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Short Communication

CHARACTERIZATION OF RICE (*ORYZA SATIVA* L.) ACCESSIONS USING PHENOL COLOUR STAINING

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Oka (1958) used phenol colour staining of rice grains (browning or blackening of grains when soaked in aqueous solution of phenol) in the classification of cultivated rice. Since then, this test has been used to ascertain the genetic purity of rice cultivars and their identification. Because this method is rapid and cost effective, attempts were made to use this test in the characterization of rice accessions.

Four hundred ninetyseven rice accessions of diverse agro-ecology and origin were evaluated for phenol staining during 1991-93. Of 497 accessions 404 were indigenous and 93 exotic accessions (upland 69; medium land 24).

The rice grains (10 to 15) of each accession were placed on filter paper and soaked in freshly prepared aqueous solution of phenol (C_6H_5 OH, AR grade, freezing point: 40.5-41°C, molecular weight: 94.11 and purity: 99.9%) for 48 h at room temperature. The phenol staining was rated as no colour development, designated as (–) or colour development, designated as (+). The intensity of coloration was given by +, ++ and +++ using checks - Jaya (+++) and Type 3 (–).

Of the 497 rice accessions only 115 (23.1%) did not produce any colour and yielded negative reaction indicating the predominance of accessions showing positive phenol reaction. Nevertheless, there was variation in the intensity of coloration. (Fig. 1). Among the indigenous accessions, the pattern of phenol reaction was not influenced by the agroecology i.e. upland or medium/low land. The accessions showing phenol negative reaction were found in both agroecologies and the proportion of such accessions was 16.3 and 11.2%

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respectively, in upland and medium/low land collections. Most of the breeding lines tested gave positive phenol reaction. Oka (1958) suggested that varieties from *indica* group of cultivated rice were phenol positive. However, the results of the present study as well as some earlier reports (Chauhan and Nanda, 1984, Vannangmudi, 1988) have shown the existence of variability for phenol staining in *indica* group. Though, by and large, majority of varieties of this group exhibited positive reaction.

Among the exotic collections, phenol reaction of most of the breeding lines developed at IRRI, Philippines was positive (87.5%). However, the number of lines tested was less. This could be due to the fact that these breeding lines were mostly from *indica* group. Fifty six (81.2%) accessions yielded phenol negative reaction in the exotic upland rice accessions. These accessions were originated mainly from IRAT-Africa (18), CNA and IAC, Brazil (20) Bangladesh and IITA, Nigeria (Table 1). This group might be representative of tropical *japonica* or their derivatives. Because these accessions did not react to phenol, thus, indicating the absence of gene(s) for this trait.

Table 1. List of rice accessions giving phenol negative reaction.

Agroecology/ Group	Accessions
Indigenous upland	Dular, Pankee, Akashi, N22, Surajmukhi, Bala, Sukhawel 20, Brown gora (298, 409), White gora (305, 312, 313, 320, 322, 323), Bangalore, Laloo 14(A), Laloo 14(B), Beali-26, ARC 11775, CR143-2-2, CR634-1, RR2-6, RR47-3, RR145-22, NDR1015, RP2307-7109-8, RP2346-2325-148-70, IET10387, Mettasannalu, GS529, ARC7046(A), ARC7046 (B), ARC10372.
Indigenous medium/ low land	Raria 9268), Jhulaka (578), Agnisal (699, 700), Jhillidhan (703), Kalamdani (706), Tulsimanjri (719), Nanhiya (721, 722), Bhojana (727), Jugadi (733), Baligoya (736), Jerra (739), Ladusar (Dumka 14), Tilasar (105470), Hathipanjar (105629), Bhogana (105681), Maghi (105747), Bad (105800), Jonga (105812), 4/323 and 4/335.
Exotic upland	Aus (257, 454), IRAT(1108, 112A, 133, 146, 147, 193, 208, 211, 216, 237, 260, 263, 267, 284, 291)
	IR47686-5-1-B, IR47686-5-10-8, IR47686-9-1-8-1, IR47701-99-B- 2, Arroz de Aldeia caulina, Arroz dos indios, Arroz de Productor, ITA257, Khaolo 33, Saita, Lakshmijata, Precoce Branco, Khao shino yao, Early Setterial, Rangpur, 63-83, AOB-253, AOB-391, AOB-394, A12-309, IAC25, IAC165, IAC1246, CNA(4097, 4121, 4124, 4125, 4127, 4130, 4136, 4164, 4173, 4744, 4745, 5160, 5164 A, 5164 B, 5166, 5366).
Exotic medium land	BG731-2, IR29725-21-1-3, IR32429-47-3-2-2

