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COLLECTING GERMPLASM OF OKRA AND ITS WILD RELATIVES IN SOUTHERN INDIA

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Exploration and collection of okra and its relatives were conducted under the joint sponsorship of IBPGR and NBPGR in Southern region of India. A total of 236 accessions of the genus *Abelmoschus* collected included 205 samples of cultivated okra belonging to *Abelmoschus esculentus* and *A. callei* and 30 of 5 wild species and 1 of a semiwild hybrid form. Cultivated okra had wide spread distribution. Three wild species and one variety were found to occur in Western Ghat areas and two others in plains. Wide variability in the collections mainly in fruit and plant types have been noticed in *A. esculentus* and on the basis of fruit characters 12 distinct types could be identified.

Key words : Okra, Genetic resources, wild relatives, *Abelmoschus* spp.

Genus *Abelmoschus* medic. of the family *Malvaceae* includes both Sudanian and Guinean okra which are important vegetables. It is distributed mainly in Asia and Africa. In India, it is grown under diverse conditions right from coastal plains to elevations as high as 1000m. Besides, another form of okra, now identified as *A. callei* (A. Chev.) Stevels is also found. Few Wild species also occur in Southern region. Genetic erosion in both cultivated and wild okra is quite rampant in the region due to change in land use pattern, cropping pattern and habitat disribution. This report pertains to survey and collection work on okra and its wild relatives carried out highlighting its variability, distribution and taxonomy in the region.

MATERIALS AND METHODS

Exploration and collection of okra and its wild relatives were carried out in Kerala, Karnataka, Tamil Nadu and South and North Eastern parts of Andhra Pradesh during 1989-1991. The route map is given in Fig. 2. Sampling sites included roadside disturbed vegetation, forest pockets, farmers fields, backyards, tribal areas, pockets of ethnic importance, farmer's stores and markets. Mostly, biased sampling based on the types noticed in the field and

bulk samples from the stores were collected. MH herbarium, Coimbatore was consulted for identifying the wild species.

RESULTS AND DISCUSSION

The details of collection mission is presented in Table 1. A total of 236 cultivated okra and 42 wild okra have been collected. Areas surveyed (Fig. 1) include very wet areas in Kerala and parts of Karnataka and dry areas in plains and plateau in Tamil Nadu and Andhra pradesh and parts of Karnataka.

Table 1 Details of exploration & collection of Abelmoschus spp.

Areas	No. of sites	No. of spp.	No. of samples
Parts of Kerala, Tamil Nadu & Andhra pradesh	113	1	41
Parts of Kerala, Karnataka & Southern Tamilnadu	111	2	60
Parts of Kerala & Karnataka	133	5	97
Parts of Kerala & Tamilnadu	46	5	20
Nilgiri Biosphere reserve	19	4	18
Total	422	5	236

Okra is mainly cultivated during rainy and summer seasons in uplands and paddy fallows in Kerala and in three seasons in other states. Both irrigated and rainfed crops are found. Details of passport information on samples collected is given in Table 2. In Kerala, the crop is mainly subsistence in nature but commercial in other states. Local old land races are mainly concentrated in Kerala, coastal Karnataka and pockets of Tamil Nadu.

Taxonomically two distinct taxa of okra viz. *A. esculentus* (L.) Moench. and *A. callei* (A. Chev.) Stevels occur in the region. The first one is commonly cultivated bindi of North or 'Vendai' of South, now called as Sudanian okra and the latter is 'Maravenda' of Kerala, now called as Guinean okra. The second one has been highly adapted to back yards and kitchen gardens in midlands and hills of Kerala. Okra is cultivated in wide variety of climates, soils and elevations in the region. Commercial cultivation of the released types viz. 'Pusa savani was very common in Karanataka, Andhra Pradesh and Tamil Nadu and the others such as 'Parbani Kranti' co-1 and co-2 are very rare. In Kerala okra is mainly a subsistant crop. Commercial cultivation under irrigation in paddy fallows during summer has become rare now.

Very distinct okra cultivars have been noticed in parts of Palghat, Kannur and Wynad districts of Kerala; Periyar, Salem and Kanyakumari districts of Tamilnadu and uttar Kannada and Dakshin Kannada districts of Karnataka.

