

## SUGARCANE GERMPLASM COLLECTION IN MANIPUR AND MEGHALAYA

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*One hundred and seven clones of Saccharum and related genera, Erianthus, Naranga, Miscanthus, Imperata, Neyrudia and Phragmites were collected from Manipur and Meghalaya. Variability in plant height, diameter and leaf type was observed.*

North eastern India bordering Myanmar (Burma) and China is one of the major centres of diversity for *Saccharum* spp. and allied genera. Efforts to collect *Saccharum* germplasm from these areas began in 1950s with the launching of Spontaneum Expedition Scheme (SES), by the Indian Sugar Committee, for collecting wild *Saccharum* germplasm from different parts of the world. However, North eastern states were not adequately covered under SES. Efforts were renewed after three decades by Sugarcane Breeding Institute, Coimbatore, to explore and collect *Saccharum* germplasm from North eastern states before they become totally extinct. During the period from 1981-1985, four expeditions were organized by Sugarcane Breeding Institute under NBPCR National Exploration programme, New Delhi in the states of Bihar, Sikkim and Arunachal Pradesh and a total of 637 clones were collected and added to the World collection of sugarcane germplasm (Sreenivasan *et al.*, 1982, 1984, 1985; Sreenivasan and Palanichamy, 1985). The collection from Manipur and Meghalaya is a continuation of this programme.

Existence of abundant variability for *S. spontaneum* and *Erianthus* spp. in these regions had been already reported (Panje, 1951, 1953). Under SES, collections were made from both these states during 1951. Two *S. spontaneum* clones were collected from Manipur, one from Lok Tak and

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the other from Kangchup. From Meghalaya, 4 clones of *S. spontaneum*, one clone of *E. fulvus*, two clones of *E. arundinaceus* and one each of *E. longisetosus* and *Sclerostachya fusca* were collected. The areas explored were Cherrapunji, Shillong peak, Nungpoh and Umsaw. The present expedition was organized by Sugarcane Breeding Institute in collaboration with National Bureau of Plant Genetic Resources New Delhi during October, 1989 in Manipur and Meghalaya. More emphasis was given for collection from Manipur, because of the inadequate coverage of the State during the earlier expeditions and a possible commonness with the flora of Myanmar, particularly along the common rivers. The time of the expedition coincided with the peak flowering of *Saccharum* and related genera in this area.

### SAMPLING AND COLLECTION METHODS

Collection routes were fixed based on the availability of species diversity. Collections were made from forest margins, open clearings, agricultural lands, river banks and hill slopes. Efforts were made to make the collections as representative as possible. Distinctive forms of tall, broad leaved, *S. spontaneum* were collected. Dwarf and medium tall forms which were much more frequent, were carefully sampled to avoid duplication. In *Erianthus*, collection of cane forming types were given more emphasis. Besides, clones possessing specific attributes like tolerance to waterlogging were also collected. Healthy stalks were collected in case of *S. officinarum*. Stalks were cut into 3 budded setts for packing and transport. Clumps were dug out for *S. spontaneum*, *Erianthus*, *Narenga* and *Imperata* spp. The collections were described on the spot for habit and all other morphological and flowering attributes. Besides information on altitude, habitat, plant association, soil type and topography were also recorded.

### COLLECTION IN MANIPUR

A total of 85 collections were made (Table 1) from Imphal, Bishenpur, Churachandpur, Tamenglong and Ukrul districts. Variability was limited for *Saccharum* germplasm in Imphal valley, which represent most of the cultivable land area of the state. Three distinct morphotypes of *S. spontaneum* were present in the valley. Tall, broad leaved forms were seen in semi-cultivated state in agricultural lands, being used for reinforcement in house construction. Some of them were mildly sweet forms growing to nearly 6m height and having about 2.5cm thick stalks. Dwarf, narrow leaved forms were frequent along paddy fields. Medium tall forms with broad leaves were also seen in the district. *S. officinarum* was in cultivation, in many parts of Imphal district. Four distinct varieties were found; red, yellow, green and one being striped types. Both dwarf and tall forms of *S. spontaneum* were present in Bishenpur district. Some of the tall forms were over 6m in height with 2.5cm thick stalks. Around Moirang, tall *S. spontaneum* forms were seen growing in partially submerged condition. The entire stretch from Imphal

