

PLANT GENETIC RESOURCES WITH SPECIAL REFERENCE TO RICE VARIETIES OF MAJULI ISLAND

B.D. Sharma¹, D.K. Hore and P.K. Pathak²

National Bureau of Plant Genetic Resources,
Regional Station, Shillong 793 013 (Meghalaya)

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Majuli is the biggest freshwater island in the world located in Brahmaputra river in Jorhat District of Assam. It has an area of 1245 sq. kms. and lies between 93° 39' to 94° 50' E longitude and 26°40' to 27°10' N latitude (Fig.1). Out of a total geographical area of 12,4512 ha occupied by this island, 24.38 per cent is cultivable area and 0.2 per cent is under forest cover. The irrigated area is only 4 per cent. The island constitutes vast arable sandy area along the river banks cultivated by small and marginal farmers. A cropping intensity of 189 per cent is maintained and the cultivation of vegetable crops is discouraged due to poor communication with the main land. The present studies reports on the plant genetic resources of the island and its rich diversity in rice.

Exploration and collection of rice germplasm and a general survey of the floral diversity was undertaken in the Majuli island during September, 1991. The soils and crop growing conditions in the island showed much variation. Rice germplasm was collected by taking random population samples of 80-90 panicles per accession. Passport data were recorded at the site. Comprehensive notes were taken on varietal characters including the grain characters and uses. Majuli represents alluvial plain deposits of the Brahmaputra and its tributaries, viz., Kherakatia, Luit Suti and Tuni Suti. The soils of the island are mainly of 3 types, viz., loam, clay loam and loamy sand. These are acidic in nature. Humid and warm weather is characterized by high mean annual rainfall of 2000 mm; maximum temperature of 28° to 36°C during summer and minimum of 10° to 15°C during the winter months. The island receives very less rainfall during the period from November to March.

¹Present Address : NBPGR Regional Station, Phagli, Shimla 171 004 (Himachal Pradesh)

²Assam Agricultural University, Jorhat (Assam)

