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Effect of Seed Pelleting with Micronutrients and Pesticides on Seed Yield of Radish cv. Pusa chetki (*Raphanus sativus* L.) *

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ABSTRACT

Field experiment was conducted to study the influence of seed pelleting on seed yield of radish cv. Pusa chetki during 2014-2015 at Agricultural Research Station, Kalloli, University of Agricultural Sciences, Dharwad. In the present study fresh seeds of radish were first pelleted with micronutrients like $ZnSO_4$ (@ 3 g/kg), $FeSO_4$ (@ 2 g/kg) Borax (@ 2 g/kg) and $ZnSO_4$ (@ 3 g/kg) + Borax (@ 2 g/kg) and pesticides like Imidacloprid (@ 2.5 ml/kg), Vitavaxpower (@ 2 g/kg) and control (unpelleted) along with a filler material (Talc powder @ 250 g/kg) and maida (Starch gruel @ 10 %) as a binding material. The maximum seed yield (11.73 q/ha) was recorded due to seed pelleting with the micronutrient $ZnSO_4$ @ 3 g/kg seed, which is 23.44 per cent more over $FeSO_4$ @ 2 g/kg seed. Similarly, maximum number of pods per plant (334.4) was registered due to seed pelleting with the micronutrient $ZnSO_4$ @ 3 g/kg seed over $FeSO_4$ @ 2 g/kg seed (301.2). The significantly higher seed yield per hectare were noticed due to seed pelleted with Imidachloprid @ 2.5 ml/kg seed (11.30 q) over control (8.94 q, respectively).

Key words *Micronutrients, Pesticides, Radish cv. Pusa chetki, Seed pelleting*

Radish *(Raphanus sativus* L.*)* is a member of the *Cruciferae* family, native to Europe or Asia. It is a cool season annual vegetable crop. It has been cultivated from thousands of years in both China and Mediterranean area. Radish is a good source of vitamin A, C (15-40 mg/100 g), calcium, magnesium, phosphorus and potassium including trace amount of other nutrients. Plant nutrients are important and crucial elements, which are required for the plant for its growth and development. The translocation of photosynthates from source to sink is very important for the development of economic part (Kernel or seed). Apart from major nutrients, micronutrients also play an important role in seed production. Their requirement is in less quantity but without their presence the plant cannot complete its life cycle.

Seed pelleting is a process of enclosing a seed in an inert material for precision sowing, but this also enables exogenous application of bioactive substances for improving endogenous level of the applied substances for added benefits in final outcome (Abdul Balki and Anderson, 1973). In case of micronutrients application as bioactive chemical, the requirement is lesser compared to soil application and the nutrients are available to the seed directly in a easier manner as each seed is enclosed with nutrients. In a field various insects will attack and cause the damage. Among these insects, the sucking insect pests are important. They are causing damage at early stage of the crop. Seed pelleting with Imidachloprid can easily control sucking pests upto 45 days effectively. The most significant diseases on radish are black rot (caused by *Aphanomyces raphani*), downy mildew (caused by *Peronospora parasitica*), white rust (caused by *Albugo candida*) and *Rhizoctonia* diseases such as damping off and wire stem. To minimize these pathogen activities the seeds are pelleted with Vitavaxpower fungicide. With this background the present investigation was undertaken to find out the effect of seed pelleting with micronutrients and pesticides on seed yield of radish cv. Pusa chetki.

MATERIAL AND METHODS

In the present investigation fresh seeds of radish were first pelleted with micronutrients like $ZnSO_4$ @ 3 g/kg seed $FeSO_4$ @ 2 g/kg seed Borax @ 2 g/kg seed and $ZnSO_4$ @ 3 g/kg seed + Borax @ 2 g/kg seed and pesticides like Imidachloprid @ 2.5 ml/kg seed, Vitavaxpower @ 2 g/kg seed and control (unpelleted) along with a filler material (Talc powder @ 250 g/kg seed), maida (Starch gruel @ 10 %) as a binding material and directly used for sowing. Five plants from each, treatment/ replication were selected at random and tagged for

Table 1. Effect of seed pelleting with micronutrients and pesticides on the number of pods per plant and seed yield/ha (q) of radish cv. Pusa chetki

Treatment	Number of pods/plant Pesticides (P)				Seed yield/ha (q) Pesticides (P)			
Micronutrients (M)	**P_1**	**P_2**	**P_3**	**Mean**	**P_1**	**P_2**	**P_3**	**Mean**
M_1	324.27	348.66	330.40	**334.44**	10.46	12.78	11.94	**11.73**
M_2	295.86	308.46	299.12	**301.15**	7.50	10.09	9.35	**8.98**
M_3	313.41	323.29	319.45	**318.72**	9.35	11.94	11.48	**10.93**
M_4	308.57	315.87	312.62	**312.35**	8.43	10.37	9.35	**9.38**
Mean	**310.53**	**324.07**	**315.40**		**8.94**	**11.30**	**10.53**	
	M	**P**	**M×P**		**M**	**P**	**M×P**	
S.Em±	4.09	3.54	7.09		0.14	0.12	1.9	
CD (p=0.05)	12.00	10.39	NS		0.40	0.34	NS	

