CRITERIA CONDITIONING THE CHOICE OF RICE VARIETIES AND PROBLEMS IN RICE IMPROVEMENT IN HARYANA, PUNJAB, DELHI, UTTAR PRADESH AND RAJASTHAN

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By

S.S. Bains, R. De, I.C. Mahapatro,
E.A. Siddiq, M.S. Swaminathan and
L.S. Venkataramanan

Indian Agricultural Research Institute,
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1. Area and distribution:

The northern region comprising Punjab, Uttar Pradesh, Haryana, Rajasthan and Delhi has a total area of 4.967 million hectares under rice. The State-wise distribution of rice is given below:

DISTRIBUTION OF RICE ACREAGE

State	Million Hectares
Uttar Pradesh	4.359
Punjab	0.295
Haryana	0.216
Rajasthan	0.095
Delhi	0.002
TOTAL	4.967

The rice areas are largely confined to Karnal and Ambala districts in Haryana; Gurdaspur, Pathankot and Amritsar districts in Punjab; Kota district in Rajasthan and practically throughout the State in U.P.

This region has a low winter temperature and hence only a single crop of rice is raised from May-June to September-October. Though the area is put under a single crop of rice, the average yield in kg/ha is comparable to that of the all India average.

AVERAGE YIELD IN KG./ha

State	Yield in kg/ha.
Haryana	1324
Punjab	1325
Rajasthan	999
Uttar Pradesh	734
All India	1031

Though rice is grown from 8° to 35°N latitude in India, rice yields obtained within the country do not appear to bear any relationship to the latitude. Rice yields are higher in Andhra Pradesh, Mysore, Tamil Nadu and Kerala situated between 8° and 20°N latitude and in the Punjab and Haryana situated above 20° latitude

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than in U.P. situated between 24° to 30° N latitude. Further, it is well known that rice yields of Assam and West Bengal are much higher than those of Bihar and U.P., though these States are situated practically in the same range of latitude. The yields obtained in the States at various latitudes could thus be attributed to the varietal, agronomic and management practices adopted in raising the rice crop in these areas.

2. Rice Growing Season:

The period of the single crop taken in Northern India from the months of May-June to September-October coincides with the south-west monsoon. The crop is grown in waterlogged lands where usually no other crop can be taken during the kharif season. The low temperature conditions during winter season prevalent in this particular region restricts the double or triple cropping of rice. Short duration varieties of 110 to 120 days only are usually grown as the rice crop should mature before the onset of the winter. A short duration is now even more preferred because of the desire of the farmers to grow wheat or other rabi crops.

3. Cropping Sequence:

The normal cropping practice in rice areas in this particular region consists of a single crop of rice followed by legumes, wheat or oilseed. Occasionally, inter-cropping with red gram is also done. Rice is grown mainly as a rainfed crop in the uplands, but in the plains of Punjab and Haryana, the crop is irrigated and transplanted. For want of adequate irrigation facilities, double cropping of rice during summer and kharif seasons is neither practicable nor economical. Even in tube-well irrigated farms, a summer crop is not as remunerative as the normal kharif crop (June - September) because of low yields which is attributable to high temperature (atmospheric drought) leading to poor seed set and grain weight.

4. Soil:

In this zone, rice is grown within a pH range of 6.5 to 8. The crop is grown mainly in alluvial soils most of which are loams, sandy loams or clay loams. For lighter soils quick maturing types are preferred. Further lighter soils being poor in water retention capacity, they will be more suitable for upland cultivation. There is hence need for high yielding varieties for upland cultivation.

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In most of the areas, there is no problem of water stgnation. Taking advantage of this, the yield potentiality of a variety can be exploited to a maximum level through efficient water and fertilizer management. Thus, there is great scope for achieving a rapid rise in production in this area.

5. Suitability of Available High Yielding Varieties in Northern India :

The comparative yield performance of IR.8, T.N.1, Jaya and Padma are given below as recorded in the U.V.T. and P.V.T. of the All-India Coordinated Rice Improvement Project.

Locations	Season	Varieties			
		Jaya	Padma	I.R.8	T.N.1
Kapurthala	Kharif 1968	6141	-	5985	5501
Faizabad Fai	"	3513	-	3507	2917
Nagina	"	4530	-	3154	3432
Faizabad	Kharif 1967		4848	5826	5723
Pantnagar			5734	7246	6082
Faizabad			2856	3507	2817
I.A.R.I.	Kharif 1968	4320	6220	5950	-

It willbbe seen from the data that yield of Jaya varied between 3513 to 6141 kg., while that of IR.8 ranged between 3154 to 7246 kg. and T.N.1 between 2917 to 6082 kg./ha. The yield of Padma ranged between 2856 to 6088.

Padma scores over other high yielding varieties becasse of its earliness. At I.A.R.I. it has been seen that Padma is decidedly better that IR-8, in respect of grain yield. This has also the advantage of fitting into the cropping pattern in Northern India. Further the grain quality of Padma is relatively better than Jaya, IR-8 and T.N.1 and hence the price discrimination will be less against this variety.

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6. Specific Varietal Requirements of the Locality :

In the regions comprising Punjab, Haryana, U.P. and Delhi fine, scented, photo-insensitive, short duration, high yielding varieties of rice are preferred. It is true that consumers of this part of the Country prefer fine (superfine) scented types such as Basmati 370, but they do not do so at the cost of yield, as is clear from the acceptance of varieties like Jhona 349. Hence any variety with medium fine (slender) grain and good cooking quality (with or without scent) and an yield potential of 6000-7000 kg./ha. will be well received. These varieties should have a high milling recovery and also seed dormancy. In parts of U.P. such as Saharanpur, where the soil is waterlogged and in the districts of Mathura, Bulandshahr, Aligarh and Meerut where part of the areas are affected by flood occasionally, photo-sensitive, long duration varieties that have vigorous seedling growth would be preferred. In parts of eastern U.P. comprising Gorakhpur, Deorai, Basti and Baharaich, deep water and flood-resistant varieties would be valuable.

7. Diseases and Pests:

In most of this region, bacterial leaf blight is not much of a problem. Among the rice diseases, Helminthosporium is more severe than others, and amongthe insect pests, 'Gundhi' bug and stem borer are very serious. Varieties resistant to 'gundhi' bug and stem borer would be valuable.

8. Upland Paddy:

As rice is grown on uplands in Northern India, suitable upland and drought resistant varieties would answer most of the problems in rainfed rice farming. If Padma possesses the drought resistance of T.N.1, it would be a suitable variety.

9. Research Activity Currently in Progress:

Even though the problems of rice farming as listed above have been known for many years now, no serious attempt in rice research is being made in this part of India to cater to the needs of nearly 5 million hectares of rice. The solution to rice production problems in this region necessitates a concerted research effort embracing breeding, agronomy and plant protection.

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Several aspects of rice agronomy have been investigated at the Indian Agricultural Research Institute. The dwarf nature of the recently introduced rice varieties requires an entirely different water management than the hitherto known methods of water management for the tall Indian varieties. It has been found that it is not necessary to keep the soil water-bound throughout the growing season. Water height exceeding 4-5 cms. during the period immediately following transplantationppppeess deliterious for the young seedlings and the yield is adversely affected. Another period of low level standing water is at the time of grain ripening. For the control of monocot as well as dicot weeds, use of 3,4-dichloroprotionanilide (Stam F.34) at the rate of 2 Kg. per hectare has been found to be very effective. The dose of the herbicide may be reduced to 1 kg. per hectare if mixed with urea (3% solution), Application of Stam F.34 about 35 days after transplanting brings about a very effective control of the weeds.

Considerable work has been done on the methods of increasing the efficiency of nitrogenous fertilizers in rice culture. It has been found that the use of nitrification inhibitors in combination with fertilizers like urea or ammonium sulphate increases the efficiency of utilisation of these fertilizers. Increases in yield ofthe order of 20-30 per cent have been noted by the use of a nitrification inhibitor. Foliar application of urea is another method of increasing the efficiency of the fertilizer. A dose of 100 kg. of N applied 80 per cent through foliage increases the yield of rice by 4-5 quintals per hectare over that obtained by making the entire application through the soil.