Depending upon the local preferences, cultivation practices and environmental factors, distinct local cultivars such as 'Palvendai', 'Ezhila venda, Nila venda, 'Anakkomban' and 'Wynad short' are met. In coastal and tribal areas in Karnataka, two distinct local types with very long thin fruits and medium thick and short fruits have been collected. The thickest fruit type has been collected from foot hills of Western Ghats in Kanyakumari district in Tamilnadu. In the case of 'Maravenda' plants are biennial, with purple pigmentation on stem, petioles, leaf veins and tender fruits. Fruits are short to medium long, thick and multisided. It is tolerant to yellow mosaic disease and to drought.

Table 2 Passport information of Abelmoschus spp.

Species	Common name	Situations	Status	Number of colln.	Ker	Kar	TN	AP
A. escullentus	Okra/ Sudanian	Backyard, okra farmers	Culti.fields	191	+	+	+	+
A. caillei	Guinean okra	Backyards	Cult.	14	+	+	+	0
A. moschatus ssp. *tuberosus*	-	Deciduous forests	Wild	1	0	0	+	0
A. moschatus ssp. *moschatus* var. *Moschatus*	-	Gardens/ road sides	Wild/cult.	3	0	0	0	0
A. manihot ssp. *tertraphyllus* var. *tetraphyllus*	-	Hedges/ road sides	Wild	2	+	+	0	0
A. angulosus	-	Rainforests/ road sides/ sholays	Wild	31	+	+	+	0
A. ficulneus-	-	Dry plains	Wild	3	0	+	+	0
Abelmoschus sp. (natural hybrid)	-	Backyards/ Hedges	Weed	1	0	+	0	0

Fruit colour was whitish green in 95, whitish green with red tint in 2, red in 5, green in 36, light green in 16, light red in 1, dark green in 5, light purple in 2 and green with light purple tint in 2 collections. Fruit length varied from extra long in 1, long in 37, medium long in 76 and short in 58 collections. It was not known in the rest. Number of ridges on fruits varied from 5 sides in 90 to multi ridged types in 68 accessions. Cultivated okra