NS: Non significant

Seed pelleting with micronutrients (M): Four

M_1- $ZnSO_4$ @ 3 g / kg of seed

M_2- $FeSO_4$ @ 2 g / kg of seed

M_3- Borax @ 2 g / kg of seed

M_4- M_1+ M_3

Seed pelleting with pesticides (P): Three

P_1- Control

P_2 -Imidachloprid @ 2.5 ml/kg of seed

P_3 - Vitavaxpower @ 2 g/kg of seed

recording observations of seed yield parameters. The data were statistically analysed by using randomized complete block design in factorial concept. The critical differences were calculated at 5 per cent level of probability wherever 'F' test was found significant.

RESULTS AND DISCUSSION

Yield parameters were also significantly influenced by seed pelleting with micronutrients. Seed pelleted with $ZnSO_4$ recorded significantly higher number of pods per plant (334.44) and seed yield per hectare (11.73 q) followed by Borax pelleted seeds. While $FeSO_4$ pelleted seeds recorded lower number of pod per plant (301.15) and seed yield per hectare (8.98 q) as shown in Table 1. Which might be due to zinc is regarded as component of a variety of enzymes which helps in protein synthesis and in the utilization of phosphorous and nitrogen metabolism. It is also known to enhance plant growth on account of its major role in increased auxin metabolism which has a pivotal role in metabolic activity of plant as well as seed formation as also evident in the present study. The findings are in line with Kostantinov *et al.* (1982); Sathyamoorthy and Vivekanandan (1990); Ramesh (1996) in carrot and Ahamed Raza (1997) in onion, Anon (1999); Srimathi *et al.* (2006) in tomato.

The increased in yield parameters noticed with $ZnSO_4$ pelleted seeds may be due to the better crop stand and activation of metabolic activities of the plant. Nutrients are constituents of several dehydrogenase enzymes that activates other enzymes and are also necessary for the biosynthesis of IAA, which is essential for normal enhancement of cells.

Yield parameters were also significantly influenced by seed pelleting with pesticides. Seed pelleted with Imidacloprid recorded significantly higher number of pods per plant (324.07) and seed yield per hectare (11.30 q) followed by Vitavaxpower pelleted seeds. While control unpelleted seeds recorded lower number of pod per plant (305.53) and seed yield per hectare (8.94 q) as shown in Table 1. The beneficial effect of these treatments may be due to availability of bio-nutrients in the pelleted seeds which could improve the growth that in turn resulting in higher plant height of the crop. Availability of Zinc and Boron to roots near seed soil interface, which could make it easily available. While, Vitavaxpower and Imidachloprid might have provided protection against seed and

soil borne pathogens and insect leading to reduced damage to seedling, foliage, branches, pods and to the seeds, respectively that helped in early vigorous growth of plants, that lead to early reproduction phase and resulted in higher yields. The similar findings were also observed by Manjunath *et al.* (2009) in chilli, Singh and Verma (1991) and Ramesh and Thirumurugan (2001)

The yield parameters did not differ significantly due to interaction effect of seed pelleting with micronutrients and pesticides. However, numerically higher results were recorded in the $ZnSO_4$ + Imidachloprid followed by $ZnSO_4$ + Vitavaxpower, Borax + Imidachloprid and Borax + Vitavaxpower and the lowest results were recorded in $FeSO_4$ + control as shown in Table 1. The increase in seed yield parameters might be due to enhanced seed vigour resulting in better crop stand and activation of metabolic activities of the seed on account of seed pelleting with different micronutrients and pesticides. Progressive increase in yield observed might be attributed to the cumulative favorable effect of sulphur in growth attributes, yield components and uptake of nutrients. Because of higher growth, chlorophyll content coupled with higher nutrient uptake, more assimilates might have been synthesized and translocated efficiently to the pods thereby increasing the seed yield. The role of sulphur is regulating the hormonal and nutritional balance of the plant resulting in more sink (pod and seed yield) would be the probable reason (Ananthi *et al.,* 2004). Similar results are also obtained by Manjunath *et al.* (2009) in paprika chilli.

In general, all the pelleting treatments improved the growth of plant during early stage of crop with vigorous and stronger root system enabling plants to derive the available soil moisture and nutrients which might have resulted in enhanced growth and seed yield.

The present investigation revealed that, seeds pelleted with $ZnSO_4$ @ 3 g/kg seed, Borax @ 2 g/kg seed and $ZnSO_4$ + Borax showed superiority in terms of yield parameters of radish.

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