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Effect of Organic Manures and Biofertilizers on Seed Quality of Radish (*Raphanus sativus* L.) under Temperate conditions of Kashmir

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ABSTRACT: Two field experiments were conducted at SKUAST- K, Shalimar during 2018-19 and 2019-2020 to evaluate the effect of organic manures and biofertilizers on test weight and germination potential of radish seeds produced from stecklings. The experiment was laid out in RCBD with ten different treatment combinations of FYM, vermicompost, vermiwash and biofertilizers with three replications. Plots without any fertilizer input were taken as control. Results indicated that all the treatment showed better performance over control. However, T8 (8 t ha^{-1} vermicompost + bio fertilizers @ 5kg ha^{-1}) recorded maximum test weight (13.71g), percent seed germination (94.51), seedling length (20.74cm), seedling fresh weight (0.285g), seedling dry weight (10.94mg), seedling vigour index –I (1961.4) and seedling vigour index-II (1.035). As such use of organic fertilizers and biofertilizers particularly vermicompost @ 8t.ha^{-1} + biofertilizers @ 5kg.ha^{-1} may be practiced for quality seed production of radish using root to seed method. The seeds developed under conventional farming are generally high fertilizer responsive hence lack the qualiy traits that are required for sustaining crop yields irrespective of the changing climatic patterns. The current study has been taken under investigation as the organic seed production could help out in infusing the desired quality traits in seed.

Keywords: Radish, bio-fertilizers, vermicompost, 1000 seed weight, seedling vigour.

INTRODUCTION

Radish (*Raphanus sativus* L.) is a small-sized Brassicaceae, grown for its tuberous root and is distinguished by its short growing period (Yuan *et al*., 2014). It offers a variety of shapes (round, oval, or elongated), sizes, colours (red, yellow, pink, or white), and flavours (Filgueira, 2008). Radish plants cannot grow in less fertile soils (Basha and El-Aila 2015). Nutrient management is crucial for preserving a greater yield and soil fertility among the many causes causing low radish output. It is well acknowledged that chemical fertilizers are being used more often to boost vegetable production, but over the long term, these practices have had negative effects on soil health, ecology, natural resources, living things, including beneficial soil microorganisms, and people. The increasing cost of chemical fertilizers and their negative effects on the land, ecology, and human health compelled farmers to switch to organic manures and bio-fertilizers, which provide soil fertility and sustainable crop production. Crop output is enhanced by the use of organic manures such FYM, vermicompost, and bio fertilizers. Since FYM is high in organic matter, it is frequently used as a supplemental fertilizer for crops. Vermicompost possesses all the necessary traits to be used as the most beneficial organic manure. Vermicompost is a slow-releasing organic manure that fulfills the longer-term nutritional needs of plants by providing the majority of macro and micronutrients in chelated form (Jat *et al*., 2017).

Organic seed is the planting material produced by a crop that is planted and raised organically for a minimum of one generation in the case of annual crops, and two generations in the case of biennial and perennial crops (Lammerts, 2002). Organic seed production includes the growing of seed crops by a collection of guidelines that prohibit the use of synthetic products/chemicals. The two primary biofertilizers, Azotobacter and PSB, are biologically active products containing bacteria that enhance the fertility and health of soil. They release vitamins and chemicals that promote growth, which might raise crop output. (Sharma *et al*., 2013). Poor quality seed has been indicated to be responsible for up to 40% decrease in crop production. However, limited availability of good quality certified seed is a major constraint in Indian agriculture. Out of the total seeds used by the Indian farmers only 30% are certified/ quality seeds, and the present production meets only 20% of the total demand. The lower availability is primarily due to lower production which is again due to the associated economic risk. Seed produced under organic environment could help out in infusing the desired quality traits. However, if seed production under conventional practice is compromised due to the associated economics, economic viability is naturally more difficult under organic production, which in turn significantly jacks up their market price.