The following items of work are underway at the Indian Agricultural Research Institute in order to supplement the work in progress in the State Research Stations under AICRIP:

a) Development of high yielding short duration photo-insensitive drought resistant and upland varieties.

b) Breeding varieties with finer grain types having high yield potential and export value and the standardisation of agronomic practices for realising their yield potential.

c) Development of varieties that can be fitted into double crop rice areas with short duration photo-insensitive variety as the first crop and with long duration photo-sensitive type with cold resistance as the second crop.

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d) Breeding of varieties suitable for direct seeding.

e) Varieties suitable for high altitudes having thermo- and photo-insensitivity.

f) Varieties with cold tolerance at the early seedling stage for some of the waterlogged areas in U.P. during January-April. Varieties resistant to flood and deep water conditions in Meerut, Bulandshahar, Aligarh and Meerut districts.

g) Popularisation of direct seeding of rice under puddled conditions.

h) Intensive research programme on agronomy of directly seeded rice.

i) Research on bacterial and virus diseases of rice.

j) Enhancement of protein content and re-distribution of proteins in the rice grain.

10. Varistal Needs in a Multiple Cropping System :

In most of this region, as stated earlier, only one crop of rice is grown in the kharif season. However, with assured irrigation facilities, the following rotations could be adopted : (i) rice-wheat-moong, (ii) rice-rice-wheat, (iii) rice-wheat, (iv) maize (fodder)-rice-wheat, (v) rice-potato-wheat-moong. For adopting these rotations in a multiple cropping programme, rice shall have to be necessarily of short duration, maturing in 85 to 100 days. The planting season of rice can be advanced to April for the first crop which can be harvested in July. After the harvesting of the first crop, the second crop of rice could be planted which could be harvested by the first week of November and thereafter, wheat can be put in. Two crops of rice during summer and kharif season could be a practical proposition in tube-well commanded areas. In one experiment conducted at the I.A.R.I. with B.C.6, it was seen that 70 q. of grain/ha. could be obtained from the first crop grown during April-July and 60 q. grain/ha. from the second crop (grown during July-November). But the first crop grown during summer needs nearly 21 irrigations in sandy loam soils, under high temperature conditions prevalent in Delhi. To put a 'Baisakhi' moong during summer months whose water requirement is comparatively lower than many other crops is an economically sounder proposition. A rotation like rice-wheat-moong is good both from the profit and soil fertility points of view. For such a multiple cropping pattern a rice variety of 85 to 100 days duration would be needed.

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11. Classification, Procurement and Market Prices of Rice in Punjab, Haryana, Delhi, U.P.,& Rajasthan:

The variation in the demand for and consumption of different rice varieties based on quality and taste differences have led producers and traders to adjust production, marketting and pricing of varieties keeping consumers' point of view. After the introduction of State Trading, attempts were made to classify varieties that were equally preferred and those having similar physical characteristics in the same group. Purchases and sale prices were determined for an entire group rather than for each variety within the group by the State agencies and the Food Corporation.

Rice classification:

In the early phase of State Trading, three groups were proposed : (a) long slender and scented varieties that were liked most by the consumers were placed in the fine category, (b) medium slender and long bold were classified in the medium group, and (c) the short bold was classified in the coarse group. With the introduction of zonal restrictions and short fall in rice availability, as well as total foodgrain production, several States upgraded some varieties to secure a higher price for them. Reclassification was done by States to secure higher prices although the purpose of classification was to grade varieties following quality differences,as determined in the open market.

Work of the Ramiah Rice Classification Committee:

The Government of India appointed the Ramiah Committee in 1965 to submit a report on the classification of rice. The terms of reference before the Committee were (i) to examine the quantitative, qualitative, morphological and other characteristics of the different varieties of rice grown in the country; (ii) to evolve a uniform standard, and make recommendations on that basis, for classification of these varieties for the purposes of procurement, distribution, price fixation etc.

The Ramiah Committee examined the classification adopted by various States for commercial varieties and came to the conclusion that there was no uniformity in the classification adopted by various States. They also found that frequent changes were made by States by re-classifying given varieties.

The questions that the Ramiah Committee asked were, whether the classification of rice varieties should, besides size, also take into account the cooking qualities, or, whether, in view of the

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foodgrain and rice production situation in the country, stress should be given on production potential alone irrespective of finer considerations of quality. The Committee concluded that even though in the future there would be increasing substitution of indigenous rice varieties by high-yielding varieties leading to the reduction in the number of varieties grown, the different varieties that are produced and marketed now need to be classified. They further decided that no preference in classification should be given to high yielding varieties; that the high yield of these varieties was in itself a substantial incentive for growers to choose them.

New classification scheme:

Following the classification scheme suggested by the Food and Agriculture Organisation of the United Nations, and after consultation with the State Governments, the Ramiah Committee recommended the following group classification:

a) Long slender
b) Short slender
c) Medium slender
d) Long Bold, and
e) Short bold.

The Ramiah Committee suggested that the scented varieties may be placed in the appropriate group on the basis of dimensions and allowed a certain premium for scent. On the suggestion of many States, the Committee also felt that the red rice varieties may be priced slightly lower. According to the Committee, the classification of varieties, based on dimensions of the grain, with slender and scented varieties getting higher prices than the bold and short ones, would be a very useful guideline in fixing procurement and market prices. The recommendations of the Committee regarding classification were agreed to by the States of Punjab and Rajasthan. The State of Uttar Pradesh felt that taste and cooking quality should also be kept in view.

New criteria for classification:

The classification of rice varieties suggested by the Ramiah Committee and adopted by the various States are as follows:

i) Long slender (L.S.) : Length - 6 mm. and above
Length breadth ratio - 3 and above.

ii) Short slender (S.S) : Length less than 6 mm
Length breadth ratio 3 and above

iii) Medium Slender (M.S): Length less than 6 mm
Length breadth ratio : 3.5 to 3.

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iv) Long Bold (L.B.) : Length 6 mm and above.
Length breadth ratio less than 3.

v) Short Bold (S.B.): Length 6 mm and below
Length breadth ratio less than 2.5.

Prices based on classification:

The names of different varieties, their classification following the Ramiah Committee report and the purchase prices of these varieties per quintal in 1966-67 for the States of Punjab, Rajasthan, Uttar Pradesh are shown in Table 1, 2 and 3.

Table 4 gives the names of varieties and the States where they are marketed. It gives the existing classification, the Ramiah Committee proposed classification and the procurement price per quintal in 1966-67. Basmati on the existing classification gets classified as fine in Punjab, medium fine II in Rajasthan and Grade I Special in Uttar Pradesh, Parmal variety is fine in Punjab and medium fine II in Rajasthan, Lakda variety is grade III in Uttar Pradesh, and Cheena variety classification is coarse in Punjab and Grade III in Uttar Pradesh.

Practice for price recommendation followed by Agricultural Prices Commission :

The Agricultural Prices Commission has recommended prices only for the standard rice variety in each State, recommending the minimum prices and procurement prices for paddy, and procurement prices for rice (See Tables 5 and 6). The practice has been to allow the State Governments to announce the prices for the other varieties in view of the quality differential between each variety and the standard variety.

View of Agricultural Prices Commission on inter-state Ramiah Committee prices :

The Agricultural Prices Commission has endorsed the recommendations of the Ramiah Rice Classification Committee. The Prices Commission has favoured the narrowing of inter-state disparities in prices by following the principle of uniformity of procurement prices for different States. The procurement prices recommended for paddy for 1968-69 by the Agricultural Prices Commission is Rs.52/- for the States of Punjab, Haryana, Uttar Pradesh and Rajasthan.

