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Short Communication

Genetic Resources of Tropical Tuber Crops

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Cassava and sweet potato are the two major tropical tuber crops important for industry, as well as for food. While cassava has a restricted distribution in humid tropical areas, sweet potato is grown from humid tropics to sub-tropical/ sub-temperate regions in the lower Himalayas. Cassava cultivation has now been successfully extended to sub-humid tropical areas of India. Tuber crops and their wild species maintained at NBPGR, Trichur station are listed in Table 1.

TABLE 1. GERMPLASM OF TROPICAL TUBER CROPS MAINTAINED AT TRICHUR

Crop	Species	Accessions
Cassava	*Manihot esculenta*	57
Sweet potato	*Ipomea batata*	6
Greater yam	*Dioscorea alata*	177
Lesser yam	*D. esculenta*	41
Potato yam	*D. bulbifera* var. *sativa*	4
Taro	*Colocasia esculenta*	410
Coco yam	*Xanthosoma sagittifolium*	21
—	*Alocasia macrorhiza*	5
Elephant foot yam	*Amorphophallus companulatus*	70
Chinese potato	*Coleus parviflorus*	38
West Indian arrow root	*Maranta arundinacea*	18
Queensland arrow root	*Canna edulis*	2
Wild yam	*D. hamiltonii*	5
	D. wallichi	5
	D. tomentosa	3
	D. oppositifolia	5
	D. pentaphylla	5
	D. bulbifera var. *verosa*	6
	D. anguina	2
	D. hispida	3
Total		883

Cassava (*Manihot esculenta* crantz)

The crop was introduced in India during British colonial period by the Maharajah of Travancore and now it is grown commercially mainly in Kerala and Tamil Nadu. The indigenous and exotic collections of this crop and its related species have been accumulated in CTCRI, Trivandrum and the Institute has

made commendable contributions in all aspects of this crop. To enrich genetic variability, a recently collaborative exploration programme was taken up with CTCRI by NBPGR and 57 collections made from North Kerala.

Sweet potato (*Ipomoea batata* (L.) Lam.)

This crop is highly adapted to various agro-climates and therefore, has spread to even semi-temperate regions. In India, it is cultivated all over and is a major crop in Uttar Pradesh, Bihar and Orissa.

Greater yam (*Dioscorea alata* L.)

It is the most important Asian yam cultivated in India. It has originated through domestication/selection of wild forms related to two commonly occurring wild species such as *D. persimilis* and *D. hamiltoni* in South Asia (Purseglove, 1974; Coursey, 1976). Both species occur in the Indo-Burmese region and the latter is very commonly available in the rain forests of the Western Ghats. Arora and Nayar (1984) have reported the occurrance of wild *D. alata* in tropical and sub-tropical Himalayas. The crop is widely cultivated except in arid regions. Collections (177) accumulated at the station are from Kerala, Tamil Nadu, Karnataka, parts of Maharashtra, Madhya Pradesh and Himachal Pradesh.

Distinct morphotypes based on the above ground and below ground traits have been differentiated. Tuber shapes are broadly cylindrical, digitate and round. A trial conducted consecutively for 3 years showed that collection No. 5, No. 102 and No. 35 yielding 31.4 t/ha 30.8 t/ha and 27.6 t/ha, respectively were significantly superior to the others. Majority of the collections were male. Muralidharan and Velayudhan (1985a) have reported the performance of promising collections of *D. alata* alongwith their important morphological characters. Among the new collections evaluated during 1986, No. 193 and 240 yielding 38.0 t/ha and 35.0 t/ha respectively topped the list. A catalogue on Crop genetic resources including greater yam (Muralidharan *et al.*, 1983) has been published.

Lasser yam (*Dioscorea esculenta* (Lour.) Burkill)

Lesser yam is mainly distributed in Kerala, parts of coastal Karnataka and North-Eastern region. Collections from Kerala have been made by this station. These exhibited little variability with respect to above ground morphology; however, tubers varied in size, shape, hairiness, texture, colour and cooking qualities. In a trial on 9 promising collections conducted during 1986, collections No. 7, 5 and 37 proved to be superior, yielding 18.6 t/ha, 17.6 t/ha and 17.3 t/ha, respectively.