Seed production of radish is practiced through root to seed or seed to seed method. In root to seed method selected plant are given the proper root and shoot cuts which have the significant effect on seed yield (Hamid *et al*., 2002). The use of high amount of fertilizers and pesticides decreases the food quality and soil fertility and results in degradation of cultivated land, water and air which threatens food safety and food security. In addition to contaminating the land and surface water, the increased use of chemicals in agriculture has also damaged the equilibrium between plant, soil and microbial communities (Bahadur *et al.,* 2006). Keeping the above facts in consideration the present investigation was performed to assess the effects of organic manures and bio-fertilizers on growth and seed yield attributes of radish.

MATERIALS AND METHODS

The experiment was performed in the years 2018-2019 and 2019-2020 at SKUAST-Kashmir, Shalimar, to assess the effects of bio-fertilizers and organic manures on seed yield and growth of radish cv. Chinese pink. Ten treatments were used in the randomised complete block design (RCBD) experiment, which was triple replicated. The treatments comprised of (i.) FYM @ 20t.ha^{-1} - T_1, (ii.) Vermicompost @ 8t.ha^{-1} - T_2, (iii.) FYM @10t.ha^{-1} + Vermicompost @ 4t.ha^{-1} - T_3, (iv.) FYM @ 20t.ha^{-1} + Vermiwash spray - T_4, (v.) Vermicompost @ 8t ha^{-1} + Vermiwash spray - T_5, (vi.) FYM @10t.ha^{-1} + Vermicompost @ 4t.ha^{-1} + Vermiwash spray - T_6, (vii.) FYM @20t.ha^{-1} + Biofertilizers @ 5kg.ha^{-1} - T_7, (viii.) Vermicompost @8t.ha^{-1} + Biofertilizers @ 5kg.ha^{-1} - T_8, (ix.) 50% FYM + 50% Vermicompost + Biofertilizers @ 5kg.ha^{-1} - T_9, (x.) Control (No inputs) - T_{10}. The true to type roots of radish variety Chinese Pink which were raised from seeds were selected and used as stecklings. These were prepared by trimming the tops and roots keeping 10 cm of the top with crown intact . The roots were transplanted on flat beds with a spacing of 60 × 45 cm between and within rows thus accommodating 20 stecklings/plot (5.4m^2). Stecklings were prepared from 45days old roots and transplanted in the evening hours. The organic manures (FYM and Vermicompost) and biofertilizers were added at the time of land preparation to the field of experiment. Vermiwash was given thrice as a foliar spray (prior to flowering, during flowering and 15 days prior to flowering). The observations on germination percent (equation 1), seedling length (cm), 1000 seed weight, seedling fresh weight (g) and seedling dry weight (mg) were recorded following the standard procedure. Additionally, the seedling vigour indexes I and II were measured using equations 2 and 3, respectively (Abdul-Baki and Anderson 1973). According to the ISTA protocol, 200 seeds from each treatment were used in the germination test, which was conducted with four replications each comprising 50 seeds (Anonymous, 1985). The test was carried out in petri dishes as well as by using the paper towel method at 25±2°C temperature. After 5 and 14 days, respectively, the first and final counts were taken.

Germination percent =

$$\frac{\text{Number of seeds germinated}}{\text{Total number of seeds kept for germination}} \times 100 \quad (1)$$

SVI-I = dry weight of 10 seedling (g) × germination (%) (2)

SVI-I = length of 10 seedlings (root+shoot) (cm) × germination (%) (3)

Data were analysed statistically using the analytical techniques described by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Data from Table 1 indicated that all treatments had significant effects on seed quality measures in both the years.. Among all the treatments the highest 1000 seed weight (13.71 g) was obtained with treatment T_8 (8 t ha^{-1} vermicompost + bio fertilizers @ 5kg ha^{-1}) followed by T_9 (FYM 10 t ha^{-1} + vermicompost @4 t ha^{-1} + biofertilizers) with 13.62g of 1000 seed weight where as minimum seed weight (12.31g) was recorded with treatment T_{10} (control *i.e.* no manure). The improved test weight under organic and biofertilizer treatments may be ascribed to better plant growth due to enhanced physical, chemical and biological attributes of soil resulting in improved nutrient uptake, root proliferation, and improved photosynthate synthesis. Lamo (2009); Mehta (2010) observed similar results in radish.

