CYTOTAXONOMICAL STUDIES IN THE GENUS SENECIO L. FROM MAHARASHTRA

¹Chavan S. G.,²P. P. Sharma ,¹N.V. Malpure , ¹P. S. Raut, ¹S. S. Gosavi ¹Department of Botany, S.S.G.M. College, Kopargaon, District Ahmednagar, 423 601 ²IndrarajArts, Commerce and Science College, Sillod, TalukaSillod, District Aurangabad, 431112

Abstract:

The genus *Senecio* L.is the largest genus in the family AsteraceaeBercht.& J. Presl.Comprising about 3000 species in the world, mainly distributed in sub-tropical and tropical region of the world. It is very difficult to delimit the taxa from the genus because of lack of defined taxonomicboundaries that has lead to a major confusion and conflict in this genus. In the present worktaxonomic and cytological studies in genus *Senecio* L. from Maharashtrawas carried out. Out of 8 species reported from Maharashtra, 3 endemic species *viz. S. bomabyensis* N. P. Balakr, *S. dalzellii* C. B. Cl., and *S. edgeworthii* Hook. f. were studied for their mitotic studies and it was found that all the three species has 2n= 20 chromosome number with a variation in the karyotype. Here with we report the chromosome number for two species viz. *S. bomabyensis* N. P. Balakr, *S. edgeworthii* Hook. f.

Keywords: Senecio, endemic species, cytotaxonomy, karyotype.

Introduction-

The genus *SenecioL*. belongs to family Asteraceae, described by Linnaeus. Asteraceae is the largest family in plant kingdom, which comprises about 3100 species in the world, mainly distributed in tropical and sub-tropicalregions(Jeffrey et.al. 1978;Nordenstam 1978;Bremer 1994; Vincent 1992). The genus represented byabout 63 species in India (Hooker 1875).

In Maharashtra the genus is represented by 8 species out of which 7 species are endemic (Singhetal 2001). The species of the genus have a great range of variations and also shows diverse populations restricted to particular geographical areas. Species of *SenecioL*. are usually found growing along exposed hill slopes and rock crevices. The genus is worked by various authors (Cooke 1904, Singh et al 2001, Hooker 1875), a detailed taxonomic account of the genus was given by Hajra et. al(1995) reporting 43 species India. As the genus shows a great range of diversity it is very difficult to assign the populations to a respective species and hence the present work was undertaken to revise the genus from Maharashtra and solve its taxonomic ambiguity.

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In the present work 3 different species *viz. S. bombayensis, S. dalzellii, S. edgeworthii*were collected from various locations of Maharashtra. The collected plant materials was studied thoroughly with respect to their morphology and were identified with the help of Flora of Maharashtra. At the cytogenetic level, the genus is highly diverse, with haploid numbers varying from n = 5 to with a modal number of n = 20. Lopaz et.al. (2002) proposed the existence of a polyploidy complex in *Senecio* that could explain some of the difficulties in the species identification. In this sense, chromosome studies would help to enlarge the understanding of the evolutionary pattern of this group. These species shows remarkable cytomorphological as well as ecological diversity. In Maharashtra the genus is represented by about 8 species out of which7 species are endemic (Singh et al., 2001). It also possesses diverse populations restricted toparticular geographical areas. Significant work has been done mainly to species from Northern parts of India and it is only restricted to meiotic studies. The species and populations of the genus from Maharashtra are need to be worked out thoroughly so as to know the exact number of existing species and the variability amongst them. In the present work all the populations areanalysed with respect to their cytology to know the variations in the species and polyploidy present in the genus.

Hence with this backdrop in mind three species*vizS. bombayensis* N.P. Balakr, *S.dalzellii* C.B. Clarke and *S. edgeworthii* Hook. f. fromBhandardara, Anjaneri Hills and Ankai fort respectively along with flowering and fruiting were collected. The mature seeds were collected and mitotic studies were carried out to know the chromosome number and karyotype.

Collection

*S.bombayensis*N.P. Balakr : N 19⁰ 31' 51.06'' E 73⁰ 49' 46.80'' 777 m Bhandardara *S. dalzellii*C. B. Cl. : N 19⁰ 55' 19.37'' E 73⁰ 34' 22.46'' 1291 m AnjaneriHills *S.edgeworthii*Hook. f.: N 20⁰ 11' 19.30'' E 74⁰ 27' 03.00'' 814 m Ankai Hills

Materials and methods

In the present work all three species *viz. Seneciobombayensis* N.P. Balakr, *S. dalzellii* B. Cl. and *S. edgeworthii* Hook. f. were collected from Bhandardara, Anjeneri hill, and Ankai fort respectively in flowering and fruiting, GPS coordinates for the collection sites were marked and recorded.. The mature seeds were selected for mitotic studies. Seeds were germinated on germination paper and coco-peat. Seeds germinated in three days. Germinated seeds with 2 to 3 mm long roots were pre-treated with saturated 1, 4 dichlorobenzene at early morning 9:00 to 9:30 am.the vials were stored in refrigerator at 5 0 to 7 0 C for 4

hours. The vials were removed and kept at room temperature for 1 hour. Root were thenhydrolyzed with 1N Hydrochloric acid and stained with 2% propionic orcein. Slides were prepared and images were taken under LEICA DM 1000 microscope. The chromosome number was recorded for all the three species. For pollen studies, fresh flowers were used. The pollen grain was mounted in glycerin on a glass slide. Microphotographs were taken using LEICA DM 1000 microscope at 100X magnification.