Potato yam (*Dioscorea bulbifera* L. var. *sativa*)

It is only a minor tuber crop and its distribution is restricted to Kerala and Tamil Nadu. Bulbils resembling potato are consumed as a vegetable. About four collections from Kerala and Tamil Nadu were made. No variation except for leaf size and bulbil size was noticed. A wild relative of this crop viz, *D. bulbifera* var. *verosa* occurs widely in India.

Taro (*Colocasia esculenta* Schott.)

In India, the crop is widely grown from humid tropics to sub-tropical areas and is also adapted to semi-arid conditions with irrigation. So far 410 collections mainly from Kerala, Tamil Nadu, parts of Karnataka, Maharashtra, Madhya Pradesh, Orissa, North-Eastern and North-Western regions have been made in *C. esculenta* var. *esculenta*, *C. esculenta* var. *antiquorum* and wild stoloniferous, semi-stoloniferous and non-stoloniferous types. These collections were grouped into 29 distinct morphotypes based on the aboveground and underground morphology. Variability in wild *Colocasia* collections from Kerala and Karnataka were also reported (Velayudhan and Muralidharan, 1985).

Evaluation of the germplasm resulted in isolation of five promising lines based on the corm and cormel yield which varied from 15-19 t/ha. In preliminary screening of the collections for diseases in collaboration with CTCRI, Trivandrum, 62 collections were found to be free from diseases when scored 65 days after planting. A catalogue based on 60 descriptors has been published.

Coco yam (*Xanthosoma saqittifolium* Schott.).

It has originated in South America and spread to South and South-East Asia and Africa. It is restricted to high rainfall regions in Western peninsular and North-Eastern regions. It is similar to taro in growth habit and cultivation but yields are higher. So far 21 collections have been made from Kerala. Varieties identified comprise a form with stoloniferous tubers which flowers and sets seed collected once from Thenmala in South Kerala, and two types with much variation in tuber size in duration, differing in plant habit and colour of flower.

Elephant foot yam (*Amorphophallus companulatus* Blume)

It is mainly grown in Kerala, Tamil Nadu, Andhra Pradesh and the North-Eastern region. The crop has originated in South-East Asia. Chromosome number of $2n = 28$ is reported. Seventy two collections, mainly from Kerala and Tamil Nadu, were made comprising two distinct varieties of cultivated *Amorphophallus*. The commonly cultivated type throughout India has a main rhizome bearing few tuberous outgrowths. While the others locally known as *Karuna* in Tamil Nadu, has cylindrical thick tubers within comparatively smaller main mother rhizome. Preliminary studies on the morphology of the collections resulted in the identification of 7 distinct morphotypes including *Amorphophallus bulbifer* which is a wild relative of the crop (Arora and Nayar, 1984). The collection also include wild elephant foot yam (*A. companulatus*) from plains and foot hills of the Western Ghats in Kerala.

Chinese potato (*Coleus parviflorus* Bush)

In India, it is grown mainly in Kerala and Southern parts of Tamil Nadu. It is locally known as *koorka* and forms an important seasonal vegetable. Out of 38 collections made in 1984, 5 distinct morphotypes based on habit, size of leaf,

branching pattern, pigmentation on stem, wartiness, shape and colour of tuber were identified. Preliminary screening for nematode infection on tubers (this is a serious problem of the crop in this area) has revealed a collection (No. 15) free of nematodes, and tolerant to root-knot nematode (*Meloidogynea* sp.) infection (No. 13, 30 and 23). Muralidharan *et al.* (1985b) grouped 41 of the original collections into 6 clusters based on D^2 analysis of 7 morphological characters.

The ten base centres of the National Bureau of Plant Genetic Resources will collect tropical tuber crop germplasm, with CTCRI, Trivendrum. Though these are not priority crops, yet because of the fast rate of genetic erosion caused by changes in cropping pattern and habitat destruction, native types are being lost. Identification of types which are highly productive, of shorter duration, resistant/ tolerant to insect pests and diseases and adapted to various agro-climates may lead to increase in area under cultivation and greater production and utilisation in this group of crops.

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