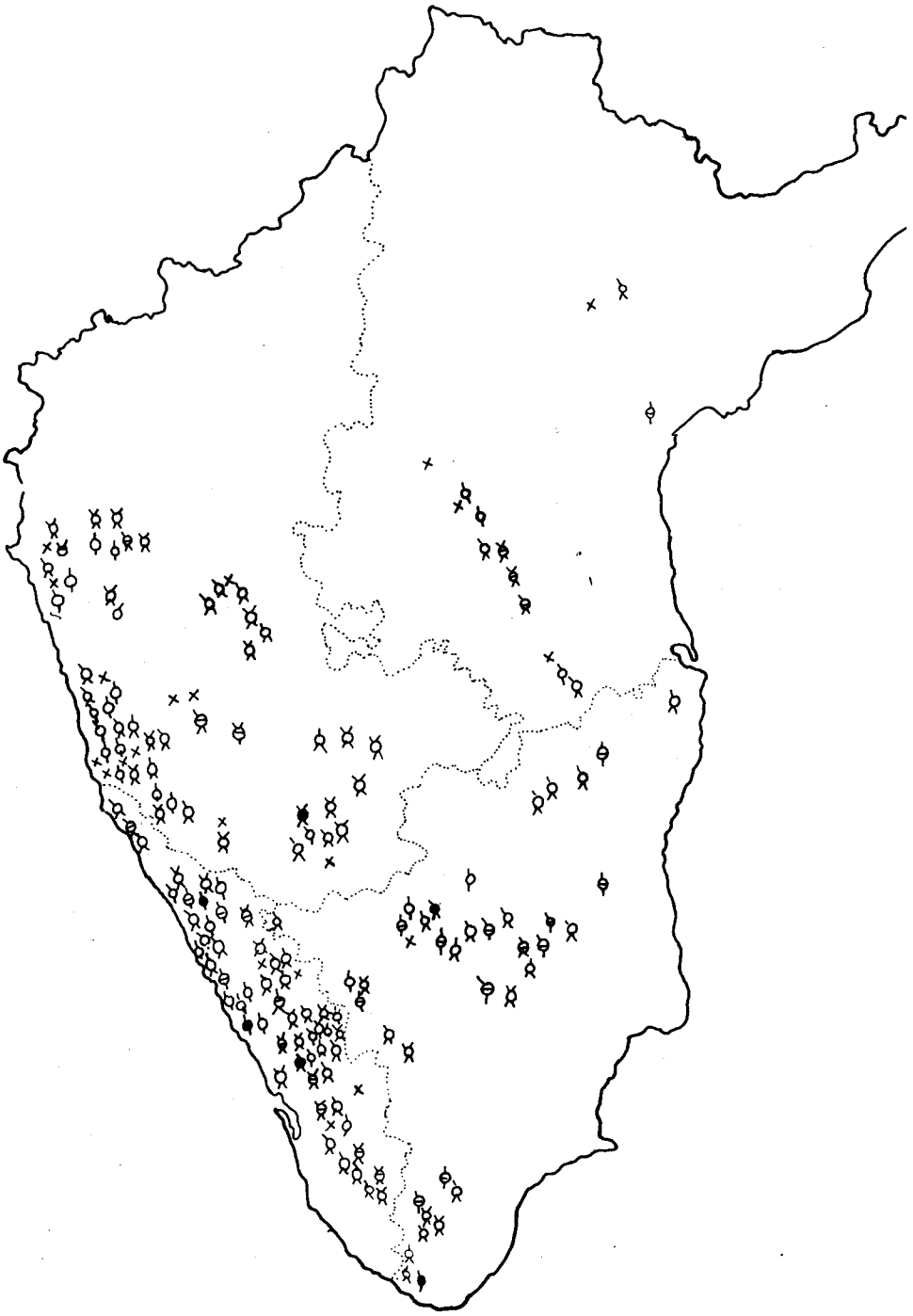

Fig. 1. Distribution of okra types in Southern Region
1. Not known; 2. Long whitish green; 3. Long redish; 4. Medium long multisided whitish green; 5. Medium long whitish green; 6. Long green; 7. Short multisided green; 8. Medium long multisided green; 9. Short multisided whitish green; 10. Medium long multisided redish green; 11. Short multisided redish green; 12. Medium long redish; 13. Long multisided whitish green

