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Effect of Pre-sowing Seed Treatment of Raya With Micronutrients on Yield Parameters

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Abstract: A field experiment was conducted to investigate effect of micronutrients ($ZnSO_4$, $MnSO_4$ and $FeSO_4$) as pre-sowing seed treatment of Peela Raya (*Brassica carianata* L.). Seed treatments comprised of control (un-soaked), 12 hours soaking of seed in distilled water and in solutions of 0.5 M $FeSO_4$, 0.5 M $MnSO_4$ and 0.5 M $ZnSO_4$. The soaked seed was then dried under the shade for 12 hours before sowing. The results showed that yield parameters such as number of primary branches per plant, plant height at maturity, days to 50% flowering, number of pods per plant, number of seeds per pod were affected to a considerable extent.
Seeds treated with $ZnSO_4$ gave the highest values of yield parameters.

Keys words: Seed treatment, micronutrients, peela raya

Introduction

Micronutrients have vital role for the production of agricultural crops. Copper deficiency in wheat crop causes low grain formation; Zinc deficiency in rice crop is very obvious. Availability of micronutrients to crops is essential for obtaining maximum yield. Micronutrients are applied in the form of broadcast, foliar spray and pre-sowing seed treatment. Pre-sowing seed treatment of micronutrients is good technique to decrease expenditure and get more income. Roberts and Winifred (1948) described a method for economizing the use of fertilizer by soaking the cereal seeds in nutrient solution prior to sowing. They stated that sufficient quantities of deficient elements could be introduced in this way to carry the plant growth through the critical stages of early growth and to produce the significant increase in yield parameters. Smalik (1959) noted that seed soaking with trace elements was more effective than soil treatment. Igue and Gallo (1960) in their field experiments observed that the chlorotic symptoms could be dispersed or prevented by spraying 0.5 % $ZnSO_4$, band spraying of 5 kg $ZnSO_4$ ha^{-1}. Similarly, Farah *et al.* (1980), Khan (1981) and Pakroo and Kashirad (1981) found $ZnSO_4$ treatment superior over other micronutrients. Fenster *et al.* (1984) suggested that a maximum of 0.22 kg Zn ha^{-1} could be banded indirect contact with seed while Mikkelson and Brandon (1975) indicated that coating 1 kg of seed with 20 g of Zn from either $ZnSO_4$ or ZnO satisfactorily corrected Zn deficiency in rice. Whereas Vitosh *et al.* (1981) found that bean seed treatment with 1.1 kg Zn ha^{-1} as ZnO reduced emergence and yields in many locations. Kuznestov and Openlender (1971) conducted their research using serosem-meadow soil. They steeped the maize seeds in solutions of $MnSO_4$, $ZnSO_4$ and found that number of grains per cob increased from 8.18 to 8.30 and 8.58 to 8.80 tons ha^{-1} by $MnSO_4$ and $ZnSO_4$ respectively. The present study was conducted with the objective to explore the effect of micronutrients seed treatments on growth parameters of peela raya.

Materials and Methods

The experiment was conducted in 1998 at Soil Salinity Research Institute, Pindi Bhattian in a normal sandy loam soil to evaluate the effect of micronutrients as pre-sowing seed treatments on yield parameters of peela raya (*Brassica carianata* L.). Seed treatments were control (un-soaked seed), soaking of seed for 12 hours in distilled water, solutions of $FeSO_4$ (0.5 M), $MnSO_4$ (0.5 M) and $ZnSO_4$ (0.5 M). The soaked seeds were then dried under shade for 12 hours before sowing. The system of layout was randomized complete block design with three replications and having plot size of 7 X 2.40 m^2. Yield parameters i.e. No. of primary branches/plant, No. of secondary branches/plant, plant height at maturity (m), No. of days for 50% flowering, percentage mature seeds, plant population at harvest, No. of pods/plant and 1000-grain weight were recorded during the course of study. All the data recorded were statistically analyzed by Fisher= s method of analysis of variance (Fisher, 1958). Duncan= s multiple range test was used to see the significance of the treatments (Leclerge *et al.*, 1962).

Results and Discussion

The data pertaining to number of primary branches per plant (Table 1) were found statistically significant and the effect of $ZnSO_4$ resulted in producing 11.60 number of primary branches per plant that were the maximum of other treatments. It was followed by $MnSO_4$, which produced an average of 10.43. Water soaking seed treatment though produced 9.77 number of primary branches per plant yet it was better than control. Control (un-soaked) occupied the bottom position by producing an average of 9.60 primary branches per plant.

