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COLLECTION AND EVALUATION OF HILL RICE GENOTYPES OF ASSAM

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In an exploration undertaken in the hills zone of Assam, comprising Karbi Anglong and North Cachar Hills districts, a total of 76 hill rice genotypes were collected from 42 sampling sites. High variation was observed among the genotypes for all the traits studied. GCV and PCV were recorded high (> 50%) for yield per plant. Heritability estimates were recorded high for all the traits. A high estimates of genetic advance were recorded for grain yield per plant, grains per panicle, tillers per plant and spikelets per panicle. High heritability coupled with high genetic advance was observed in yield per plant, grains per panicle, tillers per plant and spikelets per panicle, which revealed predominance of additive gene action in inheritance of these traits. Three cultivars *viz.* Maibee Socket and Banglai were identified promising for grain yield per plant.

Key words : Rice, collection, evaluation, genotype, variability, heritability, genetic advance

Hills zone of Assam comprised Karbi Anglong and North Cachar Hills districts. Here rice is grown mostly in the hilly slopes as *jhum* (shifting cultivation through burn and slush method) and also in terraces. A number of hill rice cultivars are grown by the farmers of these two districts. These cultivars are mainly poor in yielding ability but highly adaptable to the existing agro-ecological condition. Most of these cultivars are tolerant/ resistant to water stress, major diseases and insects-pests. Moreover, they possess lot of other agronomically important traits. These local cultivars are facing imminent danger of extinction due to recent trends in agricultural development. Hence, collection and evaluation of these genotypes for various morpho-physiological traits is an important breeding aspects for identification of outstanding genotypes to use as such and also for development of suitable rice varieties for the region. Keeping this view in mind, the present work was planned to collect and evaluate the hill rice germplasm of Assam.

MATERIALS AND METHODS

Agro-ecology

The hills zone of Assam has diverse agro-ecological situations resulting from variation in slope (0-80%), altitude (95m to 1000m above mean sea level), temperature (3.7°C to 40.1°C) and average annual rainfall (1000mm to 2500mm). Hill rice cultivars are mainly grown in hilly slopes as *jhum* (shifting cultivation through burn and slash) and also in terraces either as mixed or mono-crop under direct seeded rainfed condition. Micro- environments such as day to day and day and night temperature and also soil characteristics differ markedly from place to place and within a short distance. All these factors lead to accumulation of enormous variability among the rice cultivars grown in this zone.

Collection strategy

An itinerary for collection of germplasm was prepared in consultation with the State Department

Table 1. Range, mean and mean squares of different quantitative traits in hill rice genotypes of Assam

Characters	Range	Mean ± SE	Mean Square	
			Variety	Replication
Days to 50% flowering	81.00-145.00	101.36 ± 1.46	485.532**	98.450**
Days to maturity	113.50-162.50	126.86 ± 1.35	414.812**	0.161
Plant height (cm)	88.85-161.80	127.62 ± 1.69	652.019**	142.453**
Tillers/plant	3.35-12.50	8.45 ± 0.26	15.945**	0.011
Leaf length (cm)	40.65-73.70	57.54 ± 0.96	200.218**	3.561
Flag leaf length (cm)	21.80-49.15	34.30 ± 0.64	93.114**	20.271*
Leaf breadth (cm)	1.22-2.20	1.66 ± 0.03	0.171**	0.110**
Flag leaf breadth (cm)	0.973-1.88	1.42 ± 0.03	0.138**	0.018
Panicle length (cm)	19.70-31.85	25.64 ± 0.30	19.808**	1.303
Spikelets/panicle	81.75-293.00	181.77 ± 5.24	6252.752**	312.053
Grains/panicle	51.50-243.25	131.47 ± 4.96	5619.908**	2007.484**
100 grain weight (g)	1.17-3.00	1.84 ± 0.04	0.432**	0.003
Yield/plant (g)	5.05-35.35	15.26 ± 0.92	194.364**	2.524

*,** Significant at 5% and 1% level respectively

of Agriculture, Assam, and the areas covered are given in Fig. 1. Farmer's field was taken as a unit area and random samples from the populations and biased samples of the elite materials were collected (Chang, *et al.*, 1972, Chang, 1976, Pandravada and Reddy, 1990). Germplasm samples were also collected from threshing yards and farm stores (Pandravada *et al.*, 1996). Each germplasm sample was given an accession number and name of the farmer, place and date of collection were also recorded.

Materials and Design

All the 76 rice genotypes were grown in randomized block design with three replications during summer 1998 at Regional Research Station, Diphu (25° 50' N longitude, 90° 30' E latitude and altitude of 180m above m.s.l). Observations were recorded for 13 yield and yield attributes *viz.* days to 50% flowering, days to maturity, plant height, tillers per plant, leaf length, flag leaf length, leaf breadth, flag leaf breadth, panicle length, spikelets per panicle, grains per panicle, 100 grain weight and grain yield per plant. The data were subjected to analyze variances. Genotypic and phenotypic co-efficient of variances (GCV and PCV) were worked out according to the formulae suggested by Burton (1952) while heritability (broad sense) and genetic advance (GA) as percentage of mean were obtained using the formulae of Hanson *et al.* (1956).

