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Identification of improved rice genotypes for grain protein and quality traits

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Abstract:

With the increasing global urbanization and population, the need for both quality and quantity in food grain production is enormously felt. Rice is the most preferable, affordable and cultivated food that meets the hunger of almost worlds half of the population. To combat the protein energy malnutrition and provide quality food to the society we need to focus on improvement of rice for grain nutrition and quality. The average protein content of rice is low (6-7%) as compared to other cereals. In this present work we focused on the identification of breeding lines having high protein contain as well as good grain quality. By using donors for high protein content ARC 10075 and ARC 10063, we have developed many breeding lines. In this study we took 57 advanced lines derived from pedigree and backcross breeding method. Some of them were introgressed lines in the background of high yielding popular varieties such as Swarna and Naveen. The gain protein content (GPC) was estimated by using calibrated Near-infrared (NIR)-Spectrophotometer. Grain quality traits were estimated using standard procedure. The statistical analysis revealed the significant difference ($p<0.05$) in all parameters. The range of different parameters such as hulling percentage (72.5-79), milling percentage (62.5-71), head rice recovery (42-70%), length of grain (4.4-6.45 mm), breadth of grain (1.55-2.21 mm), amylose content (15.26-22.65%), grain length after cooking (7.5-10.8 mm), volume expansion ratio (2.8-4.25), water uptake by cooked rice (57.5-122.5 ml/100gm) and grain protein content (6.75-11.55%) varied widely. It was observed that various breeding lines such as CR 2818-1-11-1-B-3-1-B, CR2829-PLN-23-7, CR 2829-PLN-98-9, CR 2829-PLN-114-13, CR2830-PLS-57 along with released varieties, CR Dhan 310 and Mukul were showing more than 60% head rice recovery, desired amylose content (20-22%) as well as high protein content (10-11.5%). These breeding lines could be tested further in multilocation and also could be used in breeding programme for further improvement of rice for protein and quality traits. This may facilitate unspeakable new opportunities for generating biofortified rice varieties to achieve the food and nutritional security for the rapidly expanding global population.