Significantly, the maximum germination % among all treatments of 94.51% was observed in treatment T_8 (8 t ha^{-1} vermicompost + bio fertilizers @ 5kg ha^{-1}) which was followed by T_9 (FYM 10 t ha^{-1} + vermicompost @4 t ha^{-1} + biofertilizers @ 5kg ha^{-1}) and T_7 (FYM @20 t ha^{-1} + biofertilizers @ 5kg ha^{-1}) with final germination of 93.05 and 91.71 percent, respectively. While as minimum germination percentage of 80.71 percent was recorded with control (T_{10}). Phosphate-solubilising microbes are beneficial in seed germination as well as in increasing radicle and plumule length as reported by Sharma *et al.* (2007). Like seed germination percent the maximum seedling length (20.74 cm) was also recorded highest under T_8 (8 t ha^{-1} vermicompost + bio fertilizers @ 5kg ha^{-1}) treatment followed by a seedling length of 20.12 cm in T_9 (FYM 10 t ha^{-1} + vermicompost @4 t ha^{-1} + biofertilizers @ 5kg ha^{-1} and T_7 (FYM @20 t ha^{-1} + biofertilizers @ 5kg ha^{-1}) with 18.83 cm of seedling length. Whereas, the minimum seedling length (13.26 cm) was recorded with the treatment T_{10} (control). The release of chemicals that promote growth may also be responsible for the biofertlizers enhancement of seedling development. Ponmurgan and Crop (2006) reported similar outcomes. Vermicompost's high nutrition and organic matter contents might possibly be responsible for the longer seedlings (Sarma and Gogoi 2015). Numerous researchers agreed with this conclusion (Arancon *et al.*, 2004; Atiyeh *et al*., 2002).

Data presented in Table 2 showed that, maximum fresh and dry weight of 0.285 g and 10.94 mg respectively, was recorded with treatment T_8 (8 t ha^{-1} vermicompost + bio fertilizers @ 5kg ha^{-1}) followed by T_9 (FYM 10 t ha^{-1} + vermicompost @4 t ha^{-1} + biofertilizers @ 5kg ha^{-1} with the fresh and dry weight of 0.275 g and 10.68 mg respectively in opposed to minimum fresh (0.122g) and dry weight (4.66 mg) observed in treatment T_{10}. More plant spread, photosynthetic area, and the availability of micronutrients may be responsible for the increase in fresh and dry matter content, which led to a greater accumulation of photosynthates in seeds. These findings are in agreement with those made by Kavitha *et al.* (2013); Sheikh *et al.* (2017); Ghoname and Shafeek (2005); Magkos *et al.* (2003). Significantly, treatment T_8 (8 t ha^{-1} vermicompost + biofertilizers @ 5kg ha-1) produced the highest seedling vigour index-I (1961.42), followed by treatment T_9 (FYM 10 t ha^{-1} + vermicompost @4 t ha^{-1} + biofertilizers @ 5kg ha^{-1}). While as minimum seedling vigour index-I (1070.99) was observed in control (T_{10}) which was followed by treatment $T_{1.}$ Similiarly, maximum seedling vigour index-II (1.035) was found with treatment T_8. In treatment T_{10}, the lowest seedling vigour index-I (0.377) was noted. Greater assimilatory surface, which was driven by photosynthetic activity, might be the cause of a plant's higher seed vigour index, as could improvements in all other variables (Karibasappa *et al.*, 2007). It may also be attributed to adequate availability of nutrients. It might have aided the radish plants in producing seeds that were bolder and heavier (Panwar *et al.*, 2000). Similar results were quoted by several scientists like Nascimento *et al.* (2008); Mbatha (2008). Haider *et al.* (2012); Monika *et al.* (2022) in carrot and Vamadeva *et al*. (2017) in tomato.

