Indian J. Pl. Genet Resources 6 (1): 21-26, 1993

SACCHARUM GERMPLASM COLLECTION IN ARUNACHAL PRADESH

N.V. Nair, A.W. Jebadhas and T.V. Sreenivasan

Sugarcane Breeding Institute,
Coimbatore 641 007 (Tamil Nadu)

Lohit and Tawang Districts of Arunachal Pradesh were surveyed during October 1990 for collection of *Saccharum* germplasm. Areas around Paye, Hawa Camp and Hayuliang were particularly rich in diversity for *Saccharum spontaneum* and *Erianthus* in Lohit district. All morphotypes of *S. spontaneum* were present in these areas. *Erianthus fulvus* and *Miscanthus nepalensis* were extensively distributed in Tawang district. *S. spontaneum* was sparsely distributed in Tawang.

Key words : *Saccharum* spp., distribution, diversity

Arunachal Pradesh is a major area of diversity for *Saccharum* germplasm. *S. spontaneum, Erianthus* spp., *Miscanthus nepalensis, Narenga porphyrocoma* and *Sclerostachya fusca* are extensively distributed in the state. They co-exist and flower together in their natural habitats providing ample opportunity for introgression. Germplasm collection from the state was hence considered a priority and the state was explored during 1984 and 1985 (Sreenivasan *et al.*, 1984; Sreenivasan and Palanichamy, 1985) and nearly 300 clones were collected. The present collection is from areas not covered earlier and from where representation was too low.

COLLECTION METHODS

Target areas for collection were the districts of Lohit and Tawang. The team which surveyed Lohit during 1985, identified specific areas around Hayuliang for further collection. Tawang district was considered important for collection because of the possibility of collecting cultivated and wild sugarcanes growing at high altitudes. The survey was conducted during (11-27 October 1990) which coincides with the peak flowering of *Saccharum* and related grasses in the region. Collection routes were fixed based on the earlier

reports on species distribution in the state. Efforts were made to collect adequate samples to represent the whole range of variability available in a defined geographic area. Cane samples were collected from cultivated species while clumps were collected from *S.spontaneum, Erianthus, Miscanthus* and *Imperata.* Passport data on the collections were recorded on the spot. This included information on altitude, habit, plant association, soil type, topography, morphological traits and flowering.

COLLECTION IN LOHIT DISTRICT

Two major areas were identified for collection in Lohit district, (i) in the Tezu-Paya-Sunpura direction in the south and (ii) Tezu- Hayuliang-Walong direction in the North. Tezu-Paya-Sunpare areas consist essentially of flat lands with marshy patches and forest vegetation. Elevation is only 230-250 m above MSL. Both narrow leaved thin forms and medium tall forms of *S.spontaneum* were found to colonise the banks of Digaru river. Beyond Digaru, *S.spontaneum* was abundantly growing in dense thickets in association with other grasses like *Arundo* and *Phragmites. S. spontaneum* and *Erianthus* were abundant in Paya-Sunpare area. *S.spontaneum* in particular showed considerable variability observed in height from 2m to 6m. Forest margins were often waterlogged and both *S.spontaneum* and *Erianthus* were found to thrive well under these conditions.

Tezu-Hayuliang sector is mountainous. From Tezu (300m), the altitude gradually increases to 1640m at Sewak pass and then drops to 600m at Hayuliang. Small forms of *S.spontaneum* were frequent for a few kilometers from Tezu. Diversity was more at higher altitudes such as Hawa pass-Hawa Camp areas. Diverse morphotypes of *S.spontaneum* were found in this area, particularly tall, thick forms having broad and thick leaves. They often exceeded 5m in height and 2.5cm in stalk thickness. Some of them were mildy sweet also. Clone IND 90-804, collected from Hawa Camp was 5.4m tall, 2.7cm thick and recorded 14 per cent H.R.Brix. It had distinct pinkish green stalks with conoidal internodes and leaves too showed pink tinge. *S.spontaneum* clones collected from Hawa Camp area ranged from 1.00m to 5.8m in height. Most of the *S.spontaneum* clones were in flowering. Other plants found in association were *Erianthus, Phragmites* and *Imperata. Erianthus longisetosus* covered the lower sections of the hill slopes in the area and was in early stages of flowering. Variability for *E.longisetosus* appeared low.

Sewak pass at 1640 m is the highest point in Tezu-Hayuliang sector. *Miscanthus nepalensis* was found along the moist hill slopes in Sewak pass. Its distribution was sparse, restrited to a narrow stretch of about 1 km between 1500m to 1600m altitude. *Miscanthus* clones found here were weak ones and

variability was very much limited. Short forms of *S. spontaneum* were found to occur in Sewak pass.

Banks of Tiding river are extensively colonised by medium type *S.spontaneum*, which showed very little variability. *Erianthus* also was available in this area. Beyond Tiding river, huge forms of *S.spontaneum* were found to occur. IND 90-796 collected from Nara was 7.8m tall with thick stalks (2.4cm). Similar clones were frequently observed upto Hayuliang, so also short and medium typs. *Erianthus* had extensive distribution in Tafraliang,among forest vegetation and in open clearings. Variability was however limited. Most of the clones were tall forms (5m). Relatively large forms of *Imperata* were being cultivated in Tafraliang as thatching material. Different morphotypes of *S.spontaneum* were found to occur in Hayuliang-Suplang area. Tall and medium types were found on hill slopes. Dwarf forms were frequent along roadside and in open clearings. *S.spontaneum* collections ranged from 1.00m to 5.45m in height. Vast stretches of land were entirely occupied by *Erianthus*. *Erianthus* clone IND 90-781 collected from zero point was 7.6m tall. *E. longisetosus* also was well distributed in the area. At Khamba and Yathang, dwarf forms of *S.spontaneum* were also found. Other grasses found in association were *Neyrudia* and *Imperata*. Variability for *Saccharum* germplasm was limited in Hawai. *Erianthus* and *Imperata* were the major plants of interest. *Erianthus* clones found were smaller compared to those found in Hayuliang area. *S.spontaneum* was sparsely distributed. *Erianthus* occurred in many places including Changwinti, Panch kilo and Hapak. Medium type *S.spontaneum* was found in Walong, but variability was poor. *S. officinarum* are grown in home gardens also in Walong.

