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PGR NOTE

Evaluation and Validation of Bold Seeded Accession in Ricebean [*Vigna umbellata* (Thunb.) Ohwi and Ohashi]

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A total of 2,202 accessions of ricebean have been conserved in the National Genebank of India at Indian Council of Agricultural Research-National Bureau of Plant Genetic Resources (ICAR-NBPGR), New Delhi. During routine seed monitoring for seed viability, one unique accession IC009634 was observed with very bold seeds, 100-seed weight of 37.44g. The bold seeded expression was validated under field conditions at two locations viz; ICAR-NBPGR, Regional Station, Shimla and ICAR-NBPGR, Regional Station, Shillong. This accession has the potential to be utilized in the *Vigna* improvement programme.

Key Words: Bold seeded, Germplasm, Ricebean, Sikkim, *Vigna*

Ricebean [*Vigna umbellata* (Thunb.) Ohwi and Ohashi], is a multipurpose legume of Fabaceae family mainly grown in *Kharif* season. It originated in Myanmar–Thailand and India (Tian *et al*., 2013). It is widely grown in Nepal, Bhutan, and North-East India, Myanmar, Southern China, Northern Thailand, Laos, Vietnam, Indonesia and East Timor (Tomooka, 2009). In parts of South-East Asia, ricebean exists as a complex with its wild form from which it is not taxonomically distinguished and with which it can form fertile hybrids (Seehalak *et al.,* 2006). In the North-eastern hills of India, ricebean is used as a pulse, vegetable, and fodder crop. The crop is mainly cultivated under shifting cropping systems and is particularly important for ethnic groups in these areas. Ricebean is well suited to outcrossing, based on its prominent yellow flowers raised above the leaf canopy. In the tropics, ricebean is perennial based on its very thick stem and roots (Tomooka *et al.,* 1997).

This minor pulse has been little studied, but its prolific growth and abundant pods suggest a high yield potential as a vegetable (green pods), grain, and forage crop (Smartt, 1991). Most of the research work on ricebean has focused on its high level of resistance to the major storage pest bruchid beetles (*Callosobruchus* spp.) (Kashiwaba *et al.,* 2003; Somta *et al.,* 2006). Arora *et al.* (1980) collected and evaluated 300 rice bean accessions from eastern and North-eastern India and reported that this crop is free from diseases such as yellow mosaic virus, *Cercospora*, and bacterial leaf spot (*Xanthomonas* spp.). Other species of this genus suffer greatly. Pandiyan *et al.* (2008) also reported the highest level of mungbean yellow mosaic virus resistance in ricebean among different species of *Vigna.*

A total of 2,202 accessions of ricebean collected across the geographical areas of India, has been conserved in the National Genebank of India at Indian Council of Agricultural Research-National Bureau of Plant Genetic Resources (ICAR-NBPGR), New Delhi. During routine seed monitoring for seed viability in 2020, one unique accession IC009634 (collected from Sikkim) was observed for the first time with very bold seeds, weighing 37.44 g for 100-seed weight.

To date, we have not found any report in literature with such a stable genotype with high average 100 seed weight in any cultivated ricebean genotype. Hence, to validate the bold seededness IC009634 was grown at two locations viz; ICAR-NBPGR, Regional Station, Shimla (31º5'N and 77º5'E with 1,924 amsl) and ICAR-NBPGR, Regional Station Shillong (25º41'N long 91º55'E with 100 amsl during *Kharif* 2020. As ricebean is temperate crop, both these environments were well-suited for getting the desirable expression. At

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Fig. 1. a) Seed weight of IC009634; and popular reference rice bean varieties PRR1 (b), PRR2 (c) and VRB3 (d)

both locations, this bold seeded accession (IC009634) along with three checks namely, PRR-1, PRR-2 and VRB-3 were characterized for ten quantitative traits such as, days to germination, days to 50% flowering, leaflet length (cm), leaflet width (cm), no. of branches/ plant, plant height (cm), pod length (cm), seed length (cm), seed width (cm) and 100 seed weight (g); seven qualitative traits viz., flower colour, leaflet shape, pod colour, pod curvature, seed shapes, seeds colour and seeds lustre using a minimal descriptor.

Accession IC009634 grows vigorously with dark green broad leaves. The leaflet length (14.36 cm) and width (10.73 cm) of IC009634 were higher than checks. The average mean days to 50% flowering was 65 days. Accessions from Taiwan were reported with 54-78 days to 50% flowering (Tian *et al.,* 2013). Plant height ranged between 163-210 cm with an average of 191 cm, which is also very high compared to the checks, where it was 45.33 cm, 61.66 cm and 76.00 cm in PRR-1, PRR-2 and VRB-3, respectively. The number of branches per plant was recorded from 5 to 6. The average pod length was 12.83 cm. Seed length and seed width was almost double as compared to check varieties. Seed length was 11.31 cm in IC009634, and in PRR-1, PRR-2 and VRB-3 it was 6.17 cm, 6.49 cm and 6.82 cm, respectively. Similarly, the average seed width of IC009634 was 6.90 cm and 3.83 cm, 3.31 cm and 3.66 cm in PRR-1, PRR-2 and VRB-3, respectively. Average 100-seeds weight was 38.05 g which is significantly higher as compared with checks, PRR-1 (6.18 g), PRR-2 (5.89 g) and VRB-3 (5.94 g). In earlier studies, the highest 100-seed weight 29.86 g reported in the landrace Rhidi Kemagh (IC423239) collected from Zoehnoboto District of Nagaland (Pattanayak *et al.,* 2018). Studies with the Indian (Sharma *et al*., 1995; Singh *et al*., 1998; Mishra *et al*., 2008; Gupta *et al*., 2009) and international (Tian *et al.,* 2013) collections of ricebean reported high variations in 100 seed weight, seed yield, number of branches per plant, pod length and days to maturity. In Japan and Korea, small (<9 g), non-branching and early flowering accessions were prominent. In China, accessions with slightly larger seed (up to 10 g) and branching growth habit were found from Yunnan province, southern China. Bold seeded accessions (>21 g) were found in Nepal (Tian *et al.,* 2013). In ricebean, 100-seed weight exhibited high heritability and high genetic advance (Gupta *et al.,* 2009). In IC009634, the flower colour was yellow and the leaflet shape was ovate. Pods were semi-curved with brown at maturity. Seeds were cylindrical in shape, light brown and shiny.

The present study reports a novel and stable genotype with high 100-seed weight. Therefore, the identified accession has tremendous potential as a promising donor for ricebean breeding programs.

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