Table 1: **Effect of organic manures and biofertilizers on 1000 seed weight, germination percentage and seedling length on radish seed.**

Treatments	1000 seed weight (g)			Germination (%)			Seedling length (cm)		
	Year 1	Year 2	Pooled	Year 1	Year 2	Pooled	Year 1	Year 2	Pooled
T_1	13.07	13.04	13.05	87.32	85.19	86.25	14.85	13.78	14.31
T_2	13.16	13.12	13.14	90.17	88.03	89.10	16.35	15.68	15.78
T_3	13.11	13.06	13.08	88.39	86.29	87.34	16.27	15.85	16.10
T_4	13.32	13.31	13.31	92.12	89.10	90.61	18.20	17.17	17.69
T_5	13.65	13.59	13.62	94.19	90.30	92.23	20.48	18.67	19.58
T_6	13.36	13.34	13.35	93.32	89.70	91.51	19.34	17.56	18.45
T_7	13.36	13.34	13.35	92.25	91.17	91.71	18.59	18.08	18.83
T_8	13.72	13.70	13.71	95.57	93.45	94.51	21.26	20.23	20.74
T_9	13.61	13.64	13.62	94.15	91.91	93.05	20.11	19.96	20.12
T_{10}	12.27	12.35	12.31	81.85	79.56	80.71	13.77	12.75	13.26
C.D	0.17	0.16	0.16	0.21	0.38	0.097	0.19	0.27	0.076

T_1 – FYM @ 20t.ha^{-1}; T_2 – Vermicompost @ 8t.ha^{-1}; T_3 – FYM @10t.ha^{-1} + Vermicompost @ 4t.ha^{-1}; T_4 – FYM @ 20t.ha^{-1} + Vermiwash spray; T_5 – Vermicompost @ 8t ha^{-1} + Vermiwash spray; T_6 – FYM @10t.ha^{-1} + Vermicompost @ 4t.ha^{-1} + Vermiwash spray; T_7 – FYM @20t.ha^{-1} + Biofertilizers@ 5kg.ha^{-1}; T_8 – Vermicompost @8t.ha^{-1} + Biofertilizers @ 5kg.ha^{-1}; T_9 – 50% FYM + 50% Vermicompost + Biofertilizers @ 5kg.ha^{-1}; T_{10} – Control (No inputs).

Table 2: Effect of organic manures and biofertilizers on weight and vigour indices of seedling in radish.

Treatments	Seedling fresh weight (g)			Seedling dry weight (mg)			Seedling Vigour Index – I			Seedling Vigour Index – II		
	Year 1	Year 2	Pooled	Year 1	Year 2	Pooled	Year 1	Year 2	Pooled	Year 1	Year 2	Pooled
T_1	0.191	0.187	0.190	9.72	8.69	9.20	1296.8	1174..2	1235.5	0.849	0.740	0.794
T_2	0.229	0.222	0.242	10.04	9.02	9.53	1474.8	1388.7	1406.8	0.977	0.794	0.850
T_3	0.224	0.219	0.220	9.86	8.84	9.35	1437.9	1369.3	1406.9	0.872	0.763	0.817
T_4	0.242	0.237	0.232	10.59	9.57	10.09	1677.3	1530. 5	1603.9	0.978	0.855	0.915
T_5	0.285	0.280	0.283	11.20	9.81	10.50	1928.6	1686.0	1807.6	1.055	0.886	0.970
T_6	0.274	0.268	0.279	10.84	9.60	10.21	1805.3	1578.8	1689.5	1.012	0.861	0.935
T_7	0.263	0.256	0.248	10.62	10.15	10.38	1715.4	1714.0	1727.6	0.905	0.902	0.952
T_8	0.292	0.287	0.285	11.46	10.43	10.94	2032.5	1891.0	1961.4	1.095	0.974	1.035
T_9	0.284	0.277	0.275	11.18	10.19	10.68	1904.8	1837.1	1872.2	1.052	0.936	0.994
T_{10}	0.126	0.119	0.122	5.17	4.15	4.66	1127.5	1014.5	1071.0	0.423	0.330	0.377
C.D	0.001	0.002	0.054	0.10	0.11	0.031	21.08	24.64	6.35	0.011	0.08	0.030

