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RESEARCH PAPER

Effect of nutrient management on growth parameters in knolkhol (*Brassica oleracea* var. gongylodes)

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Abstract : The present field experiment was carried out with Knolkhol cv. EARLY WHITE VIENNA in a Randomized Block Design with three replications at Department of Horticulture Faculty of Agriculture, Annamalai University during 2015. The experiment comprised of 10 different combinations of five different sources of nutrients including organic, inorganic and biofertilizers. The effect of different treatments were observed and noted that plants treated with 50% RDF + VC @ 5 t ha^{-1} + biofertilizers @ 2 kg ha^{-1} (T_3) registered maximum growth parameters *viz.*, plant height, number of leaves per plant, leaf length, leaf width, root length and number of secondary roots in knolkhol cv. EARLY WHITE VIENNA.

Key Words : Knol khol, Vermicompost, FYM, Biofertilizers

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INTRODUCTION

Knolkhol (*Brassica oleracea* var. gongylodes) also known as Khol *Rabi* or German turnip, is a member of the family Brassicaceae. It is known by other names in India, like Navalkol and Ganth Gobi. Knolkhol is a stout, round, tuberous vegetable .The fleshy edible portion is an enlargement of the stem, which develops entirely above ground and is used as a vegetable. It is characterized by the formation of knob (tuber) which arises from a thickening of the stem tissue above the cotyledons. The fleshy turnip - like enlargement of the stem develops entirely above the ground. This knob is harvested for human consumption as raw or cooked vegetable, though in some parts, young leaves are also used. The cultivation of knolkhol in India is done in almost all parts of the country in small pockets; with more area in Kashmir, West Bengal, Maharashtra, Assam, Uttar Pradesh, Karnataka and some parts of south India. Application of heavy doses of chemical fertilizers without organic manures has led to a significant reduction in soil fertility, development of nutrient imbalances and deficiencies, decline in soil microbial activities, reduction in soil humus or organic matter content and has also increased pollution of soil, water and air. Hence, considering economy, energy and environment it is imperative that plant nutrients are to be used effectively by adopting the integrated nutrient management system. The basic principle behind this concept is to supply both the chemical and organic fertilizers for a sustainable crop production in most efficient manner. The complementary use of chemical fertilizer, organic manures and biofertlizers has assumed importance to maintain as well

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as sustain a higher level of soil fertility and crop productivity.

MATERIAL AND METHODS

Field investigation was carried out during 2014-2016 to find out the effect of nutrient management in knolkhol to maximize the yield of knobs of Early White Vienna at the Orchard unit of the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamil Nadu. The experiment comprised of ten treatment combinations of organic, inorganic and biofertilizers *viz.*, 100 per cent recommended dose of fertilizer (60:100:60 kg NPK/ha)T_1- 100% RDF + 25t ha^{-1} FYM (Normal practice); T_2 - 75% RDF + 2.5 t ha^{-1} VC + bio fertilizer @ 2kg ha^{-1}, T_3 - 50% RDF + 5 t ha^{-1} VC + bio fertilizer @ 2kg ha^{-1} T_4- 75% RDF + 2.5 t ha^{-1} neem cake + bio fertilizer @2kg ha^{-1}; T_5 - 50% RDF + 5 t ha^{-1} neem cake + bio fertilizer @2kg ha^{-1}; T_6- 75% RDF + 2.5 t ha^{-1} groundnut cake + bio fertilizer @2kg ha^{-1}; T_7- 50% RDF + 5 t ha^{-1} groundnut cake + bio fertilizer @2kg ha^{-1}; T_8 - 75% RDF + 2.5 t ha^{-1} FYM + bio fertilizer @2kg ha^{-1}; T_9 - 50% RDF + 5t ha^{-1} FYM + bio fertilizer @2kg ha^{-1} and T_{10}- Absolute control. The experiment was laid out in Randomized Block Design and each treatment was replicated thrice. The various morphological observations, samples consisting of five plants were selected at random from each individual plot. For each sample, observations on various growth parameters were recorded at 15 days interval from 15 DAT.The observed data were statistically analysed adopting the formula suggested by Panse and Sukhatme (1978). For significant results, the critical difference was worked out at 5 per cent probability level.

RESULTS AND DISCUSSION

The data pertaining to the various observations on growth parameters in knolkhol have been shown in Table 1. The increase in plant height, number of leaves, leaf length, leaf width, leaf area, root length, number of secondary roots by the application 50% RDF + VC @ 5 t ha^{-1} + biofertilizers @ 2 kg ha^{-1}, might be due to the enhancement in nutrient quantity favoured by the addition of organic manures and also availability of more nitrogenous compounds to the plant from organic and inorganic sources together, which increases the foliage of the plant and thereby increases the photosynthesis.

Vermicompost might have improved the soil physical properties particularly soil porosity, structure, water holding capacity and would have supplied other plant growth promoting substances. The improvement in plant growth could also be due to large increases in soil microbial biomass after vermicompost application, leading to production of hormones or humates in the vermicompost acting as plant-growth regulators independent of nutrient supply. Therefore, the increase in plant height and number of leaves due to the application of vermicompost could be due to the presence of several plant growth promoters, enzymes, beneficial bacteria and mycorrhizae as stated by Gupta (2005). Similar findings were also reported by Narkhede *et al*. (2011) in pepper. Besides, the presence of greater amount of available form of nitrogen (nitrate) in vermicompost than in other conventionally composted manure has earlier been confirmed by Taleshi *et al*. (2011).