Taxonomy

SeneciobombayensisBalakr.

Herbsup to 40 cm height, erect, branched, hairy. Stem 5 mm diameter, branched; branches mm diameter. Leaves $1.4-5 \times 0.5-3$ cm, simple, alternate, rhomboid, acute at apex, exstipulate, pinnatified at base of petiole, auricled, broad nerve present in lower surface, upper surface rough, hairy; Petiole 0.5-2 cm long, hairy. Inflorescence capitulum head, 14 mm diameter, bracteolate, heterogamous, hairy, yellow, head pedunculate; peduncle 1.5-9 cm long. Involucre 6.5×5.0 mm, bracts biseriate, leafy, oblanceolate, mucronulate margin hairy or minutely teeth. Flower lateral ray florets 8-11, 9.0×2.0 mm long, pappus absent; ligulate. central florets bisexual; Corolla 5.3×1.2 mm, companulate, yellow; pappus unequal, longer than central florets. Stamens 5, 1.18 mm long, syngencious, epipetalous, Carpels ovary 2.5-2.7 mm long, inferior; Style simple; Stigma bifid. Achens 1.5×0.5 mm, hairy, vertical ridges present.

Phonology- July to October

Locality- Bhandardara

SeneciodalzelliiC.B.Cl.

Herbs, erect, terete, branched. Stem, glabrous. Leaves $1.5-9.0 \times 0.2-2.5$ cm, simple, lower leaves rhomboid –ovate, upper linear, auricles at base, white tomentose lower surface, upper surface rough, broad nerve present, base acuminate, apex acute, $1.5-9 \times 0.2-2.5$ cm, alternate, ex-stipulate, petiole 1.0-3 cm long, Inflorescencecapitulum head, c 2.2 cm diameter, yellow, bracteolate, heterogamous, pedunculate; Peduncle 1.3-6.5 cm long, hairy, slender; Involucre bracts 2 seriate, lower lobes laterally membranous margin, 5.63–2.54 mm. Flowers Lateral ray florets 8 × 3.75 mm, 4 nerved, yellow, 3 lobed; Pappus absent; Corolla ligulate 7 × 4 mm, central disc florets bisexual, 4 mm long; Pappus longer than achenscompanulate, yellow. Stamens 5, c 2.0 mm long syngencious, epipetalous, filament free. Ovary mm long inferior style simple, stigma bifid. Achenes1.5 mmlong.

Phenology: July - October

Page | 291

Locality: Anjnerii Hills

SenecioedgeworthiiHook.f.

Sufruticose, perennial herb, erect; Stem roughly woody, 1.0 - 1.5 cm diameter, teret, obscurely branches, branches 7–9 mm diameter. Leaves simple $2.0 - 5 \times 0.5 - 3.0$ cm, alternate, suborbicular, margin rhomboid, toothed, acute at apex, base unequal sub-cordate, exstipulate, reticulate, wooly pubescent at lower surface, upper surface scarcely pubescent; petiolate, petiole 0.8-2.5 cm long, wooly, pinnatifid leaf blade auricled at the base of petioled.Inflorescencecapitulumhead,c2cmdiameter,bracteolate,heterogamous,hairy;Pedunculate, Peduncle 1.5 - 6.0 cm long. Involucre biseriate c 5.75 mm long, membranous, strigose. Flowers: Lateral florets female 8 - 11, c 8.63 mm, long; Pappus absent, corolla ligulate, 7.0×2.5 mm, 4 nerved obscurely 3 lobed yellow, central florets bisexual 6.0 mm long; corolla c 3.5×1.5 mm long companulate, yellow; Pappus unequal, ciliate. Stamens 5, cmm long syngencious, epipetalous, filament free. Ovary c 3.0 mm long, inferior, style simple, stigma bilobed. Achenesc 1.56 mm long longitudinally grooved, minutely villous.

Phenology: August -November

Locality: Ankai-Maharashtra

Results and Discussion

All the three collected species were studied morphologically and were confirmed as *S. dalzellii*, *S. edgeworthii* and *S. bombayensis*by comparing with protologues and by using floras (Singh et al 2001, Yadav & Sardesai 2002). Our cytological studies also confirm that the earlier reports of chromosome numbers. Herewith we also report chromosome number for *Seneciobombayensis* N.P. Balakr and *S. edgeworthii*Hook.f.

Vol-10 I



Senecio dalzelli C.B.Cl A.Habitat, B. Floweringbranch, C. leaf dorsalview, D. leaf ventral view, E. Flower, F. Pollen grain, G. Seed, H. Mitotic plate

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Senecio bombayensis N.P. Balakr A.Habitat, B. HabitC.Flower D. Bifidstigma E. Pollen grain, F. Leaf dorsal view, G. Leaf Ventral view, H. Seed, I. Mitotic plate

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S. edgeworthii Hook. f. A. &B Habit, C. Flower, D. Pollen grain, E. Leaf,

F. Involucre lobes, G. Seed, H. Central florets, I. Mitotic plate

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Sr.	Name of the species	Locality & habitat	Chromosome
No.			number
1.	S. bombayensisN.P. Balkar	Bhandardara, grows hilly area and hill	
		slopes	20
2.	S.dalzelliiC.B.Cl.	Anjineri hill, grows top floor hill	
			20
3.	S.edgeworthiiHook.f.	Ankai Fort, grows cervices of rocks	
			20

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