

Effect of oil cakes and bio- stimulants on growth and yield attributes in radish

D. ANBARASI^{1*} AND M. VENKATRAMAN²

¹Assistant Professor, Department of Horticulture, JSA college of Agriculture and Technology

Received: May, 2022; Revised accepted; August, 2022

Radish (*Raphanus sativus* L.) of Brassicaceae family is one of the most important root vegetable crops grown in both tropical and temperate regions. Radish is grown for its young tender fusiform root and it is rich source of Ca, K, P and Vitamin C. The edible roots can be used as raw as salad or cooked. It has refreshing and diuretic properties. It is also used for neurological head ache, sleeplessness and chronic diarrhoea. The roots are also useful in urinary complaints and piles. The radish leaves are good source for extraction of protein on a commercial scale production of good quality radish, optimum nutrition through organic, inorganic and bio fertilizers are essential for sustainable production. Organic agricultural practices rely upon recycling of crop residues, animal manure, farm organic residues and waste etc., (Khatri *et al.*, 2019). In view of changing trends for following high cost of synthetic fertilizers and its contribution to go for alternative and cheaper source like organic manures. Oil cakes and biostimulants are known supplement and promote the available nutrients for crop growth. So the present study was designed to investigate the study on effect of oil cakes and bio- stimulants on growth and yield attributes in radish.

The field experiment was conducted at JSA College of Agriculture and Technology, M. Podaiyur, Cuddalore during 2022. The experiment was set in a factorial randomized block design four levels of oil cakes including basal application of neem cake @ 3.5 tonnes ha⁻¹ (O₁), groundnut cake @ 4 tonnes ha⁻¹ (O₂), sesame cake @ 4 tonnes ha⁻¹ (O₃), control – FYM alone (O₄). Five levels of bio-stimulants comprising sea weed extract @ 3% (B₁), phosphobacteria @ 3% (B₂), effective microorganism @ 3% (B₃), vermiwash @ 3% (B₄), control (B₅). The radish seeds of Pusa Chetki were sown in rows at 30×15 cm spacing.

The organic manures like neem cake, groundnut cake, sesame cake were applied in quantities calculation of N equivalent basis. The field was well prepared, FYM, neem cake, groundnut cake, sesame cake were incorporated during at the time of ridge formation and also applied as top dressing on 20 and 30 DAS. Bio-stimulants of seaweed extract, phosphobacteria, effective microorganisms, vermiwash were sprayed twice during 20 and 30 DAS. The data were recorded on 5 plants/ treatment plot in each replication on growth and yield parameters. Observations were recorded on shoot length, number of leaves, root length, root weight, root diameter, root yield plot⁻¹. These parameters were recorded at harvest at 65 DAS. The observations recorded were statistically analysed (Panse and Sukhatme, 1989).

Among the different levels of oilcakes, O₁ excelled other treatments by recording the highest shoot length (29.00 cm), number of leaves (12.73), root length (21.19 cm), root diameter (31.59 cm), root weight (137.03 g) and yield plot⁻¹ (8.89 kg). The next best treatment was O₂. Foliar application of bio-stimulants also had significant influence on these attributes. Among the bio stimulants, effective microorganisms @ 3% (B₃), proved better recording reasonably higher values for shoot length (28.01 cm), number of leaves (12.12), root length (20.53 cm), root diameter (31.59 cm), root weight (128.10 g) and yield plot⁻¹ (8.67 kg). This was followed by B₄ and the next best treatment was B₁. The minimum was recorded in B₅ (Control). Combined application of oil cakes and bio-stimulants also showed significant differences for growth and yield parameters. Among the different combinations, the treatment O₁B₃ (FYM @ 25 t ha⁻¹ + Neem cake @ 3 t /ha + Effective microorganisms @ 3 % foliar spray) recorded the highest shoot length (37.66 cm),