Application of vermicompost in combination with chemicals fertilizer also resulted in large leaf area. This is in line with the findings of Jeyabal and Kuppuswamy

Table 1 : Effect of nutrient management in growth parameters of knolkhol

Treatments	Plant height (cm)	Number of leaves	Leaf length (cm)	Leaf width (cm)	Leaf area (cm^2)	Primary root length (cm)
T_1	34.55	22.23	25.15	14.86	199.55	9.80
T_2	35.27	22.72	25.60	15.61	200.56	10.26
T_3	36.23	23.57	26.59	16.65	215.30	10.63
T_4	29.93	19.22	23.54	13.54	195.56	8.62
T_5	29.89	19.20	23.50	13.48	195.49	8.47
T_6	22.31	18.52	21.62	11.70	170.52	7.53
T_7	21.71	17.19	20.44	10.21	163.52	6.54
T_8	33.11	19.62	24.73	14.62	198.48	9.41
T_9	33.09	19.60	24.20	14.57	198.42	9.37
T_{10}	20.15	15.12	19.17	9.11	155.19	6.12
C.D. (P=0.05)	0.04	0.21	0.25	0.22	0.28	0.31

(2001). With a higher leaf area, plants become photosynthetically more active, which would have contributed to improved yield attributes. The better efficiency of organic manures might be due to the fact that the organic manures especially, vermicompost would have provided the micronutrients such as Zn, Cu, Fe and Mn in an optimum level. Application of organic manures thus, would have helped in the plant metabolic activity through the supply of such important micronutrients in the early vigorous growth. Similar results on increase in number of secondary roots due to vermicompost application were earlier reported by Azarmi *et al*. (2009) in cucumber.

Application of biofertilizers *viz.*, *Azospirillum* and Phosphobacteria have received considerable attention in the production of horticultural crops. *Azospirillum*, an associate nitrogen fixer, fixes atmospheric nitrogen on the root surface which is taken up by the plants, it secretes growth hormones, which enhances root development. These biofertilizers are ecologically sound, economically viable and partial substitutes for costly and pollution-causing chemical fertilizers. N-fixing bacteria increased the available N in the soil. Moreover, the role of N- free living bacteria in production of phytohormones and/or improving the availability and acquisition of nutrients or by both, encouraged growth of plants inoculated with these non-symbiotic N-fixing bacteria.

Furthermore, *Azospirillum* produce IAA and cytokinins which increase the surface area per unit root length and were responsible for root hair branching with an eventual increase in acquisition of nutrients from soil (Jain and Patriquin, 1985). In addition, many organic acids produced by rhizosphere micro-organisms are effective in solubilizing soil phosphates as reported by Marschner, (1995); Mishra *et al*. (2014) and Ashour (1998).

REFERENCES

Ashour, S.A. (1998). Influence of bio-fertilizers and phosphorus application on growth and yield of potato. *J. Agric. Sci. Mansoura Univ.,* **23**: 3351-3358.

Azarmi, R., Giglou, M.T. and Hajieghrari, B. (2009). The effect of sheep-manure vermicompost on quantitative and qualitative properties of cucumber (*Cucumis sativus* L.) grown in greenhouse. *Afr. J. Biotechnol.,* **8** (19) : 2147-2156.

Gupta, P.K. (2005). Vermicomposting for sustainable agriculture, AGROBIOS (India), Jodhapur, 210.

Jain, D.K. and Patriquin, D.G. (1985). Characterization of a substance produced by *Azospirillum* which causes branching of wheat root hairs. *Can. J. Microbiol.,* **31**: 206-210.

Jeyabal, A. and Kuppuswamy, G. (2001). Recycling of organic wastes for the production of vermicompost and its response in rice-legume cropping system and soil fertility. *Europ. J. Agron.,* **15**: 153-170 .

Marschner, H. (1995). *Mineral nutrition of higher plants*.2nd Ed. Acad. tress, Harcourt Brace and Co., Publishers, LONDON, UNITED KINGDOM.

Mishra, P.P., Das, A.K. and Mishra, N. (2014). Effect of integrated nutrient management on yield, quality and economics of knolkhol (*Brassica oleracea* L. cv. GONGYLODES). *Asian J. Hort.,* **9** (2) : 382-385.

Narkhede, S.D., Attarde, S. and Ingle, S. (2011). Study on effect of chemical fertilizer and vermicompost on growth of chilli pepper plant (*Capsicum annum*) *J. Appl. Sci. Environ. Sanitation,* **6** : 327-332.

Panse, V.G. and Sukhatme, P.V. (1978). *Statistical methods for agricultural workers*. ICAR Publ., NEW DELHI, INDIA.

Taleshi, K., Shokoh - Far, A., Rafee, M., Noormahamadi, G. and Sakineijhad, T. (2011). Effect of vermicompost and nitrogen levels on yield and yield component of safflower (*Carthamus tincctorius* L.) under late season drought stress. *Internat. J. Agron. Plant Prod.,* **2**(1) : 15-22.