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No bonus needed according to Agricultural Prices Commission:

The Agricultural Prices Commission is of the view that it is not desirable for State Governments to offer bonus over and above the procurement prices for high-yielding strains. This, they feel, lead to higher prices for consumers. According to the Commission, it is no longer necessary to give bonus forthe high yielding varieties of paddy.

Agricultural Prices Commission concurs with Ramiah Committee:

As has been said earlier, the Agricultural Prices Commissionconcurs with the findings and the report of the Ramiah Rice Classification Report Committee, and both the Commission and the Committee are in favour of classifying rice varieties based on quality differences as indicated by length/breadth relationship. Both favour the classification to be limited to five varieties viz., long slender, short slender, medium slender, long bold and short bold. Both are strongly in favour of reducing inter-State price differences for the same quality and suggest the abolition of the payment of premium for production of high yielding varieties. In their view, the high yields should themselves be an inducement for the grower to plant these varieties and according to them no additional price incentive is necessary.

Wholesale market prices for different rice varieties in different States :

Table 7 gives wholesale prices per quintal for different rice varieties in the States of Haryana, Punjab, Delhi and Uttar Pradesh in the month of March, 1969. For Haryana, we have market prices for Basmati, Fine Variety, Long Slender under proposed classification and for Begmi, Coarse variety, Long Bold. These are prices at the Karnal market. The Amritsar market in Punjab has reported prices for Basmati, Fine Variety Long Slender, and Begmi variety which is also fine, Long Slender, and Begmi variety which is coarse and Long Bold. The Delhi State reports prices for Basmati, Parmal and Begmi varieties in Najafgarh market and for Begmi Dara and Sela Golden varieties in the Delhi market. The State of Uttar Pradesh reports market prices for a number of market centres for the Coarse and Arwa variety, which is also coarse. The Coarse variety figures as Short Bold in the classification suggested by the Ramiah Committee.

As has been referred to earlier, the States of Punjab, Rajasthan and Uttar Pradesh had agreed to the classification scheme suggested by the Ramiah Committee. It is not clear from the market

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prices in the different market centres of the different States reported in Table 7 whether the pricing of the qualities have been on the basis of the classification scheme reporting varieties as Fine, Medium and Coarse, or whether they are based on the new classification proposed by the Ramiah Committee. It is very likely that the change in the classification and acceptance of it by the State Governments will reflect itself first in the procurement prices for the different varieties and only with the passage of time in the prices of different varieties that are marketed over and above those sold to Government agencies. The prices of the marketed varieties in the open markets are more likely to be influenced by consumer preferences relating to smell, cooking qualities.

Table 7 gives market prices for Fine Medium as well as Coarse varieties only for the States of Punjab and Haryana. It reports only prices for different coarse varieties in the State of Uttar Pradesh. The prices for high yielding varieties are generally not reported, the only exception being the price of Taichung-1 variety price for paddy reported by the Basti Market of Uttar Pradesh. With the limitation of the price statistics with regard to prices of different varieties that are reported, it is not easy to guage the inter-quality price differential for more than a few States and inter-price differential for the same quality between States. Such price comparisons are in the main possible only for coarse varieties that are marketed in most States. The inter-price differential for the coarse variety appears to be not more than Rs.7/- per quintal. The inter quality price differential between Basmati and Begmi (coarse variety) is Rs.30/-, in Haryana and Punjab for the month of March, 1969. It is possible that the inter-price differential for the Fine Scented varieties which are marketed in small er amounts compared to coarse varieties would be greater between different States.

12. Development of Varieties Combining a High Yield Potential, Early Maturity and Fine Grain Quality :

In order to develop varieties possessing the characteristics already discussed together with a type of grain quality which will fetch a good price in the market and which might have an export value, crosses between T.N.1 and Basmati 370, IR-8 and TKM-6 and many other combinations have been made at the I.A.R.I. in 1965. By back-corssing the promising selections to Basmati 370, a type of grain which will be classified as long, bold, has been combined with a dwarf and fertilizer-responsive morphological frame (Tables 8 and 9).

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a) Plant type of Dwarf Basmati Cultures:

The selections under multiplication possess ideal plant characteristics, such as dwarf habit with upright leaves, synchronised tillering, slow senescence, photo-insensitiveness, etc. A comparative account on the morphological and physiological characteristics of BC.5 and BC.6 selections, their parents (T(N)1 and Bas.370) and IR-8 is given in Table 10.

b) Yield potential:

The bulked seed sample of plants with uniform height and maturity were tested for their yield potential during Rabi, 1968 (PVT) and Kharif, 1968 (UVT-I). The PVT data collected from 8 different Centres suggest that BC.6 yields 83% of T(N)1 (While IR-8 yielded 96% of T(N)1). The data of UVT-1 during kharif, 1968 suggests BC.6 (Bulk) to yield higher than IEI-355 and ADT-27, in four centres out of eight. In other centres they were more or less equivalent to IET-355 and better than ADT-27.

Yield trials in 0.5 acre plots at Karnal, during kharif, 1968, indicated the superiority of BC.5 and BC.6 (Bulk) over their parents (Table 9). From a comparison of 285 elite cultures raised during kharif, 1968, at Delhi, the highest yielders possessing acceptable grain and cooking qualities were chosen. Their yield range under Delhi conditions was much higher than its parents and 95% of IR-8 (Table 9). The promising selections, apart from showing uniformity, yielded much more than the bulk sample entered in the All-India Trials.

c) Cooking and nutritive qualities:

Data on the range of the kernel type, cooking quality as measured by various tests, including aroma, nutritive quality as measured by the protein content and amino acid pattern are summarised in Tables 10 and 11.

d) Disease resistance:

During the last two seasons at Delhi and Karnal, the bulk as well as the elite selections were completely free from both blast and bacterial leaf blight under field conditions. The All India Trial data of Rabi, 1968, shows BC.6 to be moderately resistant to blight at Rajendranagar and Maruteru, but it seems to be susceptible to blast at Anakapalli, Pennampet and Kalimpong. More intensive study (by spraying bacterial inoculam) on the selected lines at IARI,

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revealed that their reaction was similar to IR-8 by showing partial to complete leaf blight symptoms unlike T(N)1 and local strains including Bas.370 which developed 'Kresek' or wilt phase (Lines were tested by Dr. Y.P. Rao under field condition by spray methed using 7 virulent isolates of the pathogen). Reaction to virus diseases is nowunder study by Dr. S.P. Raychaudhuri and his colleagues.

Seed Increase:

As decided at the Cuttack Workshop in November, 1968, the best dwarf Basmati cultures are now under pre-release multiplication.

Performance of other cultures:

Several outstanding selections from IR-8 x TKM-6 cross are now in the co-ordinated trials.

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TABLE : I

NAME OF STATE : PUNJAB

Name of variety	Length mm	Breadth mm	Length Breadth ratio	Existing classi-fication	Purchase price/quintal 1966-67	Proposed classi-fication	Remarks
1. Basmati	7.0	1.8	3.8	Fine	88.25	L.S.	Scented
2. Parmal	6.5	1.8	3.8	Fine	81.00	L.S.	
3. Begmi	6.00	2.2	2.8	Coarse	69.50	L.B.	
4. Cheena Rice	5.8	2.4	2.4	Coarse	67.50	S.B.	

SOURCE: Report on the classification of Rice.

Table - 2.

NAME OF STATE : RAJASTHAN

Name of Variety	Length mm	Breadth mm.	Length breadth ratio	Existing classification	Purchase price/ quintal 1966-67	Proposed classification	Remarks
Basmati	6.70	1.80	3.70	Medium Fine II	79.75	L.S.	Scented
Parmal	6.00	1.70	3.50	Medium Fine II	79.75	L.S.	
Kamod	5.90	2.20	2.70	Medium Fine II	79.75	M.S.	
Begmi	6.00	2.30	2.60	Coarse	65.00	L.B.	
Suthersal	5.00	2.30	2.17	Coarse	63.40	S.B.	

SOURCE : Report on the classification of rice.

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Table - 3.