Corresponding author: ¹Anbarasidevar@gmail.com

²Department of Horticulture, Annamalai University Tamil Nadu, India

Table 1: Effect of Oil cakes and Bio- stimulants on growth and yield of Radish

Treatments	Shoot Length (cm)	Number of leaves	Root length (cm)	Root diameter (cm)	Root weight (g)	Yield (Kg plot ⁻¹)
Oil cakes (O)						
O ₁	29.00	12.73	21.19	31.59	137.01	8.89
O ₂	26.26	9.89	18.73	29.49	119.74	8.09
O ₃	22.73	8.14	17.05	27.55	106.69	7.39
O ₄	14.20	5.33	13.04	21.09	65.26	5.01
S.Ed	0.28	0.23	0.19	0.10	1.20	0.11
CD (0.05)	0.57	0.46	0.39	0.22	2.44	0.22
Biostimulants (B)						
B ₁	22.58	8.04	17.05	27.14	107.64	7.38
B ₂	21.41	8.53	17.01	27.07	104.92	7.11
B ₃	28.01	12.12	20.53	30.58	128.10	8.67
B ₄	26.08	10.67	18.84	28.85	116.92	7.82
B ₅	17.16	5.75	14.08	23.51	78.29	5.74
S.Ed	0.31	0.25	0.21	0.12	1.35	0.12
CD(P=0.05)	0.64	0.52	0.44	0.24	2.73	0.25
Interaction between – O × B						
O ₁ B ₁	31.66	12.10	21.42	32.54	146.76	9.27
O ₁ B ₂	20.33	9.81	19.12	29.97	122.11	8.30
O ₁ B ₃	37.66	19.82	25.45	35.31	166.31	10.66
O ₁ B ₄	35.66	15.99	24.38	34.14	154.73	9.67
O ₁ B ₅	19.66	5.94	15.60	26.00	95.14	6.59
O ₂ B ₁	23.33	7.80	17.11	28.37	113.31	7.45
O ₂ B ₂	26.33	10.11	18.42	29.47	118.64	8.04
O ₂ B ₃	30.33	11.71	22.53	33.17	149.77	9.73
O ₂ B ₄	33.66	13.74	20.58	31.63	135.85	8.96
O ₂ B ₅	17.66	6.08	15.01	24.81	81.14	6.29
O ₃ B ₁	21.33	6.96	16.24	26.45	108.02	7.29
O ₃ B ₂	24.33	9.04	18.07	28.75	115.81	7.78
O ₃ B ₃	28.33	11.42	19.75	30.74	124.86	8.63
O ₃ B ₄	21.66	7.55	16.57	27.41	110.31	7.36
O ₃ B ₅	18.00	5.75	14.61	24.39	74.45	5.91
O ₄ B ₁	14.00	5.31	13.43	21.18	62.48	5.54
O ₄ B ₂	14.66	5.16	12.44	20.10	63.11	4.34
O ₄ B ₃	15.66	5.55	14.38	23.11	71.48	5.68
O ₄ B ₄	13.63	5.41	13.84	22.24	66.78	5.29
O ₄ B ₅	13.33	5.22	11.10	18.82	62.45	4.17
S.Ed	0.63	0.51	0.43	0.24	2.70	0.25
CD(P=0.05)	1.29	1.04	0.88	0.49	5.47	0.50

number of leaves (19.82), root length (25.45 cm), root diameter (35.31 cm), root weight (166.31g) and yield plant⁻¹ (10.66 kg) This was followed by O₁B₄. The minimum was observed in control. Increased shoot to root development in the neem cake treated plots were earlier reported (Eifidiyi *et al.*, 2013) in okra. The reason could be due to the application of Neem cake can help retain water for the soil and improve its porosity. Neem strengthens the organic content in the soil by reducing its alkalinity and producing organic acids on decomposition (Sumitra Ramachandran *et al.*, 2007). Being completely

natural, neem is compatible with soil microbes, nurtures healthy bacteria and ensures stronger texture, higher water holding capacity and aeration in the soil, all contributing towards better root development (Ajay Kumar *et al.*, 2009). Further, application of EM played an important role in production of growth enhancing compounds such as indole acetic acid and gibberellins which may have positively influenced the plant growth (Olle and Williams, 2013). Another reason might be due to enriched manure provided adequate supply of macro and micronutrients to the metabolic activities of

plants. Indirectly it increases the photosynthetic activities of plants and ultimately increased growth and physiological characters of plant. The findings are in agreement with (Subramani and Anburani, 2010) in radish.

Based on the present investigation, it can be concluded from the present study that organic manure for soil application and foliar application for biostimulants found to have beneficial effects growth and physiological parameters of radish var. Pusa Chetki.

REFERENCES

- Ajay kumar, Sunil Solonnon, Neetu Singh and Sanjeev Mukherjee. (2009). Organic margosa: An Agent of Biodynamic Agriculture. *World Environment and Applied Science Journal* **6**(3): 170-175.
- Eifediyi, E. K., Ahamefule H. E and Remison, S. U. (2013). Effects of neem seed cake on the growth and yield of okra (*abelmoschus esculentus* (l.) moench) in Ilorin, north central nigeria. *Journal of Tropical Agriculture, Food, Environment and Extension* **12** : 20 – 27.
- Khatri, K.B., Ojha, R.B., Pande, K. R. and Khanal, B.R. (2019). Effects of different sources of organic manures in growth and yield of radish (*Raphanus sativus* L.). *International Journal of Applied Science and Biotechnology*. **7** (1): 39-42.
- Olle, M. and Williams, I.H. (2013). Effective microorganisms and their influence on vegetable production – a review. *Journal of Horticultural Science and Biotechnology*. **88**(4):380-386.
- Panse, V. C. and Sukhatmae, P. V. (1978). Statistical methods for agricultural workers. Indian council of agricultural research, New Delhi. pp.58-60.
- Subramani, A. and Anburani, A. (2010). Response of growth parameters of radish to various organic nutrients and biostimulants. *The Asian Journal Horticulture* **5**:464-466.
- Sumitra Ramachandran, Sudheer Kumar Singh, Christian Larroche, Carlos Ricarelo Soccol and Ashok Pandey. (2007). Oil cakes and their Biotechnological application – A review *Bioresource technology*. **98**(10): 2000-2009.