T_1 – FYM @ 20t.ha^{-1}; T_2 – Vermicompost @ 8t.ha^{-1}; T_3 – FYM @10t.ha^{-1} + Vermicompost @ 4t.ha^{-1}; T_4 – FYM @ 20t.ha^{-1} + Vermiwash spray; T_5 – Vermicompost @ 8t ha^{-1} + Vermiwash spray; T_6 – FYM @10t.ha^{-1} + Vermicompost @ 4t.ha^{-1} + Vermiwash spray; T_7 – FYM @20t.ha^{-1} + Biofertilizers@ 5kg.ha^{-1}; T_8 – Vermicompost @8t.ha^{-1} + Biofertilizers @ 5kg.ha^{-1}; T_9 – 50% FYM + 50% Vermicompost + Biofertilizers @ 5kg.ha^{-1}; T_{10} – Control (No inputs).

CONCLUSION

Based on the aforementioned findings, it can be said that application of Vermicompost @8 t ha^{1} + Biofertilizers (*Azotobacter* + PSB+KSB*)* @ 5kg ha^{-1} and Vermicompost @4 t ha^{1} + FYM @10 t ha^{-1} + Biofertilizers (*Azotobacter* + PSB + KSB*)* @ 5kg ha^{-1} was significantly effective in improving the radish seed quality under temperate conditions of Kashmir.

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Conflict of Interest. None.

REFERENCES

Abdul-Baki, A. A. and Anderson, J. D. (1973). Vigour determination in soybean seed by multiple criteria. *Crop Science 13*, 630-633.

Anonymous (1985). International rules for seed testing. *Seed Science and Technology, 13,* 293-353

Arancon, N. Q., Edwards, C. A., Atiyeh, R. M. and Metzger, J. D. (2004). Effects of vermicomposts produced from food waste on green peppers. *Bioresource Technology* , 139-144.

Atiyeh, R. M., Lee, S., Edwards, C. A. and Arancon, N. (2002). The influence of humic acids derived from earthworm-processed organic wastes on plant growth. *Bioresource Technology, 84*(1), 7-14.

Bahadur, A., Singh, J., Singh, K. P., Upadhay, A. K. and Rai, M. (2006). Effect of organic amendments and biofertilizers on growth, yield and quality attributes of Chinese cabbage *(Brassica pekinensis)*. *Indian Journal of Agricultural Sciences, 76,* 596-608.

Basha, Dmra and El-Aila, Hi (2015). Response of foliar spraying with amino acids and integrated use of nitrogen fertilizer on radish (*Raphanus sativus*) plant. *International Journal of Chem Tech Research, 8*, 135-140.

Filgueira, Far (2008). New manual of olericulture: modern agrotechnology in production and marketing of vegetables. Viçosa: UFV. 421p.

Ghoname, A. and Shafeek, M. R. (2005). Growth and productivity of sweet pepper grown in plastic houses as affected by organic, mineral and biofertilizer. *Journal of Agronomy, 4*, 369-372.

Gomez, K. A. and Gomez, A. A. (1984). *Statistical Procedures for Agricultural Research*. 2nd Edition, John Wiley and Sons, New York pp. 680

Haidar, S. M. Z., Nannnan, M. N. and Hossain, M. M. (2012). Effect of organic manures on the seed production of carrot. *Bangladesh Journal of Crop Science*, 22-23:111-115.

Hamid, A., Shah, Z. A. and Asif, M. (2002). Seed yield performance of radish depending on steckling size under the sub-tropical condition of azad Kashmir. *Asian Journal of Plant Science*, *1*(6), 636-637.

Jat, P. K., Singh, S. P., Devi, S., Mahala, P. and Rolaniya, M. K. (2017). Performance of organic manures, inorganic fertilizer and plant density of yield and quality of radish. *Int. J Agric. Sci. Res.*, *7*(2), 261-266.

Karibasappa, M., Uppar, D. S., Chetti, M. B. and Hiremath, S. M. (2007). Influence of plant nutrition on biochemical traits and seed quality attributes in okra (*Abelmoschus esculentus* (L) Moench) genotypes. *Karnataka Journal of Agricultural Science, 20*(2), 249-251.