Number of secondary branches per plant (Table 1) was statistically non-significant. All the micronutrients seed treatments ($FeSO_4$, $ZnSO_4$ and $MnSO_4$) increased the number of secondary branches as compared to control. The highest average numbers of secondary branches per plant (23.07) were observed in case of $ZnSO_4$, which was followed by water (22.93) $MnSO_4$ (21.83) and $FeSO_4$ (21.37).

Final plant height was significantly affected by seed treatments (Table 1). On an average $ZnSO_4$ occupied the top position by producing plant height of 2.96 m. Control (un-soaked) retained the bottom position showing an average plant height 2.32 m. Tallest plants produced by $ZnSO_4$ treatment indicate that momentum gained at emergence stage was maintained by this treatment. These results are supported by the findings of Bottini (1964), Djendov (1969), Martens *et al.* (1973), Trifu (1974), Dranichnikova (1977), Farah *et al.* (1980), Khan (1981) and Pakroo and Kashirad (1981). The seed treatment at time of flowering plays an important role in proper seed setting and ultimately seed yield production (Table 1). Zinc sulphate ($ZnSO_4$) completed 50 % of flowering in 52.67 days, which was earlier than other treatments. Water soaking treatment completed flowering in 57.00 days, which was shorts period over control. The shortest period of 50% flowering was obtained from $ZnSO_4$ treatment (52.67) days. The results of this variable was statistically significant. These results are not in accordance with the findings of Ignaeva (1969) that may be due to different crops.

As regards percentage of mature seeds, all the treatment remained non significant statistically. Seed treated with $ZnSO_4$ topped the list by producing

Table 1: Effect of seed treatments on various growth parameters

Treatments	No. of primary branches per plant	No. of secondary branches per plant	Plant height at maturity (m)	No of days for 50% flowering	%age of mature seeds	No of pods per plant	1000-grain weight (g)
T_1= control (unsoaked seed)	9.60b	19.43NS	2.32b	60.67ab	85.40N.S	555.09c	4.13b
T_2 = (unsoaked seed in distilled water)	9.77b	22.93	2.57ab	57.00ab	87.99	684.67b	4.63ab
T_3 = 0.5 M $FeSO_4$	10.23ab	21.37	2.64ab	67.00a	86.40	665.63bc	4.63ab
T_4 = 0.5 M $MnSO_4$	10.23ab	21.83	2.86ab	54.33ab	88.23ab	720.00ab	4.70ab
T_5 = 0.5 M $ZnSO_4$	11.60a	23.07	2.96a	52.67b	91.27	804.73a	4.80a

Any two means not sharing a common letter differ significantly at five per probability level. NS = Non significant

the highest seed maturity (91.27 %) followed by $MnSO_4$ and $FeSO_4$ producing seed maturity percentage 88.23 and 88.40 respectively. The lowest position was gained by control (un-soaked) and gave 85.40 percent seed maturity. As regards No. of pods/plant, $ZnSO_4$ treatment produced the highest number of 804.73 pods per plant. It was followed by $MnSO_4$, which produced 720.00 numbers of pods per plant. Control treatment occupied the bottom position by producing 555.09 pods per plant. These results are in accordance with those of reported by Kene (1976) and Samui *et al.* (1980). As regards 1000-grain wt. maximum weight was obtained by $ZnSO_4$ (4.80 g) treatment, which was followed by $MnSO_4$ (4.70 g). The 1000-grain weight of water soaked and $FeSO_4$ treatment was at par (4.63 g). Control occupied the bottom position in 1000-grain weight. Samui *et al.* (1980) reported that Zn increased 1000-grain weight of mustard. These results are in conformity with those of Ignaeva (1969), Kene (1976) and Farah *et al.* (1980). All the seed treatments i.e. soaking in water, $MnSO_4$ and $ZnSO_4$ proved beneficial except $FeSO_4$ treatment. $FeSO_4$ treatment showed bad results due to toxic effect on different parameters. Overall the effect of seed treatments with micronutrients on yield parameters is highly beneficial. Therefore pre-soaking seed treatment with micronutrients on Peela Raya may be applied to grow more yield parameters and reduce soil pollution due to effects of salts.

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