon in which 12 chromosomes are homologous with 12 chromosomes of the tetraploid form.
PLATE - VI

Photo 6A:-- *Mentha spicata* Linn. Introduced from R.B.G. Kew.
I.No. 1200/61.

Photo 7:-- *Mentha spicata* Linn.
(M.*piperita* Linn. var. officinalis )
Introduced from R.B.G. Kew.
I.No. 1041/60.

Photo 8:-- *Mentha spicata* Linn.
var. *laciniata*
Introduced from R.B.G. Kew.
I.No. 1205/61
PLATE - VII

Figure 13: - 2n = 36 chromosomes at metaphase in M. spicata Linn. I.No. 1200/61. X 2800

Figure 14: - 12 bivalents and 12 univalents at diakinesis in a P.M.C. of M. spicata Linn. I.No. 1200/61. X 2800

Figure 15: - 2n = 48 chromosomes at metaphase in M. spicata Linn. var. crispa Benth.

Figure 16: - 24 bivalents at diakinesis in a P.M.C. of M. spicata Linn. var. crispa Benth. I.No. 1207/61. X 2800

Figure 17: - 2n = 48 chromosomes at metaphase in M. spicata Linn. (M. piperita Linn. var. officinalis).

Figure 18: - 24 bivalents at diakinesis in a P.M.C. of M. spicata Linn. (M. piperita Linn. var. officinalis).

Figure 19: - 2n = 48 chromosomes in M. spicata Linn. var. lacinati.

Figure 20: - 24 bivalents at diakinesis in a P.M.C. of M. spicata Linn. var. lacinati.

I.No. 1205/61. X 2800