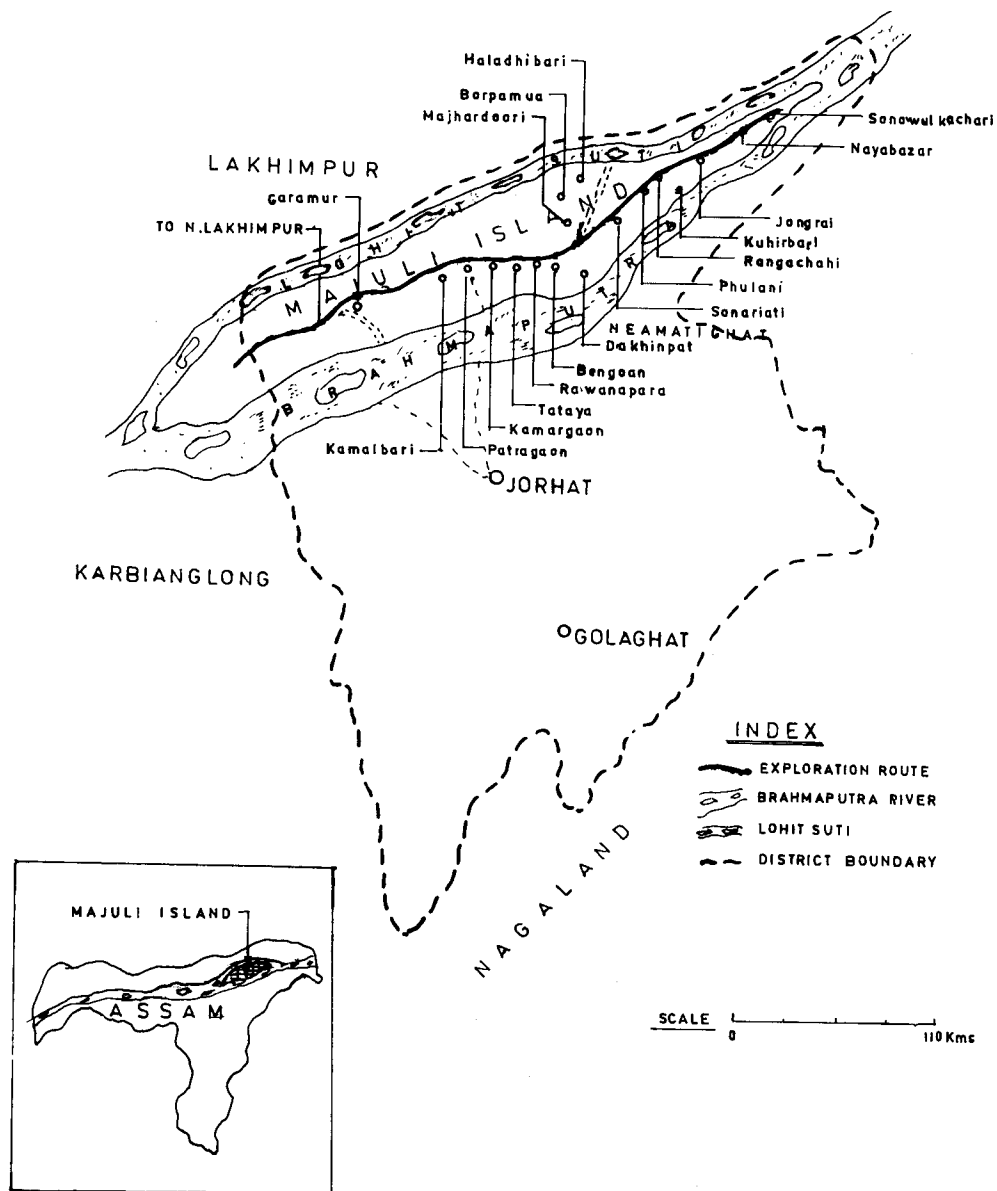


Fig. 1. Map of Majuli island in Assam showing exploration route and collection sites

Floral Diversity Pattern

According to Islam (1990), plants of 139 families, 505 genera and 692 species are found in Majuli. Among these, 76 per cent species belong to dicotyledonous group. It has been observed that the predominant families are Poaceae, Asteraceae, Fabaceae, Euphorbiaceae, Cyperaceae, Solanaceae, Malvaceae, Scrophulariaceae, Acanthaceae and Convolvulaceae. The vegetation consists of evergreen forests, swamp forests, savanna formation and the grasslands. The economically useful plants of Majuli also show wide diversity. Many of these are found in cultivation. Table 1 depicts the genetic resources of various economically useful plant species in terms of number of species which shows the existence of variability for useful plant groups. Some of such plants have even been naturalised over the period. To mention a few of these are *Brassica nigra*, *Hibiscus subdariffa*, *Luffa cylindrica*, *Capsicum annum*, *Coriandrum sativum*, *Sesamum indicum*, *Perilla frutescens*, *Trichosanthes dioica*.

Table 1 : Number of species of economically useful plants in Majuli

Crop Group	Number of Species
Cereals	3
Corms	6
Root vegetables	4
Stem and leafy vegetables	10
Vegetable fruits	16
Pod and seed vegetables	5
Plantation crops	1
Fruit plants	23
Oil yielding plants	5
Leaf fibre crops	4
Fibre yielding plants	10
(a) Cultivated	
(b) Wild	25
Leaf sheath fibre plants	3
Mesocarp fibre plants	2
Spices and aromatic plants	11
Medicinal plants	43
(a) Cultivated	
(b) Wild	75
Ornamental plants	60
Total	306

Cultivated Crops and their Diversity

The total cultivable area in the Majuli is 30,358 ha, which includes current fallow 1,296 ha, old fallow 332 ha and net sown area 26,356 ha. The total irrigated area is 1204 ha; forest cover 250 ha and the average land holding is only 0.3 ha. Rice is the staple crop grown in 3 seasons viz., *sali*, *boro* and *ahu*. The other important crops include potato, maize, tobacco, wheat, mustard and rapeseed, groundnut, sesame, niger, pea, lentil, blackgram and greengram. The cultivation of deep water or flood tolerant varieties is common in some pockets because the frequency of flood is high. The predominant local varieties are *Hatisalai*, *Salpna* and *Jahinga* which could give a grain yield of 30-40q/ha. *Mahsuri*, an improved HYV also performs well in Majuli (40-50 q/ha). Major disease of rice is leaf blast but among pests, *ufra* in *bao* (deep water) fields, case worm, stem borer, *hispa* and *gandhi* bug cause substantial damage.

Diversity in paddy germplasm

In the small area of over 26,000 ha of cultivated land with a native population of 1,34,000, seventy landraces of paddy have been found in cultivation (Table 2). The reason for occurrence of much large number of varieties / landraces over the small area may be as follows :

Difficult means of communication with the mainland : Paddy is the staple food of the inhabitants and in case of any shortage, miserable conditions are faced for immediate transportation. In order to avoid such situations, germplasm diversity preserved over generations of conscious selection provide insurance against crop failure and also during shortage of food.