*Numbers in parentheses indicate source of the material.

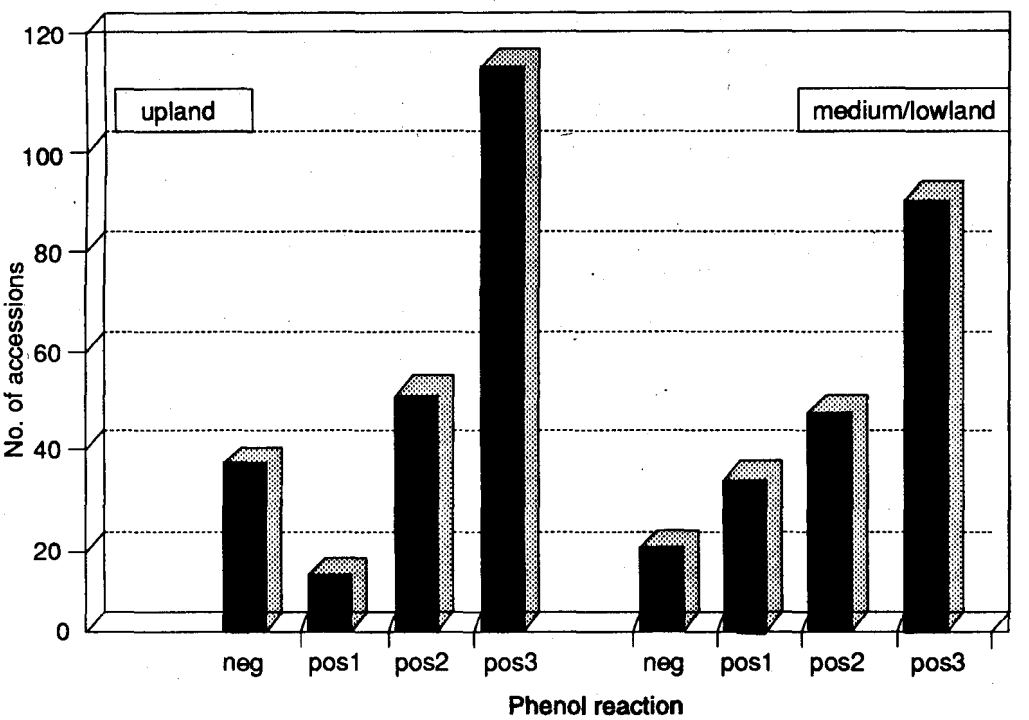

Fig. 1. Distribution of indigenous rice accessions based on phenol reaction

A few accessions exhibited mixed reaction (+/–). This could be either due to mixed population of the land races or these might be segregation for this trait because these accessions were not evaluated and selected for this character. The accessions giving phenol negative reaction are listed in Table 1. The findings of the present investigation revealed that this test in combination with other morpho-agronomic characters, chemical and biochemical tests could be used in the characterization of rice genetic resources. Further, majority of the traditional cultivars from Eastern Indian upland are *aus* where as most of the advanced breeding lines derived from crosses involving *aus* as parent(s) fell in the *indica* group of isozymic analysis. It seems that during selection process at research station the characters of *aus* types were lost. This might be due to selection against *aus* traits in the better managed research fields while in the farmers' conditions *aus* traits express to their optimum. Since a major proportion of varieties identified as *aus* also gave phenol negative reaction. It may, therefore, be possible to use this test in the segregating generations to select for *aus* types. This needs further investigation.

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