

sepiarium of the latter to distinct specific rank as suggested by WIGHT is supported on the basis of cytomorphological analysis and pattern of distribution. A high percentage of polyploidy has been noticed in the species presently investigated.

Key words: Rutaceae Himalayas, cytology.

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Cytology of Some Woody Species of Rosaceae from Himalayas

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Introduction

Rosaceae is a large family covering about 100 genera with 2,000 species (WILLIS, 1973), which are cosmopolitan but abundant in the temperate regions. Over 200 species belonging to about 25 genera are met with in India. The members exhibit varied habit being trees, shrubs or herbs. The family is best known for its ornamentals and edible fruits. *Pyrus*, *Parinari*, *Parastemon* and *Pygeum* embrace species which yield timber of considerable importance. Some genera provide woods of local value. Some species of *Cotoneaster*, above the tree line, on account of their compact growth and strong root system, hold up masses of snow, thus aiding in the prevention of erosion.

Materials and Methods

The material for the present study was collected from the wild populations in the Himalayas. For meiotic studies, flower buds were fixed in CARNOY'S fluid. The chromosomes were stained in acetocarmine. All figures are at a uniform magnification of X1360. The voucher specimens have been deposited in the Herbarium, Panjab University Botany Department, Chandigarh.

Results and Discussion

Table 1 summarises the data in respect of the investigated species. The genera and species are arranged according to their forestry importance. Flowering and fruiting months are designated by numbers, e.g. 4 denotes April, 6 denotes June etc. All species except *Cotoneaster bacillaris* displayed normal meiosis.

Prunus is represented in India by 18 species. The genus, in its natural range, is restricted to the Himalayas and Assam except for one species in the Andaman. *P. cerasoides* ($n = 8$) and *P. cornuta* ($n = 16$) (Fig. 2) are the only two commercially recognized timber species of Rosaceae in India. The latter is a moderate sized graceful tree met with at higher elevations between 2,000-3,000 m, especially in moist localities, and is commonly associated with *Abies pindrow*, *Quercus semecarpifolia* and *Q. dilatata* (Fig. 1). *P. nepalensis* ($n = 16$) is worked out for the first time (Fig. 5).

There are 23 species of *Pyrus* in India. *P. pashia* and *P. sikkimensis* showed chromosome number $n = 17$ (Fig. 6). The former species confirms identical report by RAO (1967) while the latter is cytologically reported for the first time.

The genus *Photinia* is distributed in S.E. Asia and N. America. *P. integrifolia* with $n = 17$ tallies with the same previous report by ARORA (1961).

Out of seven species of *Eriobotrya* in India, *E. dubia* and *E. pitiolata* (Fig. 7 and 8) are chromosomally reported for the first time. Both these species are diploid with $n = 17$.

Cotoneaster bacillaris is a morphologically variable taxon. The chromosome number of this species is not known before. PMC's showed abnormal meiosis with $2n = 34$ (Fig. 3). The common chromosomal configuration observed at M-I was $2_{III} + 12_{II} + 4_{I}$, indicating translocations. More than 50% of the pollen were shrivelled. The present finding of $n = 17$ for *C. frigida* substantiates the earlier report by ZEILINGA (1964).

Only three species of *Crataegus* occur in India. *C. crenulata*, an elegant shrub, is planted as an ornamental and

Table 1. — Chromosome numbers in Rosaceae.