NAME OF THE STATE :UTTAR PRADESH

Name of va-riety	Length mm (range)	Breadth mm (range)	Length breadth (ratio)	Existing classi-fication	Purchase pride per quintal 1966-67	Proposed classi-fication	Remarks
Basmati	6.45	1.90	3.40	Gr.I Sp.	93.00	L.S.	Scented
Hansraj	6.60	1.70	3.90	Gr.I	85.00	L.S.	Scented
Kalanamak	5.59	2.10	2.66	Gr.I	85.00	M.S.	Scented
Jhilma, Ramunia, Ram Ajwain	6.00-6.80	1.80 - 2.20	3.09 - 3.30	Gr.II	77.50	L.S.	
Krishna Bhog	5.60	1.80	3.10	Gr.II	77,50	S.S.	
Anji, Badsha Pasand, Tilak Chandan	5.20- 5.90	2.00- 2.12	2.50- 2.83	Gr.II	77.50	M.S.	
Anjna, Baha Type 21	6.00- 6.40	2.20- 2.30	2.58 -2.90	Gr.III	69.50	L.B.	
Cheena IV	5.71	2.67	2.13	Gr.III	69.50	S.B.	
Gadra, Ram Kaurani	4.80- 5.80	2.30- 2.58	1.87 -2.40	Gr.IV	63.00	S.B.	

Source : 1. Report on the classification of rice.

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Table - 4.

Rice varieties, existing classification proposed classification, procurement prices

Name of variety	State	Existing classification	Ramiah Committee classification	Procurement price per quintal in 1966-67
Basmati	Punjab,	Fine	Long Slender	88.25
	Rajasthan,	Medium Fine II	Long Slender	79.75
	Uttar Pradesh	Grade I Sp.	Long Slender	93.00
Parmal	Punjab	Fine	Long Slender	81.00
	Rajasthan	Medium Fine II	Long Slender	79.75
Lakda	Uttar Pradesh	Grade III	Long Bold	69.50
Cheena IV	Uttar Pradesh	Grade III	Short Bold	69.50

Table - 5.

PROCUREMENT PRICES FOR PADDY 1968-69

Name of State	Standard Variety	Procurement prices for 1967-68 as fixed by the State Govt.	Minimum prices for 1968-69 as recommended by the Commission	Procurement prices recommended for 1968-69	Current week ended 21.3.1969 wholesale prices
1.	2.	3.	4.	5.	6.
Haryana	Begmi	52.50 N	44.00	52.50	
Punjab	Begmi	52.50 N	44.00	52.50	56.00
Uttar Pradesh	Grade III	56.25	44.00	53.00	65.00

N : National price, the State Governments did not announce the procurement price of paddy.

Source: 1. Report of the Agricultural Prices Commission on price policy for kharif cereals for the 1968-69 season (Sept. 1968), Government of India, Ministry of Food & Agriculture, Community Development and Cooperation, New Delhi.

2. For Column (6) Bulletin of Agriculture Prices week ended 21st March, 1969 by Economic and Statistical Adviser, Govt. of India.

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Table - 6.

PROCUREMENT PRICES FOR RICE 1968-69

Name of State	Standard variety	Procurement prices for 1967-68 as fixed by the State Govts.	Procurement prices recommended for 1968-69.	Current week ended 21.3.1969 Wholesale prices
1.	2.	3.	4.	5.
Haryana	Begmi	86.00	85.00	112.00
Punjab	Begmi	85.00	85.00	105.00
Uttar Pradesh	Grade III	90.00	85.00	110.00

Source: 1. Report of the Agricultural Prices Commission on price policy for kharif cereals for the 1968-69 season. (Sept. 1968) Government of India, Ministry of Food & Agriculture, Community Development and Cooperation, New Delhi.

2. For Column (5) Biweekly Bulletin on wholesale and retail prices of foodgrains by Directorate of Economics and Statistics, Ministry of Food & Agri., Community Development and Cooperation, Vol.No.VIII. (31.3.1969).

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Table - 7.

Statewise wholesale prices for different rice varieties in the 1st week of Apr.'69

State	Market	Variety	Wholesale price per quintal (on 2nd April, 1969)	Remarks
Haryana	Karnal	Begmi	110.00	
		Basmati	140.00	
Punjab	Amritsarr	Begmi	105.00)	
		Parmal	125.00)	As on March 28th.
		Basmati	156.00)	
Delhi	Delhi	Sela Golden	165.00	
		Begmi Dara	110.00	
Uttar Pradesh	Varanasi	Jelhera	110.00	
	Nowgarh	Arwa III	108.00	
	Gorakhpur	-do-	115.00	
	Saharanpur	Arwa IV	110.00	
	Attari	Arwa III	105.00	
		Arwa IV	103.00	
	Bahraich	Arwa III	104.52	
	Etawah	-do-	105.00	
	Kanpur	-do-	110.65	
	Balrampur	Arwa III	104.49	
	Allahabad	Arwa III	107.92	
		Arwa IV	112.56	
	Sultanpur	Coarse	110.62	
	Chandausi	Coarse	102.50	
	Auraiya	Arwa III	105.00	March 31st
	Basti	T(N)1	65.00	March 21st

Table - 8.

CLASSIFICATION OF RICE VARIETIES
(according to the Ramiah System).

Variety	Length mm	Breadth mm	Length/breadth ratio	Classification
Basmati 370	10.00	2.00	5.00	Long Slender
T.N.1	5.44	2.61	2.08	Short Bold
I.R.8	6.58	2.75	2.39	Long Bold
Jaya	6.53	2.61	2.50	Long Bold
Padma	5.60	2.46	2.28	Short Bold
BC.5	8.20	2.60	3.10	Long Slender
BC.6	8.00	2.50	3.20	Long Slender

Table - 9.

Yield data (Kharif 1968)

Culture	Yield(kg./ha)	
	Karnal	Delhi
BC.5	6543	7714
BC.6	6813	7488
T(N)1	6475	7262
Basmati 370	3993	5100
IR-8	6467	8167

Table - 10.

Comparison of morphological and physiological characteristics in BC.5, BC.6 & T(N)1

CHARACTER	B.C.5	B.C.6	T(N)1
1. General			
Early seedling vigour	Good	Good	Good
Tillering	Good	Good	Good
Plant type	Good	Good	Fair
Height (cms)	80-90	70-80	75-80
Anthocyanin pigment	Absent	Absent	Absent
Days to flower	90-95	85-90	95
Photo-sensitivity	Insensitive	Insensitive	Insensitive
2. Panicle			
Exertion of pandcle	Complete	Complete	Incomplete
Panicle length (cms)	21.2	20.9	20.6
3. Grain			
Grain no./ panicle	98	96	98
Grain wt./1000 grains (gms)	21.4	21.1	22.6
4. Kernal			
L/B ratio	3.1	3.2	2.08
Commercial grade of grain	Long slender	Long slender	Short bold
Strength	Hard	Min. breakage	More
chalkiness	+ 5%	Minimum breakage	More
Translucency of kernal	Good	Good	Average
Colour of rice	White	White	White
Hulling percent	78	76	76.0
5. Quality			
Cooking quality	Good	Good	Acceptable
Cooking time	< 15 mins.	< 15 mins	< 15 mins.
Stickiness	Nil	Nil	Sticky
Curling	Low	Low	moderate

Contd...p/B.

(contd)

CHARACTER	B.C.5	B.C.6	T(N)1
(quality continues)			
Splitting	Nil	Nil	Split
L/B(cooked rice)	3.10	3.20	2.1
Aroma	Fine scent	Med. scent	Nil
Protein	9-11%	9-10%	8-9%
6. Reaction to:			
Stem borer	*	-	Moderately susceptible
Gall midge	-	-	Susceptible
Low temperature tillering	-	-	Susceptible
Blast	-	-	Moderately resistant
Bacterial leaf blight	Susceptible	Susceptible	Susceptible
Tungro	-	-	
Leaf scenscence	Slow (late)	Slow (late)	Early.

* The crop was free from diseases and insect pests.