Frequent floods : Changing course of river also creates uncertain situations and at times may play havoc with the crop. This has provided suitable ecological selection pressure on the paddy varieties being grown, resulting thereby, flood and drought tolerant types.

Favourable edaphic and ethnic situations : High soil fertility, diverse growing conditions and tendency for self-sufficiency for food are the important factors in favour of high varietal diversity.

Disease and insect pest pressure on the crop : The varietal materials must have been introduced in the island over different periods from the main land without adequate quarantine measures. The continuous high humid conditions and suitable mild hot temperatures conducive to the prevalence and annual recurrence of disease and insect-pests incidences caused severe damages to the crop particularly by *hispa*, *gandhi* bug and stem borer. This has indirectly cautioned farmers to select for resistant materials and diversify their varietal stock.

Table 2 : Paddy varieties grown in Majuli Subdivision of Jorhat District, Assam

Ahu March-April to June-July	Bao (deepwater) March-April to November-December	Sali June- July to October-November
Guni, Ekha joi, Borkula, Ekora guni, Gobarguni, Kaoriguni, Milung, Meghi, Bangah, Bedguti, Lepu, Benganguti, Saraituni, Haitibor, Salpna Ahu and Kalaguni.	Rangoli (Ranga gotha), Amuna, Kakua, Kahijul (Kalijul), Bogajul, Sakibao, Nagheri, Maiman-singia, Deoribao, Indinarayan (Indianayan), Chenga, Maguri, Dubri, Dalbao, Biria Bhanga, Adulia (Hedulia) bao, Rupahi bao and Kholio bao.	<p>i) <i>Lahi</i> (Fine grain) varieties: Salpna, Taraboli, Suhagmoni (Jengoni), Khamati Sali, Kolahali, Malbhog, Ampakhi.</p> <p>ii) <i>Joha</i> (Scented) varieties : Bhabeli joha, Kala joha, Manaki joha.</p> <p>iii) <i>Soft rice</i> (Sweeter, good for Chira, Khoi & Muri) varieties : Komol dhan, Hatidatia, Bor Jahanga, Horu Jahanga and Rangasali.</p> <p>iv) <i>Jalpan</i> (Breakfast) varieties : Ghewan bora, Borbora, Pakhuri (Coru Chakwa bora), Gorunda Pakhi (Necklace bora) and Harubora (Tilbora).</p> <p>v) Local common (cooked rice) varieties : Bor Chakhua, Horu Chakhua, Betu, Nania, Jaldubi, Hati-sali, Sailsali, Chakharu, Nakera, Dalkachu hali, Kala Ampakhi, Neokadam, Henduri hali (Senduri hali), Herai Powa and Mahsuri (Aizons).</p>

The three seasons for paddy growing are **Ahu** (moisture stress period), **bao** (a crop which remains submerged in water) and **sali** (rainy season crop). All the **ahu** season varieties are short duration (110-120 days) and are tolerant to moisture stress. **Sali** season is characterised by the regular precipitation. The **hali** or **sali** varieties are generally of medium maturity duration (130-160 days). The **bao** paddy varieties are well adapted to flood waters and hence are grown in flood prone areas. These varieties are, in general, of very long duration (170-215 days), have very bold grains and mostly bear awns. The

main (or sali) crop constitute the biggest group of 35 paddy varieties. These varieties could be further grouped as **Joha** (scented), **Lahi** (fine grain), soft rice, **Jalpan** (breakfast) and general cooked varieties (Table 2). The varieties showed much variation in grain size, starch and sweetness, husk colour, colour and size of lemma (sterile), awn character (colour and length), plant height, pigmentation on culms and adaptation to various soils (submerged or non-submerged) and planting conditions. For instance, **Ranga Sali** and **Salpna** does well under continuously submerged soils. The **Gorunda** variety had very long (full grain length) sterile lemmas. Among scented varieties **Kala Joha** is considered to be the best variety. For taste, **Khamti** rice is the best and when a sample of it was cooked it was observed that it appeared as if ghee had been added to it. Another variety **Ekha joi** is well adapted to water logged soils and had allelopathic effect on weeds, as these were found to be suppressed. Some varieties have already become obsolete. These were **Sarai Tuni** (good grain quality) and **Haria Duli** (scented ahu).

REFERENCES

Islam, M. 1990. The Flora of Majuli. Bishen Singh Mahendra Pal Singh, Dehradun.