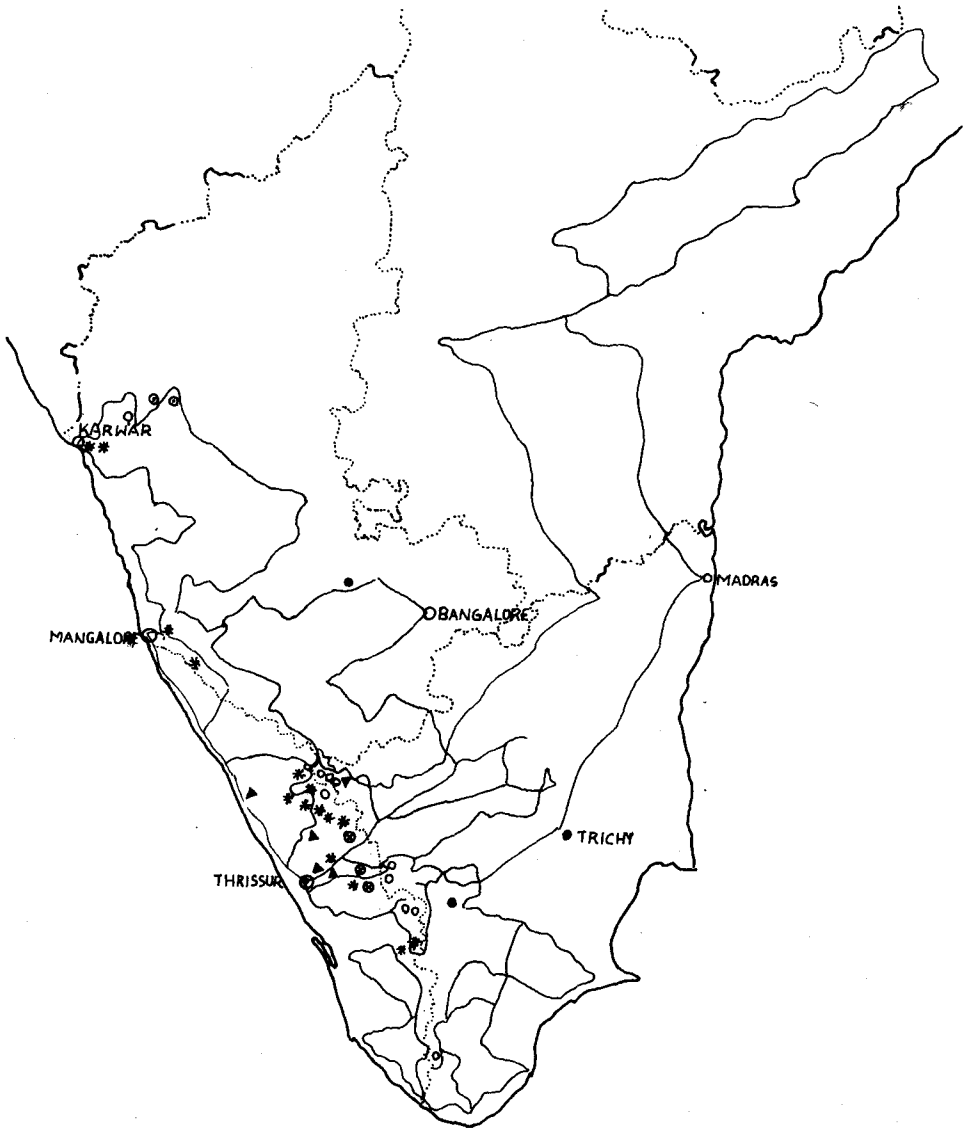

Fig. 1. Okra collection route and species distribution
1. *A. angulosus* var. grandiflorus; 2. *A angulosus* var. *purpureus;* 3. Intermediate forms of the above varieties; 4. *A ficulneus;* 5. *A moschatus* ssp. *moschatus* var. *moschatus;* 6. *A moschatus* ssp. *tuberosus;* 7. *A. manihot* var. *tetraphyllus;* 8. Natural hybrid between okra and var. *tetraphyllus*