Criteria conditioning the choice of Rice Varieties and problems in Rice improvement in Haryana, Punjab, Delhi Uttar Pradesh and Rajasthan

S. S. Bains, R. De, I. C. Mahapatro, E. A. Siddiq, M. S. Swaminatham and L. S. Venkataramanan

Indian Agricultural Research Institute, New Delhi.

Criteria conditioning the choice of Rice Varieties and problems in rice improvement in the varieties in the

Criteria influencing the choice of Rice

A Note on Varietal needs of rice in Northern India comprising of Punjab, Haryana, Delhi, U.P. and Rajasthan

.....

1. Area and distribution of rice in Northern India :

The northern region comprising of Punjab, U.P., Haryana, Rajasthan and Delhi has a total area of 4.967 million hectares under rice. The state-wise distribution of rice is given in Table 1. below

Table 1 : Distribution of rice acreage in North India

State	M. Hectares
U.P.	4.359
Punjab	0.295
Haryana	0.216
Rajasthan	0.095
Delhi	0.002
Total	4.967

The rice areas are largely confined to Karnal and Ambala districts in Haryana; Gurdaspur, Pathankot and Amritsar districts in Punjab; Kota district in Rajasthan and practically throughout the state in U.P.

This region has a low winter temperature and hence only a single crop of rice is raised from May-June to September-October.

Though the area is put under a single crop of rice, still it can be seen that the average yield in kg/ha is comparable to that of the all India average as given in Table 2 below:

Table 2 : Average yield in kg/ha.

Name of the State	Yield in kg/ha
Haryana	1324
Punjab	1325
Rajasthan	999
U.P.	734
All India	1031

* Even in ~~assure~~ tube-well irrigated farms, a ~~In spite of assured irrigation in some areas~~, summer crop is not as remunerative as normal kharif crop (June to Sept) because of low yields which is attributable to high temperature (atmospheric drought) leading to poor seed set.

Though rice is grown from 8° to 35°N latitude in India, rice yields obtained within the country do not appear to bear any relationship to the latitude. Rice yields are higher in Andhra Pradesh, Mysore, Tamil Nadu and Kerala situated between 8° and 20° N latitude and in the Punjab and Haryana situated above 20° N latitude than in U.P. situated between 24° to 30° N latitude. Further, it is well known that rice yields of Assam and West Bengal are much higher than those of Bihar and U.P. though these states are situated practically in the same range of latitude. The yields obtained in the states at various latitudes could thus be attributed to the varietal, agronomic and ~~managerial skill~~ management practices adopted in raising the rice crop in these areas.

2. Rice Growing Season :

~~Only one~~ The period of the single crop ~~is~~ taken in Northern India from the months of May-June to September-October. ~~This period~~ coincides with the south-west monsoon. The crop is grown in waterlogged lands where usually no other crop can be taken during the kharif season. The low temperature conditions during winter season prevalent in this particular region restricts the double or triple cropping of rice. Short duration varieties of 110 to 120 days only are usually grown as the rice crop should mature before the onset of the winter. A short duration is now even more preferred because of the desire of the farmers to grow wheat or other rabi crops.

3. Cropping Sequence :

The normal cropping practice in rice areas in this particular region consists of a single crop of rice followed by legumes, wheat or oilseed. Occasionally, Some time inter-cropping with red gram is also done. Rice is grown mainly as a rainfed crop in the uplands, but in the plains of Punjab and Haryana, the crop is irrigated and transplanted. For want of adequate irrigation facilities, double cropping of rice during summer and kharif seasons is ~~not practicable~~. neither practicable nor economical.

Added here from the attached sheet. *

4. Soil :

~~Rice is grown over a wide range of soils re-action but~~ In this zone, the rice is grown within a pH range of 6.5 to 8. In northern India, The crop rice is grown mainly in alluvial soils most

In most of the areas, there is no problem of water stagnation. Taking advantage of this, the yield potentiality of a variety can be exploited to a maximum level through efficient water and fertilizer management. Thus, there is great scope for achieving a rapid rise in production in this area.

* Further lighter soils being poor in water retention capacity they will be more suitable for upland cultivation. ~~This~~ There is hence need for high yielding ~~necessitates evolving suitable~~ varieties for upland cultivation.

* It is true that Consumers of this part of the country prefer fine (Super fine) scented types such as Basmati 370. But they ~~never accept such varieties~~ do not do so at the cost of yield, as is clear from the acceptance of varieties like Jhona 349. Hence, any variety with medium fine (slender) grain and good cooking quality (with or without scent) and an yield potential of 6000-7000 kg/ha will be well received.

of which are loams, sandy loams or clay loams. For lighter soils quick maturing types are preferred. Though almost all types of soils in the country grow rice successfully, the success depends upon available water, soil management and timely fertilizer application.

Add here * from attached sheet

5. Suitability of available high yielding varieties in Northern India:

The comparative yield performances of IR.8, T.N.1, Jaya and Padma are given below as recorded in the U.V.T. and P.V.T. of the All India Coordinated Rice Improvement Project.

Locations	Season	Varieties			
		Jaya	Padma	I.R.8	T.N.1
Kapurthala	Kharif 1968	6141	-	5985	5501
Faizabad Fai	"	3513	-	3507	2917
Nagina	"	4530	-	3154	3432
Faizabad	Kharif 1967		4848	5826	5723
Pantnagar			5734	7246	6082
Faizabad			2856	3507	2817
I.A.R.I.	Kharif 1968	4320	6220	5950	-

It will be seen from the above table data that yield of Jaya varied between 3513 to 6141 kg. while that of IR.8 ranged between 3154 to 7246 kg. and T.N.1 between 2917 to 6082 kg/ha. The yield of Padma ranged between 2856 to 6088.

Padma scores over other high yielding varieties because of its earliness. At I.A.R.I. it has been seen that Padma is decidely better than IR-8 in respect of grain yield. This has also the advantage of fitting into the cropping pattern in Northern India. Further the grain quality of Padma is relatively better than Jaya, IR.8 and T.N.1 and hence the price discrimination will be less against this variety.

6. Specific Varietal requirements of the locality :

In the regions comprising of Punjab, Haryana, U.P. and Delhi fine, scented, photo-insensitive, short duration, high yielding varieties of rice are preferred. These varieties should have good cooking quality with high milling recovery and also seed dormancy. In parts of U.P. such as Saharanpur, where

* Add here from the attached sheet

the soil is water-logged and in the district of Mathura, Bulandshahar, Aligarh and Meerut where part of the areas are flood affected by flood occassionally, photo-sensitive, long duration varieties that have vigorous seedling growth would be preferred. In parts of eastern U.P. cromprising of Gorakhpur, Deorai, Basti and Baharaich, deep water and flood-resistant varieties could be preferred. would be valuable

7. Diseases and Pests.

In most of the regions, bacterial leaf blight is not much of a problem, but among the rice diseases, Helminthosporium is more severe than others, and among the insect pests 'Gundhi' bug and stem borer are very serious. The varieties to be advocated should be moderately resistant to 'gundhi' bug and stem borer as far as possible. would be valuable

8. Upland Paddy:

As rice is grown on uplands in Northern India, suitable upland and drought resistant varieties would answer most of the problems in rainfed rice farming. If Padma possesses the drought resistance of T.N.1, it would be a suitable variety

9. Research Activity currently in progress :

Unfortunately even though the problems of rice farming as listed above have been known for many years now, no serious attempt in rice research is being made in this part of India to cater to the needs of nearly 5 million hectares of rice. The Solution to rice production problems in this region necessitates a concerted research effort embracing breeding, agronomy and plant protection.