Kavitha, Sivagami and S. Ranjin (2013). Individual and combined effect of biofertilizer, chemical fertilizer and vermicompost on *Amaranthus tristis*. *International Journal of Pharmaceutical Sciences Review and Research, 20*(2), 190-195.

Lammerts, V. B. (2002). Organic plant breeding and propagation: concept and strategies. Ph.D. Thesis, *Wageningen University. The Netherlands*, 210.

Lamo, K. (2009). Effect of organic and biofertilizers on seed production of radish (*Raphanus sativus* L) .cv Chinese Pink. M. Sc. thesis, Dr. Y. S. Parmar University of Horti-culture and Forestry, Nauni, Solan, HP, India.

Magkos, F., Arvaniti, F. and Zampelas, A. (2003). Organic food: Nutritious food or food for thought? A review of evidence. *International journal of Food Science and Nutrition, 54,* 357-371.

Mbatha, A. N. (2008). Influence of organic fertilizers on the yield and quality of cabbage and carrots. M.Sc. Thesis submitted to University of the free state Bloemfontein, South Africa.

Mehta, K. S. (2010). Integrated nutrient management studies on growth, seed yield and quality of radish (*Raphanus sativus* L) cv Chinese Pink. M. Sc. thesis. Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, H.P., India.

Monika, Makhan Lal, V.P.S. Panghal and Amit Verma (2022). Effect of Manure and Bio-fertilizers on Seed yield and Seedling characteristics of Carrot Seed Crop Grown in Northern Plains of India. *Biological Forum – An International Journal*, *14*(1), 1661-1665.

Nascimento, W. M., Vieira, J. V., Rezende, F. V., Reis, A., Muniz, M. F. B. and Silva, F. N. (2008). Organic seed production of carrot in Brazil. In IV International Symposium on Seed, Transplant and Stand Establishment of Horticultural Crops, *Translating Seed and Seedling, 782*, 245-250.

Panwar, A. S., Raiyan, J. S. and Verma, V. S. (2000). Yield and quality of radish (*Raphanus sativus* L) seeds as affected by fertility levels and biofertilizers. *Indian Journal of Agronomy, 45*(4), 822-826.

Ponmurgan, P. and Crop, C. (2006). *In-vitro* production of growth regulators and phosphatase activity by phosphate solubilizing bacteria. *African Journal of Biotechnology, 5*(4), 348-350.

Sarma, B. and Gogoi, N. (2015). Germination and seedling growth of okra as influenced by organic amendments. *Journal of Cogent Food and Agriculture, 1*, 1

Sharma, D., Singh, R. K. and Parmar, A. S. (2013). Effect of doses of biofertilizers on the growth and production of cabbage (*Brassica Oleracea* L. Var. Capitata). *J Multidisciplinary Adv. Res., 2*(1), 30-33.

Sharma, K., Dak, G., Agrawal, A., Bhatnagar, M. and Sharma, R. (2007). Effect of phosphate solubilizing bacteria on germination of *Cicer arietimim* seeds and seedling growth. *Journal of Herbal Medicine and Toxicology 1*(1), 61-63

Sheikh, B. A., Jabeen, N., Afroza, B. and Makhdoomi, M. I. (2017). Influence of organic cultivation on growth, yield and quality of bell pepper *(Capsicum annum var. grossum). SKUAST Journal of Research*, *19*(2), 203-208.

Vamadeva Angadi, Prashant Kumar Rai and Bineeta M. Bara (2017). Effect of organic manures and biofertilizers on plant growth, seed yield and seedling characteristics in tomato (*Lycopersicon esculentum* Mill.) *Journal of Pharmacognosy and Phytochemistry, 6*(3), 807-810.

Yuan, Wl, Yuan, Sy, Wang, Qf; Gan, Cx, Liu, Yh and Mei, Sy (2014). Effect of different amount of N-fertilizers on growth, root yield and nitrate content of white radishes in southern China. *Journal of Food, Agriculture and Environment*, *12*, 302-304.

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