Taxon	Locality	Flowering and fruiting periods	Chromosome number and level of ploidy	Fig. number	Previous reports
<i>Prunus cornuta</i> WALL. (= <i>P. padus</i> L.)	Simla: Kufri, 2,600 m	4—5; 8—10	n = 16 (tetraploid)	2	n = 16 or 2n = 32: KOBEL, 1928; MEHRA & DHAWAN, 1966.
<i>P. cerasoides</i> D. DON (= <i>P. puddum</i> ROXB.)	Simla: Tutikandi, 1,800 m	10—11; 4—5	n = 8 (diploid)		2n = 16: OKABE, 1928.
* <i>P. nepalensis</i> SER.	Darjeeling, 2,000 m	3—4; 6—8	n = 16 (tetraploid)	5	
<i>Pyrus pashia</i> BUCH.-HAM.	Simla: Mushobra, 2,400 m	3—4; cold season	n = 17 (diploid)		n = 17: RAO, 1967.
* <i>P. sikkimensis</i> HOOK. f.	Darjeeling, 2,000 m	3—4; 6—7	n = 17 (diploid)	6	
<i>Photinia integrifolia</i> LINDL.	Darjeeling, 2,000 m	3—4; 5—6	n = 17 (diploid)		n = 17: ARORA, 1961.
* <i>Eriobotrya dubia</i> DCNE.	Darjeeling, 2,000 m	3—5; 9	n = 17 (diploid)	7	
* <i>E. petiolata</i> HOOK. f.	Darjeeling, 2,000 m	3—8; remains on tree upto next year	n = 17 (diploid)	7	
* <i>Cotoneaster bacillaris</i> WALL.	Simla: Kufri, 2,600 m	5—6; after rainy season	2n = 34 (diploid)	3	
<i>C. frigida</i> WALL.	Darjeeling, 2,000 m	4—5; 9—10	n = 17 (diploid)		n = 17: ZEILINGA, 1964.
* <i>Crataegus crenulata</i> ROXB.	Nainital, 1,950 m	3—5; 8—11	n = 17 (diploid)	9	
* <i>Stranvaesia glaucescens</i> LINDL.	Nainital: Bhowali, 1,600 m	5—6; 10 onwards	n = 17 (diploid)	10	
<i>Spiraea sorbifolia</i> L.	Simla: Sanjoli road, 2,200 m	5—6	n = 9 (diploid)	4	n = 9: MEHRA & DHAWAN, l. c. n = 18: MALIK, 1965.
<i>S. canescens</i> DON	Simla: Fagu, 2,600 m	5—6; 10—11	n = 18 (tetraploid)		n = 18: MALIK, l. c.; MEHRA & DHAWAN, l. c.
<i>Prinsepia utius</i> ROYLE	Simla, 2,000 m	12—4; 5—7	n = 16 (tetraploid)		n = 16: SHARMA & SWARUP, 1962.
<i>Rubus niveus</i> WALL.	Simla: Khadralla, 2,700 m	4—6; 6—8	n = 14 (tetraploid)		n = 7: MALIK, l. c.; MEHRA & DHAWAN, l. c. n = 14: MEHRA & DHAWAN, l. c.
<i>R. ellipticus</i> SM.	Kasauli: Dharampur, 1,200 m	1—4; 4—6	n = 7 (diploid)		n = 7: MALIK, l. c.; MEHRA & DHAWAN, l. c.

* Species worked out for the first time.

hedge plant. The present count of $n = 17$ is the first record for this species (Fig. 9).

Stranvaesia glaucescens with $n = 17$ is a new report for this species (Fig. 10).

The genus *Spiraea* is much appreciated for its ornamental value. *S. sorbifolia* (Fig. 4) shows intraspecific polyploidy. The present observation of $n = 9$ is in agreement with that of MEHRA and DHAWAN (1966). The gametic number $n = 18$ was determined in the same species by MALIK (1965). Thus, diploid and tetraploid races, based on $x = 9$, are evident within the species. *S. canescens* is tetraploid with $n = 18$. The previous reports by MALIK (l. c.) and MEHRA and DHAWAN (l. c.) are confirmed in this species.

Prinsepia is a small genus of 3—4 species distributed from Himalayas to North China and Formosa. *P. utilis*,

$n = 16$, is tetraploid as also earlier recorded by SHARMA and SWARUP (1962).

The genus *Rubus* is cosmopolitan in distribution. *R. niveus* exists as two cytotypes, diploid with $n = 7$ (MALIK, l. c.; MEHRA and DHAWAN, l. c.) and tetraploid with $n = 14$ (MEHRA and DHAWAN, l. c., and present count). *R. ellipticus* in possessing $n = 7$ (diploid) coincides with the previous reports by MALIK (l. c.) and MEHRA and DHAWAN (l. c.).