Several aspects of rice agronomy have been investigated at the Indian Agricultural Research Institute. The dwarf nature of the recently introduced rice varieties requires an entirely different water management than the hitherto known methods of water management for the tall Indian varieties. It has been found that it is not necessary to keep the soil water-bound throughout the growing season. Water height exceeding 4-5 cms. during the period immediately following transplantation proves deliterious for the young seedlings and the yield is adversely affected. Another period of low level standing water is at the time of grain ripening. For the control of mono-cot as

well as di-cot weeds, use of 3,4-dichloropropionanilide (Stam F.34) at the rate of 2 kg. per hectare has been found to be very effective. The dose of the herbicides may be reduced to 1 kg. per hectare if mixed with urea (3% solution). Application about 35 days after transplanting brings about a very effective control of the weeds.

Considerable work has been done on the methods of increasing the efficiency of nitrogenous fertilizers in rice culture. It has been found that the use of nitrification inhibitors in combination with fertilizers like urea or ammonium sulphate increases the efficiency of utilization of these fertilizers. Increases in yield of the order of 20-30 per cent have been noted by the use of a nitrification inhibitor Foliar application of urea is another method of increasing the efficiency of the fertilizer. A dose of 100 kg. of N applied 80 per cent through soil before transplanting and 20 per cent through foliage increases the yield of rice by 4-5 quintals per hectare over that obtained by soil application.

8. ~~What AICRIP should do?~~

~~The rice project should have more regional stations in this area to undertake the following work:~~

1. Development of high yielding short duration photo-insensitive drought resistant and upland varieties.
2. ~~Improvement of grain quality of Padma or similar duration varieties~~ with finer grain types having high yield potential.
3. Development of varieties that can be fitted into double crop rice areas with short duration photo-insensitive variety as the first crop and with long duration photo-sensitive type as the second crop.
4. Breeding ~~for~~ varieties suitable for direct seeding.
5. Varieties suitable for high altitudes having thermo- and photo-insensitivity.
6. Varieties with cold tolerance at the early seedling stage for some of the waterlogged areas in U.P. during January-April. Varieties resistant to flood and deep water conditions in Meerut, Bulandshahar, Aligarh and Meerut districts.
7. Popularisation of direct seeding of rice under puddled conditions.
8. Intensive research programme on agronomy of directed seed rice.
9. Research on bacterial and virus diseases of rice
10. Enhancement of protein content and re-distribution of proteins in the rice grain

9. Varietal needs in a multiple cropping system :

In most of these regions, as stated earlier, only one crop of rice is grown in the kharif season. However, with assured irrigation facilities, the following rotations could be adopted (1) rice-wheat-moong, (2) rice-rice-wheat, (3) rice-wheat, (4) maize (fodder)-rice-wheat, (5) rice-potato-wheat-moong. For adopting these rotations in a multiple cropping programme, rice shall have to be necessarily of short duration, maturing in 85 to 100 days. The planting season of rice can be advanced to April for the first crop which can be harvested in July. After the harvesting of the first crop, the second crop of rice could be planted which could be harvested by the first week of November and thereafter, wheat can be put in. Two crops of rice during summer and kharif season could be a practical proposition in tubewell commanded areas. In one of the experiments conducted at I.A.R.I. with B.C.6 it was seen that 70 q. of grain/ha. could be obtained from the first crop grown during April-July and 60 q. grain/ha. from the second crop (grown during July-November). But the first crop grown during summer needs nearly 21 irrigations in sandy loam soils, under high temperature conditions prevalent in Delhi. To put a 'Baisakhi' moong during summer months, whose water requirement is comparatively lower than many other crops, is an economically sounder proposition. rotation like rice-wheat-moong is ~~a very practicable proposition.~~ good both from the tropic and soil fertility points of view. ~~However, in~~ For such a multiple cropping pattern a rice variety of 85 to 100 days duration ~~is needed.~~ would be needed.

.....

Criteria for rice classification, procurement and market prices of rice in Punjab, Haryana, Delhi, Uttar Pradesh and Rajasthan.

.....

Introduction: The variation in the demand for and consumption of different rice varieties based on quality and taste differences have led producers and traders to adjust production, marketing and pricing of varieties keeping consumers' point of view. After the introduction of State Trading, attempts were made to classify varieties that were equally preferred and those having similar physical characteristics in the same group. Purchase and sale prices were determined for an entire group rather than for each variety within the group by the State agencies and the Food Corporation.

Rice Classification: In the early phase of State Trading, three groups were proposed: (a) long slender and scented varieties that were liked most by the consumers were placed in the fine category, (b) medium slender and long bold were classified in the medium group, and (c) the short bold was classified in the course group. With the oncoming of zonal restrictions and short fall in rice, as well as total foodgrain production, several states upgraded a given variety to secure a higher price for it. Reclassification was done by States to secure higher prices although the purpose of classification was to grade varieties following quality differences, as determined in the open market.

Work of Ramiah Rice Classification Committee: The Government of India appointed the Ramiah Committee in 1965 to submit a report on the classification of rice. The terms of reference before the Committee were (1) to examine the quantitative, qualitative, morphological, and other characteristics

of the different varieties of rice grown in the country; and (2) to evolve a uniform standard, and make recommendations on that basis, for classification of these varieties for the purposes of procurement, distribution, price fixation etc.

The Ramiah Committee examined the classification adopted by various States for commercial varieties and came to the conclusion that there was no uniformity in the classification adopted by various states. They also found that frequent changes were made by States by re-classifying given varieties.

The questions that the Ramiah Committee asked were, whether the classification of rice varieties should, besides size, also take account of cooking qualities, or, whether, in view of the foodgrain and rice production situation in the country, stress should be given on production potential alone irrespective of varieties. The Committee concluded that even though in the future there would be increasing substitution of indigenous rice varieties by high yielding varieties in production leading to the reduction in the number of varieties grown, the different varieties that are produced and marketed now need to be classified. They further decided that no preference in classification should be given to high yielding varieties; that the high yield of these varieties was in itself a substantial incentive for growers to choose them.

New Classification Scheme:

Following classification scheme suggested by the Food and Agriculture Organization of the United Nations, and after consultation with the State Governments, the Ramiah Committee recommended the

following group classification:

(a) Long Slender (b) Short Slender (c) Medium Slender (d) Long Bold and (e) Short Bold

The Ramiah Committee suggested that the scented varieties may be placed in the appropriate group on the basis of dimensions and allowed a certain premium for scent. On the suggestion of many States, the Committee also felt that the red rice varieties may be priced slightly lower. According to the Committee, the classification of varieties, based on dimensions of the grain, with slender and scented varieties getting higher prices than the bold and short ones, would be a very useful guideline in fixing procurement and market prices. The recommendations of the Committee regarding classification were agreed to by the States of Punjab and Rajasthan. The state of Uttar Pradesh felt that taste and cooking quality should also be kept in view.

New Criteria for classification:

The classification of rice varieties suggested by the Ramiah Committee and adopted by the various States are as follows:

(1) Long Slender (L.S.) Length - 6 mm. and above
Length breadth ratio - 3 and above.

(2) Short Slender (S.S.) Length less than 6 mm.
Length breadth ratio 3 and above.

(3) Medium Slender (M.S.) Length less than 6 mm.
Length breadth ratio 2.5 to 3

(4) Long Bold (L.B.) Length 6 mm and above.

Length breadth ratio less than 3.

(5) Short Bold (S.B.) Length 6 mm + below

Length breadth ratio less than 3.5

Prices based on Classification: The names of the different varieties, their classification following the Ramiah Committee report and the purchase prices of these varieties per quintal in 1966-67 for the States of Punjab, Rajasthan, Uttar Pradesh are shown in Table 1, 2 and 3.

Table 4 gives the names of varieties and the states where they are marketed. It gives the existing classification, the Ramiah Committee proposed classification and the procurement price per quintal in 1966-67. Basmati on the existing classification gets classified as fine in Punjab, medium fine II in Rajasthan and grade I special in Uttar Pradesh, Parmal variety, existing classification is fine in Punjab and medium fine II in Rajasthan, Lakda variety, existing classification is grade III in Uttar Pradesh, and Cheena variety classification is coarse in Punjab and grade III in Uttar Pradesh.

