

CHARACTERISTICS OF COLD TOLERANT RICE CULTIVARS OF NWFP

Ihamuddin*, Dil Rosh** and Munir Ahmad*

ABSTRACT: Three recommended cold tolerant rice varieties namely 'Swat-1', 'Swat-2' and 'JP-5' were studied for their morphological, agronomical and biochemical diversities at different growth stages, at the Agricultural Research Station, Mingora, Swat during 1984 and 1985. Varieties showed a wide range in these characters. Obvious differences were found in flag leaf angle, varying from erect to semi erect, and panicle exertion from moderate to well exerted type. Besides, these varieties also exhibited their diagnostic identities in the grain type, chalkiness, quality and protein content. These diagnostic characteristics can be used for the quick identification of these cultivars.

Key Words: Oryza sativa; Temperature Resistant; Varieties; Plant Anatomy; Agronomic Characters; Protein Content; Identifications; Pakistan.

INTRODUCTION

Rice (*Oryza sativa* L) is an important food crop of Pakistan. Good cultivars play a significant role in the increased production per unit area along with other inputs. Accordingly, many cultivars, suitable for different agroclimatic conditions have been released by various research institutes. The cultivars released have not been well defined except a few distinguishable and agronomic characters. Varietal diversity is always identified and measured by certain distinguishable characters of seed, seedling and plant stand which are controlled by heredity with good phenotypic stability (Lampang, 1982). Hence, this study was conducted to determine the varietal diversity with the help of morphological, agronomical and biochemical attributes in the rice cultivars and to prepare descriptive feature for the identification of these cultivars from one another. Certain characters for varietal identification together with differences in the seed contents (Chang and Bardanas, 1985) have been suggested and descriptors have been developed by various workers (Larson and Galdwell, 1969; Pat,

1980 and Hussain, 1985). Certain characters were suggested to merit the uniformity and stability of rice varieties by the International Union for the Protection of New Varieties (Anonymous, 1985).

MATERIALS AND METHODS

Three recommended cold tolerant cultivars namely, 'Swat-1', 'Swat-2' and 'JP-5' were used in this study at the Agricultural Research Station, Mingora during 1984 and 1985. Forty-day old seedlings were transplanted in soil fertilized with 80: 30: 30 kg NPK /ha. The experiment was laid out in randomized complete block design with four replications. Each sub-plot consisted of six, 5m long rows. Observations were recorded on 10 randomly selected plants in each plot. Morphological characters of plants as well as of grain were studied by the techniques developed by Latif (1983), and the descriptor for rice was used as developed by National Seed Registration Department, Rawalpindi. Data on morphological characteristics of plant were recorded at early and maturity stages of the plant growth. Plant height was measured from soil to the top of plant including panicle. Leaf angle was recorded keeping in view the distance in between stem and leaf. Days of flowering and maturity were noted from sowing date. Leaf

* Agricultural Research Institute, Tarnab, Peshawar.

** Agricultural Research Station, Mingora, Swat.

sheath colour was observed at flowering stage of plants. Determination of the protein and other components in grain was done at the Chemical Laboratories, Nuclear Institute for Food and Agriculture, Tarnab, Peshawar.

RESULTS AND DISCUSSION

Varietal differences in morphological traits of these cultivars, at different growth stages are discussed in the following text.

Leaf Characteristics

The leaf of rice cultivars is linear in general. However, variations were found in length, blade colour, angle, sheath colour, flag leaf length, flag leaf attitude and ligule length (Table 1).

The data revealed that the maximum leaf length (48.72 cm) was found in 'Swat-1' and the minimum in 'Swat-2'. The leaf blade

colour was an important distinguishing character in these cultivars. It is green in 'Swat-1', light green in 'Swat-2' and dark green in 'JP-5' which clearly differentiates these varieties from one another. The leaf angle and leaf sheath colour also differed in these cultivars. The flag leaf length and angle were found as conspicuous characters for the identification of these cultivars at maturity. Flag leaf was longest in 'Swat-1' and shortest in 'Swat-2' while it was intermediate in 'JP-5'. The flag leaf angle in 'JP-5' was semi erect while in 'Swat-1' and 'Swat-2' it was erect. Ligule size also differed in these cultivars being longer in 'Swat-1' than 'JP-5'.

