Global Science Research Journals

Global Journal of Plant Breeding and Genetics

Extended Abstract Open Access

Integration of Chemical Fertilizers, Enriched Compost and Biofertilizers in Coriander (Coriandrum sativum L.)

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Abstract

To study the effect of integration of chemical fertilizers, enriched compost and biofertilizers on growth and yield of coriander (*Coriandrum sativum* L.), a field experiment was conducted on medium black calcareous clayey soil at Junagadh (Gujarat) during rabi season of 2017-18. The results revealed that application of enriched compost + recommended dose of fertilizers (RDF) + vesicular-arbuscular mycorrhizae (VAM) + Azotobacter + phosphate solubilizing bacteria (PSB) + potash mobilizing bacteria (KMB) significantly promoted growth parameters and yield attributes along with higher seed and stover yields.

India has been recognized the world over as the home of spices. Being a predominant export item, spices constitute an important group of horticultural commodities which plays a significant role in the national economy. India is the largest producer of coriander both in terms of area and production. Despite concerted efforts, productivity of this crop is almost stationary, which is a matter of great concern. Injudicious use of chemical fertilizers has hostile impact on soil, environment and human health. Application of biofertilizers such as *Azospirillum*, *Azotobacter*, *Rhizobium*, phosphate solubilizing bacteria (PSB), potash mobilizing bacteria (KMB), mycorrhizae *etc*. has led to a decrease in the use of chemical fertilizers and has provided high quality organic products free of harmful agrochemical residues for human safety.

In view of the facts highlighted above, a field experiment was carried out at Junagadh (Gujarat, India) in *Rabi* season of 2017-18 on a medium black clayey soil having low available nitrogen, medium available phosphorus and available potash. Ten treatments *viz*., T_1: RDF (60-60-40 kg N-P_2O_5-K_2O/ha, T_2: VAM soil application @ 0.25 kg/ha, T_3: *Azotobacter* + PSB + KMB soil application each @ 3 L/ha, T_4: RDF + VAM, T_5: VAM + *Azotobacter* + PSB + KMB, T_6: RDF + VAM + *Azotobacter* + PSB + KMB, T_7: 75% RDF + VAM + *Azotobacter* + PSB + KMB, T_8: 50% RDF + VAM + *Azotobacter* + PSB + KMB, T_9: Enriched compost @ 5 t/ha + VAM and T_{10}: Enriched compost @ 5 t/ha + RDF + VAM, were laid out in randomized block design with three replications.

The experimental results (Table 1) shown that treatment T_{10} (Enriched compost + RDF + VAM) had significantly the highest plant height, number of branches per plant and dry matter per plant, but it was found statistically at par with treatments T_9 (Enriched compost + VAM) and T_6 (RDF + VAM + *Azotobacter* + PSB + KMB) in case of plant height and number of branches per plant, and with treatments T_9 (Enriched compost + VAM), T_6 (RDF + VAM + *Azotobacter* + PSB + KMB) and T_4 (RDF + VAM) in case of dry matter. This might be due to adequate supply of N, P and K during the plant growth period through chemical fertilizers and improved physical, chemical and biological properties of soil with enriched compost. Microbial cultures enriched with compost and VAM might have increased the availability of nutrients in the rhizosphere. These results endorse the findings of Pandey *et al*. (2014) and Matama and Parvatam (2016).

Treatment T_{10} (Enriched compost + RDF + VAM) recorded significantly the most number of umbels per plant, number of umbellates per umbel, number of seeds per umbellate and test weight, which remained statistically equivalent to the treatments T_9 (Enriched compost + VAM), T_6 (RDF + VAM + *Azotobacter* + PSB + KMB) and T_4 (RDF + VAM) in case of number of umbels/plant, with the treatment T_9 (Enriched compost + VAM) in respect of umbellates/umbel and number of seeds per umbellate, and with the treatments T_9 (Enriched compost + VAM) and T_6 (RDF + VAM + *Azotobacter* + PSB + KMB) in respect of test weight.

Application of RDF + VAM + *Azotobacter* + PSB + KMB (T_6) produced significantly the highest seed yield, however it was found statistically at par with the treatments T_{10} (Enriched compost + RDF + VAM), T_1 (RDF), T_7 (75% RDF + VAM + *Azotobacter* + PSB + KMB) and T_4 (RDF + VAM). The magnitude of increase in seed yield with the treatments T_6, T_{10}, T_1, T_7 and T_4 was 34.14, 27.58, 22.55, 22.01 and 21.56 per cent, respectively over the treatment T_2 (VAM). The treatment T_{10} (Enriched compost + RDF + VAM) has given significantly the highest stover yield and it was found statistically at par with the treatments T_9 (Enriched compost + VAM), T_6 (RDF + VAM + *Azotobacter* + PSB + KMB), T_4 (RDF + VAM) and T_1 (RDF). The beneficial effects of enriched compost, inorganic fertilizer and biofertilizer application on yield and yield attributes seems to be due to better growth of plants in terms of dry matter accumulation owing to favourable soil physical, chemical and biological properties. Similar results in terms of yield attributes and yield to inorganic fertilizer, enriched compost and biofertilizers in coriander crop have been obtained by Kumar *et al.* (2016) and Datta *et al.* (2017).

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