Practice for price recommendation followed by Agricultural Prices Commission: The Agricultural Prices Commission has recommended prices only for the standard rice variety in each State, recommending the minimum prices and procurement prices for paddy, and procurement prices for rice (see tables 5 and 6). The practice has been to allow the State governments to announce the prices for the other varieties in consultation with the Union Government keeping in view the quality differential between each variety and the standard variety.

View of Agricultural Prices Commission on inter-state ~~prices~~ prices disparities:

The Agricultural Prices Commission has endorsed the recommendations of the Ramiah Rice Classification Committee Report. The Prices Commission has favoured the narrowing of inter-state disparities in prices by following the principle of uniformity of procurement prices for different states. The procurement prices recommended for paddy for 1968-69 by the Agricultural Prices Commission is Rs. 52/- for the States of Punjab, Haryana, Uttar Pradesh and Rajasthan.

No bonus needed according to Agricultural Prices Commission:

The Agricultural Prices Commission is of the view that it is not desirable for state governments to offer bonus over and above the procurement prices for high-yielding strains. This, they feel, lead to higher prices for consumers. According to the Commission, it is no longer necessary to give bonus for the high yielding varieties of paddy.

Agricultural Prices Commission concurs with Ramiah Committee:

As has been said earlier, the Agricultural Prices Commission concurs with the findings and the report of the Ramiah Rice Classification Report Committee, and both the Commission and the Committee are in favour of classifying rice varieties based on quality differences as indicated by length/breadth relationship. Both favour the classification to be limited to five varieties viz; long slender, short slender, medium slender, long bold and short bold. Both are strongly in favour of reducing inter-state price differences for the same quality and suggest the

abolition of the payment of premium for production of high yielding varieties. In their view, the high yields should themselves be an inducement for the grower to plant these varieties and according to them no additional price incentive is necessary.

Wholesale market prices for different rice varieties in different states.

Table 7 gives wholesale prices per quintal for different rice varieties in the states of Haryana, Punjab, Delhi and Uttar Pradesh in the month of March 1969. For Haryana, we have market prices for Basmati, Fine Variety, Long Slender under proposed classification and for Begmi, Coarse variety, Long Bold. These are prices at the Karnal market. The Amritsar market in Punjab has reported prices for Basmati, Fine variety Long Slender, Parmal variety which is also fine, Long Slender, and Begmi variety which is coarse and Long Bold. The Delhi State reports prices for Basmati, Parmal and Begmi varieties in Najafgarh market and for Begmi Dara and Sela Golden varieties in the Delhi market. The state of Uttar Pradesh reports market prices for a number of market centres for the Coarse and Arwa variety, which is also coarse. The Coarse variety figures as Short Bold in the classification suggested by the Ramiah Committee.

As has been referred to earlier, the states of Punjab, Rajasthan and Uttar Pradesh had agreed to the classification scheme suggested by the Ramiah Committee. It is not clear from the market prices in the different market centres of the different states reported in table 7 whether the pricing of the qualities have been

on the basis of the classification scheme reporting varieties as Fine, Medium and Coarse, or whether they are based on the new classification proposed by the Ramiah Committee. It is very likely that the change in the classification and acceptance of it by the state governments will reflect itself first in the procurement prices for the different varieties and only with the passage of time in the prices of different varieties that are marketed over and above those sold to government agencies. The prices of the marketed varieties in the open markets are more likely to be influenced by consumer preferences relating to smell, cooking qualities, and the consumer ordering of these preferences may not be quite in line with the new classification based on length/breadth ratio by the Ramiah Committee.

Table 7 gives market prices for Fine Medium as well as Coarse varieties only for the states of Punjab and Haryana. It reports only prices for different coarse varieties in the state of Uttar Pradesh. The prices for high yielding varieties are generally not reported, the only exception being the price of Taichung-1 variety price for paddy reported by the Basti Market of Uttar Pradesh. With the limitation of the price statistic with regard to prices of different varieties that are reported, it is not easy to guage the inter-quality price differential for more than a few states and inter-price differential for the same quality between states. Such price comparisons are in the main possible

only for coarse varieties that are marketed in ~~the~~ most states. The inter-price differential for the coarse variety appears to be not more than Rs. 7/- per quintal. The inter quality price differential between Basmati and Begmi (coarse variety) is Rs.30/- in Haryana and Punjab for the month of March 1969. It is possible that the inter-price differential for the Fine Scented varieties which are marketed in smaller amounts compared to coarse varieties would be greater between different states.

12.

Development of varieties combining a high yield potential, early maturity and fine grain quality.

In order to develop varieties possessing the characteristics already discussed together with a type of grain quality which will fetch a good price in the market and which might have an export value, crosses between T.N.1 and Basmati 370, ~~and~~ IR-8 and TKM6 and many other combinations have been made at the IARI in 1965. By backcrossing the promising selections to Basmati 370, a type of grain which will be classified as long, bold has been combined with a dwarf and fertilizer-responsive

I Pedigree :

This is a hybrid derivative of the back cross Basmati 370 x Taichung Native-1 using Bas. 370 as the recurrent parent. The Pedigree has been summarised in the Evolution chart. (Enclosed)

a) II. Plant type of Dwarf Basmati cultures

The selections under multiplication posses ideal plant characteristics, such as dwarf habit with upright leaves, synchronized tillering, slow senescence, photo insensitiveness etc. A comparative account on the morphological and physiological characteristics of BC-5 and BC-6 selections, their parents (TC(N)1 and Bas-370) and IR-8 is given in Table II. 10

b) III. Yield potential :

The bulked seed sample of plants with uniform height and maturity were tested for their yield potential during Rabi, 1968 (PVT) and Kharif, 1968 (UVT-I). The PVT

(4)

data collected from 8 different centres suggest that BC·6 yields 83% of T(N)1 (while IR·8 yielded 96% of T(N)1). The data of UUT-I during Kharif, 1968 suggests BC·6 (Bulk) to yield higher than IET-355 and ADT-27, in four centres out of eight. In other centres they were, more or less, equivalent to IET-355 and better than ADT-27 (~~Tables, and~~).

Yield trials in 0·5 acre plots at Karnal, during Kharif, 1968 indicated the superiority of BC·5 and BC·6 (Bulk) over ~~its~~ their parents (Table 9..). ~~A comparative study of~~ From a comparison of elite 285 ~~selected~~ cultures raised during Kharif '68 at Delhi, ~~on yield and other features revealed each of the cultures to differ from each other in one respect or other including yield and maturity.~~ However, ~~each culture was remarkably uniform in height, maturity, grain shape and size.~~ The highest yielders possessing ~~good~~ acceptable grain and cooking qualities were chosen. Their yield range under Delhi conditions was much higher than ... t parents and > 95% of IR·8 (Table

2.

The promising selections, apart from showing uniformity, ~~possess all the potentialities to yield~~ yielded much ~~higher~~ more than the bulk sample entered in the All India Trials. ~~The yield data is not likely to vary unlike the case with the bulk.~~

c) ~~IV~~ Cooking and Nutritive Qualities :

Data on the range of the kernel type, cooking quality as measured by various ~~standards~~ tests, including aroma, nutritive quality as measured by the protein content and amino acid pattern ~~have been~~ are summarised in Tables. 10. and 11

d) ~~V~~. Disease Resistance :

During the last two seasons at Delhi and Karnal, the bulk as well as the ~~selected lines~~ elite selections were completely free from both blast and bacterial leaf blight under field conditions. The All India Trial data of Rabi, 1968 shows BC-6 to be moderately resistant to resistant to blight at Rajendranagar and Maruteru. But it seems to be susceptible to blast at Anakapalli, Pennampet and Kalimpong.

(b)

More intensive study (By spraying bacterial inoculum) on the selected lines at IARI, revealed that their reaction was similar to IR-8 by showing partial to complete leaf blight symptoms unlike T(N)1 and local strains including Bas-370 which developed 'Kresek' or wilt phase (Lines were tested by Dr. Y.P. Rao under field condition by spray method using 7 virulent isolates of the pathogen). ~~Resistan~~ Reaction to virus diseases is now under study by Dr. S.P. Raychaudhuri and his colleagues.

