

Identification of donors for grain protein and Zinc content for biofortification in rice

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Abstract:

One of the major causes of malnutrition is the inadequacy to supplement food in terms of both quality and quantity. More than half of the Asians rely on rice as the major food crop which is having modest concentration of protein and micronutrients. To encounter this micronutrient deficiency there is an urgent need for developing varieties with enhanced protein and micronutrient content along with meeting the quantity needs of this era. In this present study we have targeted to identify donors for grain protein and Zinc content in brown rice to be used as donors in breeding program. 34 germplasm were collected from various locations and were grown at ICAR-National Rice Research Institute, Cuttack, India under standard agronomic management practices. The grain protein content (GPC) was estimated by using calibrated Near-infrared (NIR)-Spectrophotometer and Zn content estimated through calibrated X-ray fluorescence (XRF) machine at ICAR-IIRR, Hyderabad. Data on agronomic traits were collected. The statistical analysis exhibited a wide range of variation for different parameters. The mean value of grain protein content in all germplasm was 9.64% ranging from 6.14% in RRG-11 to 13.13% in ARB-6027. The mean value of Zn concentration in all germplasm was 37.37ppm ranging from 21ppm in RRG-9 to 51.1ppm in IARI-3. The range of agronomic traits were 69.17-175.5cm for plant height, 17.77-34.5 cm for panicle length, 1.09 -2.97g for 100 grain weight, 1.86 -25.53 kg for plot yield and 0.137-2.59 g for protein yield. The germplasm with elevated protein content were identified ARB 6027 (13.12%), Bindli (12.30%), Kalinga-III (12.21%) and RRG-9 (12.08%). And germplasm with higher Zn content were IARI-3 (51.1 ppm), Edavaukudi Pokkali (48.2 ppm), Bindli (47.00 ppm), RRG-10 (44.90 ppm). Grain protein content and Zn concentration were found to be positively correlated ($r=0.285$). Hence, these identified germplasms can be used as donors for grain protein and zinc content in breeding for high yielding elite lines with high nutrition value. These potential donors for high nutrient content in seed could be the strength in the development of the biofortified rice leading to nutritional security for millions of rice eating population in India.