

Screening of Rice Varieties For Susceptibility to Zinc Deficiency

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Importance of genetic variability in plant species cannot be disregarded in seeking its adaptability to a specific environment. Reports are pouring in about the increasing proportion of Zn deficiency in different states of our country. In order to recommend a variety for Zn-deficient areas, it was thought necessary to test susceptibility of some rice varieties to Zn deficiency.

Nine varieties of rice (*Oryza sativa* L.) viz. 'RP.5-2', 'RP.4-2', 'IET-1039', 'IR-20', 'IR-22', 'Padma', 'Masuri', 'Jaya' and 'GAUR-10' were screened for Zn-susceptibility using sand culture technique and their performances in terms of tillering habit, dry matter production etc. were recorded. There were four Zn-levels viz. 0(Zn₀), 0.00065 (Zn₁), 0.0065 (Zn₂) and 0.065 ppm (Zn₃) and each of them was replicated thrice. Initially, required quantity of complete nutrient solution as described by Hewitt (1952) minus zinc was given once per day for raising paddy seedlings in sand-culture. After a month, 8 paddy transplants uniform in size and growth were transferred to polythelene-lined experimental earthen pots containing

washed purified sand. Seedlings were allowed to grow till ear emergence stage because absorption of the nutrients is generally at peak during the tillering and panicle initiation phases. Zinc treatments were super-imposed immediately after transplanting. Sand in each pot was flushed at weekly interval to drain off accumulated salts. Observations pertaining to deficiency symptoms, number of tillers per plant and final weight of oven-dried (70° C) produce per pot were recorded.

In general, irrespective of varietal differences number of tillers per plant as well as yield increased progressively with progressive increase in the level of applied Zn (Table 1). The behaviour of different rice varieties was quite peculiar towards variation in levels of Zn application. Zinc is believed to be actively associated in plant metabolism and cell-division activities at tillering stage. In the case of 'Jaya' variety, tillering habit was found to be impaired under inadequate Zn nutrition. On the basis of maximum percentage increase in number of tillers per plant and highest magnitude of response at varying levels of applied Zn, it is inferred that variety 'Jaya' could be rated as highly susceptible to Zn deficiency. Similar results have been reported by Mehta (1974) and Randhawa, and Takkar (1975). Moreover, under control treatment, plants appeared pale and slightly chlorotic

Performance of different rice varieties at varying levels of Zn application.

C.D. @ 5%
Variety: 1.9; Level: 1.3; Interaction (VXL) : 3.9

with little reddening of leaf margins progressing downwards from tip to the base. Hence, rice variety 'Jaya' can be utilized as indicator plant to judge poor Zn status of soil. Such typical Zn deficiency symptoms were not visualised in any other varieties except 'Padma'. Severity of symptoms was relatively less in case of 'Padma' than those observed in 'Jaya'. Besides deficiency symptoms, the magnitude of response (41.2%) at the highest level of Zn application (Zn_3) was next to 'Jaya', which indicates that performance of 'Padma' would be relatively better than 'Jaya' on Zn-deficient soils. It can be stated that tillering was adversely affected for want of Zn in nutrient solution in case of variety 'IR-20', as this was revived by 55.8% on supplementation of Zn. Though Zn-deficiency symptoms were not observed, improvement in tillering habit and enhancement in yield by 30.6% on supplementation of 0.065 ppm Zn suggests that 'IR-20' could not thrive well in absence of Zn. However, it can be said that 'IR-20' has relatively greater tolerance against adverse conditions of restricted Zn availability than those of 'Jaya' and 'Padma' varieties.

Although, variety 'RP-5-2' thrived well in absence of applied Zn in comparison to some of the varieties which had received Zn, it did not have an edge over 'IET-1039' in establishing its vulnerability to Zn deficiency. Both these varieties can be considered on par in their abilities to withstand Zn deficiency as responses to 0.065 ppm Zn application were not very much different. Amongst rest of the varieties,

practically negligible differences were noted in percentage yield response of 'GAUR-10' and 'RP-4-2' under Zn_3 as well as that of 'IR-22' under Zn_2 level. However, on the basis of average response these varieties could be arranged in descending order of susceptibility as 'GAU-10', 'IR-22' and 'RP-4-2'. But on account of improvement in tillering habit, the positions of latter two varieties need to be interchanged.

'Masuri', seems to be the least susceptible variety to Zn deficiency as the effect of variation in Zn level was felt to the minimum extent. Amongst different varieties, average response as well as improvement in tillering habit due to addition of Zn were not substantial. Therefore, it is inferred that among different rice varieties, 'Masuri' could resist conditions of Zn deficiency to the maximum extent i.e. it could be rated as Zn-tolerant variety. Thus, 'Masuri' is the variety, which will perform satisfactorily in the area of Zn-deficiency. Therefore, on the basis of dry matter yield, tillering habit and appearance of symptoms, the rice varieties can be grouped in decreasing order of susceptibility to Zn deficiency as

'Jaya' > 'Padma' > 'IR-20' >
'IET-1039', = 'RP-5-2' > 'GAUR-10' >
'RP-4-2' > 'IR-22' > 'Masuri'.

Hence, varieties 'Jaya' and 'Masuri' are at two extremes of the yardstick for Zn susceptibility. The former is a susceptible variety, while the latter a tolerant one.

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