RESULTS AND DISCUSSION

Seventy-six hill rice germplasm were collected from 42 sampling sites of Karbi Anglong and North Cachar Hills districts of Assam (Fig. 1). Significant variations were observed among the genotypes for all the traits studied (Table 1). Wider ranges of mean performances were observed for all the traits indicating greater magnitude of variability among the genotypes. Grain yield per plant ranged from 5.05 to 35.35g. High GCV

Table 2. Genetic variability and its related parameters in hill rice genotypes of Assam

Characters	6^2g	6^2pm GCV(%)	PCV(%)	Heritabilit (b.s)%		GA% of mean
Days to 50% flowering	159.49	166.55	12.46	12.73	95.76	25.12
Days to maturity	137.49	139.83	9.24	9.32	98.33	18.88
Plant height (cm)	208.93	234.16	11.33	11.99	89.22	22.04
Tillers/plant	5.07	5.81	26.65	28.53	87.20	51.24
Leaf length (cm)	63.62	72.98	13.86	14.85	87.17	26.66
Flag leaf length (cm)	29.58	33.95	15.86	16.99	87.13	30.49
Leaf breadth (cm)	0.05	0.07	13.47	15.94	71.43	23.45
Flag leaf breadth (cm)	0.04	0.05	14.47	16.41	77.78	26.29
Panicle length (cm)	6.21	7.39	9.72	10.60	84.12	18.37
Spikelets/panicle	1951.45	2349.84	24.30	26.67	83.05	61.51
100 grain weight (g)	0.14	0.15	20.58	20.75	98.42	42.03
Yield/plant (g)	64.23	65.91	52.52	53.20	97.45	106.80

and PCV were recorded for grain yield per plant (52.52% and 53.20% respectively) indicating maximum variability among the genotypes for this trait. While, moderate GCV and PCV values 20% to 50% were recorded for grains per panicle, tillers per plant and 100-grain weight. The remaining traits showed relatively low GCV and PCV estimates. Heritability estimates were recorded high for all the traits studied. It ranged from 71.43 per cent in leaf breadth to 98.42 per cent in 100-grain weight. Higher estimates of heritability revealed lower environmental influence in expression of these traits depicting reliability for phenotypic selection. Genetic advance as percentage of mean were observed high for yield per plant (106.80%), grains per panicle (61.51%), tillers per plant (51.24%) and spikelets per panicle (45.63%). The remaining traits exhibited relatively low genetic advances. High heritability coupled with high genetic advance as observed in yield per plant, grains per panicle, tillers per plant and spikelets per panicle indicated predominance of additive gene effects in inheritance of these traits and thus revealed relatively higher feasibility for phenotypic selection. Similar observations were also reported by Kihupi and Dote (1989), Marimuthu *et al.* (1990), Deb Choudhury and Das (1998).

On the basis of mean performances of genotypes, few promising lines were identified for various agronomic traits (Table 3). One cultivar, Izong was found suitable for semidwarf plant type (88.85 cm) while four cultivars *viz.*, Maigogang, Baodm, Maidaola, and Banglai were selected for tall plant type (153.00 to 161.80 cm). Ten genotypes *viz.* Maibee, Miren, Maiju Guphu, Baodum, Izong, Petchiam, Maitotai, Bairing, Mailong Chang and N.D.C were found promising for more numbers of tillers per plant (11.00 to 12.50). Petchiam and Maiguangang were two genotypes selected for longer panicle (30.30 to 3.185 cm), while, Bairing and Maichu were identified promising for more grains per panicle (243.25) and more test weight (30.00g) respectively. Three genotypes *viz.*, Maibee, Socket and Banglai were identified promising for grain yield per plant (33.80 to 35.35 g). These three genotypes may be recommended as such for cultivation by the farmers of the region after elaborate yield traits. All these genotypes identified

Table 3. Promising cultivars identified for various agronomic traits on the basis of their mean performances

Characters		Promising cultivars
1.	Semi dwarf plant type (88.85 cm)	Izong
2.	Tall plant type (153.00 to 161.80 cm)	Maigogang, Baodum, Maidaola, Banglai
3.	More tillering ability (11.00 to 12.50 tillers/ plant)	Maibee, Miren, Maiju Guphu, Baodum, Izong, Petchiam, Maitotai, Bairing, Mailong Chang, NDC
4.	Longer panicle (30.30 to 31.85 cm)	Petchiam, Maiguangang
5.	More grains/panicle (243.25 grains/panicle)	Bairing
6.	More grain weight (test weight (30g/1000 grains)	Maichu
7.	More grain yield/plant (33.80 to 35.35 g/plant)	Maibee, Socket, Banglai

for various traits may be used as suitable breeding material for future breeding purposes.

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