to Churachandpur did not show any appreciable variation in topography or in elevation. The species diversity also was more or less similar upto Churachandpur except that *Narenga porphyrocoma* has frequent distribution after Moirang towards Churachandpur. Beyond Churachandpur, towards Lamja, the topography changes as elevation increases and dense vegetation and thick forest growth is encountered in this area. *S. spontaneum* and *Narenga porphyrocoma* were well distributed here along river banks and forest fringes, while *E. longisetosus* was found on hill slopes and relatively drier locations. Collections were made from Tolnum, Mata, Mualtam, Lamja and Nu kanang. One clone of *N. fallax* could be collected from Nu kanang. Lok Tak is one of the largest fresh water lakes in the north east. The area around Lok Tak was surveyed but variability for *Saccharum* germplasm was lacking. Along the banks of the lake, two distinct *S. spontaneum* forms were found to be growing in partially submerged condition. One clone of *Erianthus* also could be collected from Thanga village along the lake. Tamenglong district had a moderate distribution of *S. spontaneum* and related genera, especially at altitudes beyond 1000m. *S. spontaneum* was found freely growing in dry hill slopes, moist slopes as well as along river banks and other water sources. Tall forms of *S. spontaneum* were totally amiss in this area. Most of *S. spontaneum* forms found were dwarf to medium forms, the height never exceeding 2.5m. *E. procerum* was found in dry as well as moist habitats while *E. longisetosus* was found mostly on dry hill slopes

**Table 1. List of sugarcane germplasm collected from Manipur and Meghalaya**

Species	No. of accessions collected from		
	Manipur	Meghalaya	Total
<i>Saccharum officinarum</i>	5	—	5
<i>Saccharum spontaneum</i>	47	8	55
<i>Erianthus spp./hybrids</i>	4	1	5
<i>Erianthus fulvus</i>	—	3	3
<i>Erianthus procerum</i>	6	—	6
<i>Erianthus longisetosus</i>	5	—	5
<i>Narenga porphyrocoma</i>	10	3	13
<i>Narenga fallax</i>	3	1	4
<i>Neyrudia sp.</i>	—	1	1
<i>Imperata cylindrica</i>	4	2	6
<i>Phragmites karka</i>	1	—	1
<i>Miscanthus nepalensis</i>	—	3	3
Total	85	22	107

and even on hills of conglomerate rocks with little soil cover. *N. porphyrocoma* and *Imperata cylindrica* were also found in the area.

Maximum diversity for *Saccharum* and related genera was found in UkruI district. Again variability was high in the hills beyond 1000m. and *S. spontaneum*, *Erianthus* spp. and *N. porphyrocoma* were well represented in the district. Variability for *S. spontaneum* from narrow leaved dwarf forms (0.3m) to broad leaved tall forms growing to over 6m were present in the district. They were found in all habitats, along road sides, agricultural lands, hill slopes, among forest vegetation, on rock slopes and even in flooded condition. Dwarf forms were found to colonise hill slopes and river banks. Broad leaved forms were found in isolation or in association with plants of other genera. One broad leaved *S. spontaneum* form collected from Hundung, from dense forest growth was 6.36m tall. *E. longisetosus* was frequent on hill slopes and dry terrains and some of them were heavily branched and with number of arrows. Very huge forms of *Phragmites karka* were found in UkruI. Other grasses found in association were *Cymbopogon* and *Imperata* spp. *S. officinarum* was being cultivated in home gardens at Lambut (1510m) and UkruI (1820m).