Plant and Clum Characteristics

Data on plants and their agronomic traits clearly indicated considerable variation in most of the characteristics listed (Table 1). 'Swat-2' was early to mature than 'JP-5'. 'Swat-1' was a tall variety compared to 'Swat-2' and 'JP-5'. This character clearly differentiated these varieties from one another. The maximum number (15) of tillers were recorded in 'Swat-2' while the minimum (13) were observed in 'Swat-1' and 'JP-5'. Panicle exertion was found the most conspicuous character for identification of these cultivars. The highest exertion height was recorded in 'JP-5' while the lowest in 'Swat-2' which clearly distinguishes these cultivars. Similarly, the number of secondary branches and number of spikelets per panicle are more in 'Swat-1' as compared with the remaining varieties. Threshability is difficult in 'JP-5' while it was medium 'Swat-1' and 'Swat-2'.

Kernel Characteristics

Data indicated that 'Swat-2' possesses long kernels, 'Swat-1' medium and 'JP-5' small kernels (Table 1). Chalkiness was evident in 'Swat-2' kernels. The quality of 'JP-5' is poor while medium in case of 'Swat-1' and 'Swat-2' followed by 'Swat-1' while the minimum protein percentage was recorded in 'JP-5'.

Table 1. Morphological, agronomic and physicochemical characters of cold tolerant rice cultivars grown at the Agricultural Research Station, Mingora during 1984 and 1985

Parameter	'Swat-1'	'Swat-2'	'JP-5'
Leaf length (cm)	48.72	35.67	46.93
Flag leaf length (cm)	49.19	29.95	34.56
Ligule length (cm)	1.02	1.00	0.88
Leaf blade colour	Green	Light green	Dark green
Leaf angle	Erect	Semi erect	Erect
Leaf sheath colour	Green	Yellowish green	Green
Flag leaf attitude	Erect	Erect	Semi erect
Days to heading (No)	90	80	100
Days to maturity (No)	120	110	130
Plant height (cm)	125	107	120
Tillers/plant (No)	13	15	13
Panicle length (cm)	23.54	22.76	22.16
Panicle exertion (cm)	5.90	2.28	11.34
Secondary branches (No)	43.37	37.00	34.00
Spikelets/panicle (No)	122	89	106
Panicle density	Lax	Loose	Lax
Threshability	Medium	Medium	Difficult
Size	Medium	Long	Small
Chalkiness	Absent	Present	Present
Quality	Medium	Medium	Poor
Protein content (%)	7.94	7.91	6.00

Grain Characteristics

All the varieties were awned. However, they showed a marked differences in length, width, thickness, husk colour and husk pigmentation (Table 2).

Table 2. Grain morphological characters of rice cultivars grown at the Agricultural Research Station, Mingora during 1984 and 1985

Characteristics	'Swat-1'	'Swat-2'	'JP-5'
Length (cm)	0.92	0.80	0.33
Width (cm)	0.25	0.28	0.69
Thickness (cm)	0.18	0.21	0.20
Husk colour	Straw	Light brown	Creamy
Husk pigmentation	Absent	Present	Absent

The maximum grain length (0.92 cm) was recorded in 'Swat-1' followed by 'Swat-2' and the minimum grain length was recorded in 'JP-5' which differentiates these cultivars from one another. Keeping in view the grain width and thickness, there is a clear differentiation in these cultivars. Husk colour and pigmentation were observed the most promising characters for their identification.

LITERATURE CITED

1. Anonymous. 1985. Guidelines to conduct test of distinctness, uniformity and stability of rice. International Union for the Protection of New Varieties of Plants. Geneva.
2. Chang, T.T., and Bardanas, E.A. 1985. The morphology and varietal characteristics of the rice plant. IRRI, Tech. Bull. 4: 40.
3. Hussain, A. 1985. Variety sources and evaluation registration and release. Paper presented in First FAO/DANIDA Seminar on Design and Implementation of Seed Programme, Islamabad, Pakistan.
4. Lampang, A.N. 1982. Field and laboratory cultivar identification and certification. Paper presented in the Second Regional Seed Technology Workshop, Bangkok, Thailand.
5. Latif, A. 1983. Rice varieties of Pakistan. Booklet 2:3-11. Islamabad, Pakistan.
6. Larson, A.L., and Galdwell, B.E. 1969. Source of protein variants in identification. Crop Sci. 9: 385-387.
7. Pat, P.W. 1980. Rice cultivar identification. Paper presented in Second Regional Seed Technology Workshop for South East and Pacific Countries, Bangkok, Thailand.