VI ~~Areas of Adaptation~~:

~~Areas of Adaptation~~:

~~It is likely~~

Seed Increase: As decided at the Cuttack Workshop in November, 1968, the best dwarf Basmati cultures are now under pre-release multiplication

Performance of other cultures: Several outstanding selections from IR-8 X TKM-6 cross are now in the co-ordinated trials

TABLE - 7

Wholesale prices for different rice varieties in the states of Haryana, Punjab, Delhi and Uttar Pradesh in March 1969.

(Wholesale

STATE	MARKET	VARIETY	MARCH																						A
			11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Haryana	Karnal	Begmi															110.00								
	Karnal	Basmati															140.00								
Punjab	Amritsar	Begmi	105		105	105	105	105	105	105	105	105	105	105	105	105	105	105		105					
	Amritsar	Permal	122		124	120	124	124	124	124	124	124	124	124	124	124	136	136		125					
	Amritsar	Basmati	135		135	136	136	136	136	136	136	136	136	136	136	136	150	150		136					
Delhi	Delhi	Sela Golden	160	160	165	165	165		165	165	165	165	165	165		165	165	165		165					
	Delhi	Begmi Dara	105	105	110	110	110		110	110	110	110	110	110		110	110	110		110					
	Najafgarh	Begmi	120	120	120	120								110	110	110		110	110						
	Najafgarh	Permal		105	103	105								120	120	120		120	120						
	Najfafgarh	Basmati		155	155	155								155	155	155		155	155						
Uttar	Varanasi	Jelhora	110	110	110	110	110		110	110	111	111	110	110	110	110	110	110	110	110	110	110	110		
Pradesh	Nowgarh	Arwa III	98	98	99	100	100		100	100	100	98	98	96		95	98	101		105			115		
	Gorakhpur	Arwa III	115	115	115	115	115		115	115	115	115	115	115		115	115	115		115		115	115		
	Saharanpur	Arwa IV	105	110	110	110	110		110	110	110	110	110	110		110	110	110		110		110	110		
	Attari	Arwa III	106	106	106	106	106	106			105	106	106	106	106	107	107	105		105		105	105		
	Attari	Arwa IV	104	105	105	105	105			104	105	105	105	105	105	105	105	103		103		103	103		
	Bahraich	Arwa III	99.16	99.16	99.16	101.84	101.84	101.84	101.84	101.84	102.18	101.84	101.84	101.84	101.84	101.84	101.84	101.84		101.84		101.84	101.84		
	Etawah	Arwa III	105.25	105.25	105.25	105.25	105.00	106.00	106.00	105.25	106	106	106.00	105.90		105.00	105.00	105.00		105.25			105.10		
	Kanpur	Arwa III	100.88	100.88		102.39	102.39		107.20	107.20	107.20	107.20	108.88	108.88		109.85	108.88	108.88		110.63					
	Balrampur	Arwa III	101.81	101.81	104.49	104.49				104.49	107.17	107.17	107.17	107.17		107.17	107.17								
	Allahabad	Arwa III	107.20	107.20	109.88	117.92	117.92	117.92	117.92	117.92	117.92	117.92	117.92	117.92		117.92	117.92	107.92		107.92		107.92	107.92		
	Allahabad	Arwa IV	104.52	104.52	107.20	109.88	109.88	109.88	109.88	112.56	112.56	112.56	112.56	112.56		112.56	112.56	112.56		112.56		112.56	112.56		
	Sultanpur	Coarse	100.87	100.87	100.87	100.87	100.87	[illegible]	107.20	110.62	110.62	110.62	110.62	110.62		110.62	110.62	110.62		110.62			110.62		
	Chandausi	"	95	95	95	95	95		95	95	95	95	95	95		95	100	100					102.50		
	Auraiya	Arwa III	109	109	109	108	108		107	108	108		107	107		106	106	104		105	105	105	105		
	*Basti	Taichung-I																							
Rajasthan	** Jodhpur																								
	Ajmer																								

Note: Coarse & Arwa III are same.

Procurement Prices for 1968-69

Rajasthan	Nil
Haryana	Rs.88.00 for Begmi
Punjab	Rs.87.00 for Begmi
Uttar Pradesh	Rs.90.00 for Coarse: Arwa Grade III
Delhi	Nil

* Prices are for paddy - for weeks ending 1. 7.3.1969 - Rs.55.00
2. 14.3.69 - Rs.60.00
3. 21.3.69 - Rs.65.00

** There are no market prices for Rajasthan.

TABLE - 7

Wholesale prices for different rice varieties in the states of Haryana, Punjab, Delhi and Uttar Pradesh in March 1969.

(Wholesale Rice Prices per Quintal in Rs.)

RIETY	MARCH													APRIL										
	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2
															110.00							110.00	
ti															140.00							140.00	
	105		105	105	105	105	105	105	105	105	105	105	105	105	105	105		105					
l	122		124	120	124	124	124	124	124	124	124	124	124	124	136	136		125					
ti	135		135	135	136	136	136	136	136	136	136	136	136	136	150	150		136					
Golden	160	160	165	165	165		165	165	165	165	165	165		165	165	165		165				165	165
Dara	105	105	110	110	110		110	110	110	110	110	110		110	110	110		110				110	110
	120	120	120	120								110	110	110		110	110						
l		105	103	105								120	120	120		120	120						
ti		155	155	155								155	155	155		155	155						
ra	110	110	110	110	110		110	110	111	111	110	110	110	110	110	110	110	110	110	110	110	110	110
III	98	98	99	100	100		100	100	100	98	98	96		95	98	101		105			115	108	108
III	115	115	115	115	115		115	115	115	115	115	115		115	115	115		115		115	115	115	115
IV	105	110	110	110	110		110	110	110	110	110	110		110	110	110		110		110	110	110	110
III	106	106	106	106	106	106			105	106	106	106	106	107	107	105		105		105	105	105	105
IV	104	105	105	105	105			104	105	105	105	105	105	105	105	103		103		103	103	103	103
III	99.16	99.16	99.16	101.84	101.84	101.84	101.84	101.84	102.18	101.64	101.84	101.84	101.84	101.84	101.84	101.84		101.84		101.84	101.84	104.52	104.52
III	105.25	105.25	105.25	105.25	106.00	106.00	106.00	105.25	106	106	106.00	105.90		105.10	105.10	105.00		105.25			105.10	105.10	105.00
III	100.88	100.88		102.39	102.39		107.20	107.20	107.20	107.20	108.88	108.88		109.85	108.88	108.88		110.63				110.63	110.63
III	101.81	101.81	104.49	104.49				104.49	107.17	107.17	107.17	107.17		107.17	107.17							104.49	104.49
III	107.20	107.20	109.88	117.92	117.92	117.92	117.92	117.92	117.92	117.92	117.92	117.92		117.92	117.92	107.92		107.92		107.92	107.92	107.92	107.92
IV	104.52	104.52	107.20	109.88	109.88	109.88	109.88	112.56	112.56	112.56	112.56	112.56		112.56	112.56	112.56		112.56		112.56	112.56	112.56	112.56
	100.87	100.87	100.87	100.87	100.87		107.20	110.62	110.62	110.62	110.62	110.62		110.62	110.62	110.62		110.62			110.62	110.62	110.62
	95	95	95	95	95		95	95	95	95	95	95		95	100	100					102.50		102.50
III	109	109	109	108	108		107	108	108		107	107		106	106	104		105	105	105	105		

ng-I

ng 1. 7.3.1969 - Rs.55.00
2. 14.3.69 - Rs.60.00
3. 21.3.69 - Rs.65.00

than.

Procurement Prices for 1968-69

Rajasthan	Nil
Haryana	Rs.86.00 for Begmi
Punjab	Rs.87.00 for Begmi
Uttar Pradesh	Rs.90.00 for Coarse: Arwa Grade III
Delhi	Nil