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Summary

Meiotic studies have been carried out in 17 species. These include two timber species, namely, *Prunus cornuta*



Fig. 1. — *Prunus cornuta* with *Abies pindrow* on the right and in the back ground and *Quercus semecarpifolia* on the left. Simla (Narkanda).

($n = 16$) and *P. cerasoides* ($n = 8$). Seven species have been cytologically investigated for the first time. Intra-specific polyploidy seems to exist in nature in *Spiraea sorbifolia* ($n = 9, 18$) and *Rubus niveus* ($n = 7, 14$). In *Cotoneaster bacillaris*, anomalous meiosis, possibly due to translocations, resulted in about 50% pollen sterility.

Key words: Woody Rosaceae, Himalayas, cytology.

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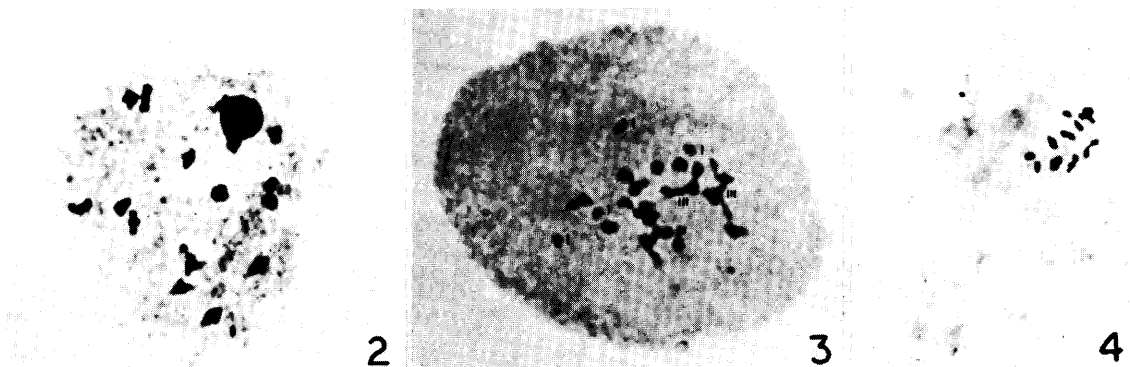


Fig. 2. — *Prunus cornuta*, diakinesis, $n = 16$. — Fig. 3. — *Cotoneaster bacillaris*, metaphase-1, $2n = 34, 2_{III} + 12_{II} + 4_{I}$. — Fig. 4. — *Spiraea sorbifolia*, metaphase-1, $n = 9$.

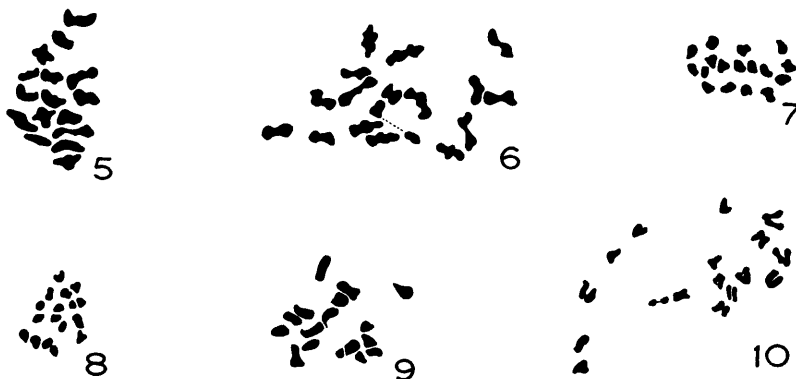


Fig. 5. — *Prunus nepalensis*, metaphase-1, $n = 16$. — Fig. 6. — *Pyrus sikkimensis*, metaphase-1, $n = 17$. — Fig. 7. — *Eriobotrya dubia*, anaphase-1 (one pole), $n = 17$. — Fig. 8. — *E. petiolata*, anaphase-1 (one pole), $n = 17$. — Fig. 9. — *Crataegus crenulata*, metaphase-1, $n = 17$. — Fig. 10. — *Stranvaesia glaucescens*, metaphase-1, $n = 17$.