#### SPECIES DISTRIBUTION AND VARIABILITY IN MANIPUR

Collections were made from altitudes ranging from 800m to 1820m. Diversity was found to be higher at altitudes beyond 900m. Of the 85 clones collected from Manipur, 40 came from UkruI district alone, which was found to be rich in diversity for *Saccharum* complex. *S. spontaneum* had the maximum diversity and was well distributed throughout the state. *N. porphyrocoma* also was well distributed, but variability for the species appeared to be limited. *S. officinarum* was in cultivation in Imphal district and in a limited scale at UkruI. Other species of interest found in the state were *E. longisetosus* and *E. procerum* and certain *Erianthus* forms of hybrid origin. *Erianthus fulvus* and *Miscanthus* were conspicuously absent in the areas visited.

Variability in general was very high for *Saccharum spontaneum* (Table 2). From very small forms (0.30m) to very tall (6.36m) were found in the state. Three *S. spontaneum* clones were collected which had stalk heights of over 6m. Stalk diameter ranged from 0.4cm to 3cm. All *S. officinarum* clones collected were of thick forms (3 to 4 cm) with robust growth.

Table 2. Variability for stalk height in Manipur collections

Species/genera	Plant height							Total No. of clones
	Less than 1m	1-2 m	2-3 m	3-4 m	4-5 m	5-6 m	6-7 m	
<i>S. spontaneum</i>	14	14	7	5	4	—	3	47
<i>S. officinarum</i>	—	—	—	5	—	—	—	5
<i>Erianthus spp/hybrids</i>	—	—	2	1	—	1	—	4
<i>E. longisetosus</i>	1	—	1	3	—	—	—	5
<i>E. procerum</i>	—	—	1	5	—	—	—	6
<i>N. fallax</i>	—	2	1	—	—	—	—	3
<i>N. porphyrocoma</i>	—	5	3	—	2	—	—	10
<i>Imperata cylindrica</i>	4	—	—	—	—	—	—	4
<i>Phragmites karka</i>	—	—	—	—	—	—	1	1
Total								85

#### COLLECTION IN MEGHALAYA

Collection in Meghalaya was restricted to Barapani, Umsaw, Upper Shillong and Cherrapunji areas and a total of 22 clones were collected (Table 1). There was extensive distribution of *E. hookeri* along the hill slopes surrounding Barapani lake, but none of the clones were in flowering. *S. spontaneum* and *N. porphyrocoma* also had wide distribution in the area. Along the fringes of the lake, *N. fallax* could be located, but this species was sparsely distributed, otherwise. *Neyrudia* and *Phragmites* were found in association with *Narenga*. There was extensive distribution of *Miscanthus nepalensis* and *E. fulvus* from Upper Shillong to Shillong peak, beyond 1700m altitude. Large populations of these two species were found in close association along the hill slopes of upper Shillong towards Shillong peak and also upto some 15 km beyond Upper Shillong towards Cherrapunji. *Imperata* was closely in association with *E. fulvus* in some areas. *S. spontaneum* was seen along river banks occasionally.

Approaching Cherrapunji, the vegetation appeared to be poor and *Saccharum* spp. were not frequent. One natural hybrid, possibly of *S. spontaneum*, was found in a semi-cultivated state in old Cherrapunji. The plant was about 20 feet tall with erect habit and broad leaves. Stalks were thick and hard with brownish patches and resembles *S. robustum* to some extent. Beyond Cherrapunji, towards Shylla, *S. spontaneum* were frequently seen.

### SPECIES DIVERSITY IN MEGHALAYA

Collections were made from altitudes ranging from 250m to 1800m in Meghalaya. Barapani area had extensive distribution of *E. hookeri* and *N. porphyrocoma* but variability appeared to be limited. *N. fallax* is present in the area. *Miscanthus nepalensis* and *E. fulvus* were found only at altitudes beyond 1700m in Upper Shillong and nearby areas and variability appeared to be low. Most of these forms were less than 1m tall. One clone, possibly a *S. spontaneum* hybrid, collected from Cherrapunji was interesting with features resembling *S. robustum*.

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