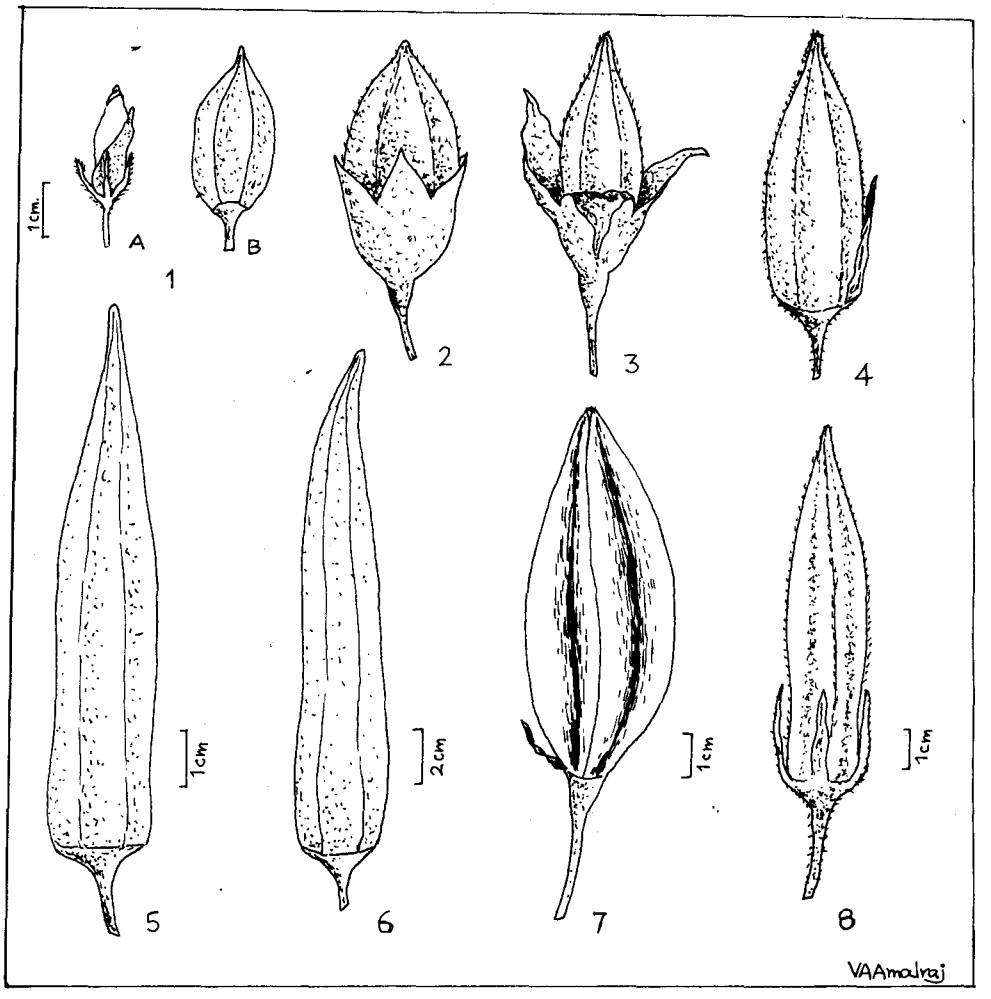

Fig. 1. Fruits of *Abelmoschus* spp. 1. *A. ficulneus* (A. flower, B. fruit), 2. *A. angulosus* var. *purpureus*, 3. *A angulosus* var. *grandiflorus*, 4. *A manihot* spp. *tetraphyllus*, 5. *A manihot* ssp. *manihot*, 6. *A esculentus*, 7. *A. moschatus*, 8. *Abelmoschus* (hybrid)

collections assembled from the region contained 12 distinct types based on the fruit characters.

Considerable work on the taxonomy of the genus has been carried out in the past. The revision of Indian species by Paul and Nair, 1988 has resulted in identity of 7 species in India. Of these, *A. moschatus, A. esculentus, A. angulosus, A. ficulneus* and *A. manihot* occur in Southern region. However in a recent International work shop on okra genetic resources held at NBPGR, New Delhi, India during 8-12 October, 1990 a group of scientists working on the world okra germplasm made the amendents on the taxonomy of the genus *Abelmoschus* based on the most recent works on taxonomy and the cytological evidences that a total of 8 species occur in the world with 5 sub species in *A. moschatus* and 2 varieties in *A. manihot* (Anon. 1990). Guinean type of okra has been identified as *A. callei*, Sudanian type as *A. esculentus* and *A. manihot* var. callei as *A. callei* which has been wrongly identified as *A. manihot* ssp. manihot in the post.

Thus, the overall picture based on the collections made by the authors in Southern Region of India in the light of the above short review of taxonomy of the genus, species such as *Abelmoschus esculentus* (L.) Moench. *A. moschatus* Medikus ssp. moschatus var. moschatus, ssp. tuberosus (Span.) Borss. *A. manihot* (Roxb. ex Hornem.) R. Graham var. tetraphyllus, *A. ficulneus* (L.) W. & A. ex Wight, *A. angulosus* Wall. ex. W & A. and *A. callei* (A. Chev.) Stevels occur in the region.

Distribution of these species has been given in Fig. 2. Western Ghats having innumerable niches becomes an abode of mainly two wild species, viz., *A. tetraphyllus* var. tetraphyllus in the northern stretches extending from North Kerala to Konkan and *A. angulosus* in the middle and southern parts of Ghats. In *A. angulosus* two extremely distinct types such as *A. angulosis* var. purpureus (Thw.) occupying higher slopes of Ghats above 4000 ft and variety grandiflorus (Thw.) occupying foot hills and midlands are noticed. Though these two are now not distinguished taxonomically in the latest classification followed by IPGRI, the authors feel that these two are distinct varieties of the species. Further, intermediate forms between the above two varieties have also been noticed in medium altitudes. In *A. moschatus* one distinct variety such as subspp. *moschatus* var. *moschatus* from midlands and plains of Kerala and another spp. such as *tuberosus* from semideciduous forests of Mudumalai in Tamilnadu have been collected. *A. ficulneus* is commonly found in plains of Tamil Nadu and Karnataka having black soil. Further, an intermediate form of okra between the cultivated and wild *A. tetraphyllus* var. tetraphyllus has been noticed in an interior tribal area in Uttar Kannada of Karnataka. This obviously leads to the conclusion that natural hybridization between okra and wild species takes place in certain situations generating intermediate forms rarely. However, on further segregation of the natural

hybrids, only wild forms resembling the original wild species are generated, thus gradually losing the wild genes from the cultivated one.

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