COLLECTION IN TAWANG DISTRICT

Tawang is located at ca 3100m altitude. Major plant species of interest in Tawang were *S.sinense, Miscanthus nepalensis* and *Erianthus fulvus*. *M.nepalensis* and *E.fulvus* were extensively distributed in Tawang and both species occurred in close association. Variability for both the species was limited. *S. spontaneum* was sparsely distributed and only thin, medium tall types were found. Cultivated sugarcanes (*S.sinense*) were collected from Kitpi, Audung and Namet villages in Tawang. Inspite of the high altitude and extreme cold climate, these clones showed excellent growth. Sugarcanes were being cultivated in home gardens in Lumla also. Distinctive types were found with thick stalks and broad leaves and impressive growth. *M.nepalensis* and *E.fulvus* were well distributed in Lumla. A total of 94 clones were collected from Lohit and Tawang Districts (Table 1).

Table 1 : *Saccharum* germplasm collection from Arunachal Pradesh

Species	Lohit District	Tawang District	Total Collection
Saccharum officinarum	2	-	2
Saccharum sinense	-	10	10
Saccharum spontaneum	42	2	44
Erianthus spp.*	24	-	24
Erianthus longisetosus	3	-	3
Erianthus fulvus	-	4	4
Miscanthus nepalensis	3	2	5
Imperata cylindrica	2	-	2
Total collections	76	18	94

*includes cane forming types, viz., *E.arundinaceus* and *E.procerus*

SPECIES DISTRIBUTION AND VARIABILITY

There were three areas in Lohit District where considerable variability for *Saccharum* germplasm was found; (i) Paya-Sunpure areas, where medium and tall forms of *S.spontaneum* and *Erianthus* occurred in abundance (ii) Hawa Camp area where all morphotypes of *S.spontaneum* were found to occur and (iii) Nara-Hayuliang - Suplang area, where again all morphotypes of *S. spontaneum* were present. Tafraliang, Hawai and Walong had limited variability and sparse distribution for *S.spontaneum.* In Tawang, *E.fulvus* and *M.npalensis* were widely distributed. *S.spontaneum* and cane forming types of *Erianthus* were not found. The locally adopted sugarcanes (*S.sinense*) collected from Tawang could be important sources for cold tolerance.

Majority of the *S.spontaneum* and *Erianthus* (Cane forming types) were collected from Lohit District. Range and variability for stalk height and stalk thickness are given in Table 2. For *S.spontanuem,* stalk height ranged from 0.3m to 7.8m while for *Erianthus,* the range was from 1.9m to 7.6m. Distribution of *S.spontaneum* and *Erianthus* clones in the different stalk height/thickness groups is given in Tables 3 & 4. In the case of *S.spontaneum,* a continuous range from 0.3m to 7.8m was observed for stalk height and from 0.3cm to 2.8cm for stalk diameter. This probably covers the entire range of variability for these two characters, available in the world collections today. For *Erianthus,* variability for stalk height and diameter was less compared to *S.spontaneum.*

Table 2 : Range and variation for stalk height and thickness

	Mean	Range	CV%
Stalk height(m)			
S.spontaneum	3.07	0.3-7.8	68.19
Erianthus spp.	4.06	1.9-7.6	31.18
Stalk thickness (cm)			
S.spontaneum	1.31	0.3-2.8	56.07
Erianthus spp.	1.87	0.8-2.6	21.96

Table 3 : Variability for stalk height (m)

Species	Stalk height (m)								Total clones
	1	1-2	2-3	3-4	4-5	5-6	6-7	7	
S.spontaneum	8	9	7	7	2	7	2	2	44
Erianthus spp.	-	2	2	13	1	5	-	1	24
Erianthus longisetosus	-	2	1	-	-	-	-	-	3
Erianthus fulvus	2	2	-	-	-	-	-	-	4
Miscanthus nepalensis	1	4	-	-	-	-	-	-	5
Imperata cylindrica	1	1	-	-	-	-	-	-	2
Total clones	12	20	10	20	3	12	2	3	82

Table 4 : Variability for stalk thickness

Species	Stalk thickness (cm)			Total clones
	1	1-2	2-3	
S.spontaneum	20	12	12	44
Erianthus spp.	1	13	10	24
E. longisetosus	2	1	-	3
E.fulvus	4	-	-	4
M. nepalensis	5	-	-	5
Total clones	32	26	22	80

ACKNOWLEDGEMENTS

Authors are thankful to the Director, Sugarcane Breeding Institute, Coimbatore and Director of Agriculture, Govt. of Arunachal Pradesh for facilities.

REFERENCES

Sreenivasan, T.V., K. Palanichamy and M.N. Koppar. 1984. Report on *Saccharum* germplasm collection in Arunachal Pradesh - 1984, Sugarcane Breeding Institute, Coimbatore.

Sreenivasan, T.V. and K. Palanichamy. 1985. Report on *Saccharum* expedition to Arunachal Pradesh. Sugarcane Breeding Institute, Coimbatore.