EFFECT OF DIFFERENT ORGANIC FERTILIZERS ON SOIL PROPERTIES, GROWTH AND YIELD OF CORIANDER CROP (*Coriandrum sativum*)

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Abstract

Coriander (Coriander sativum) is a minor spice crop as well as medicinal plant belonging to the family Umbelliferae. A fertilizer is any cloth or natural or synthetic origin that is implemented to soils or to plant tissues to supply one or more vitamins essential to growth of vegetation. Organic fertilizer performs a vital position in nutrient availability without having undesirable effect at the environment. Use of compost has positive effects in term of progressed soil fertility. The present study was conducted with the objectives to study the influence of different organic fertilizers on growth and yield of coriander. The work was was conducted during 2018-2019 at Department of Environmental Science, KTHM College, Nashik. Results shows that vermicompost influenced the growth yield and quality attributes of coriander crop than the other organic fertilizer (FYM, Poultry manure, compost and vermicompost) and hence recommended for the better crop yield.

Keywords:- Organic Fertilisers, Growth , Yield, Coriander

Introduction

Coriander (Coriander sativum) is a minor spice crop as well as medicinal plant belonging to the family Umbelliferae. It might be first spice plant to be use by human beings. It's also referred to as dhania, chinese language parsley, American cilantro. It's far an annual herb and a cool season, short period crop. Its miles mainly cultivated for end result as well as for green leaves utilized in making ready salad, soups, chutney, seasoning, dressing of vegetables. They're additionally wealthy in diet A, C and B. India is the world's biggest manufacturer of coriander.

A fertilizer is any cloth or natural or synthetic origin that is implemented to soils or to plant tissues to supply one or more vitamins essential to growth of vegetation. Soil fertility and crop production increases via adding manure and fertilizer. Manure refers to the natural materials that are acquired from decomposition of the waste of plant and animals consisting of cow dung, urine, and so on.

Manure is natural fabric obtained through decaying plant and animal waste that could observe to the soil to enhance its fertility. It organized in discipline and gives humus to the soil, comparatively less wealthy in plant nutrients and slowly absorbed by using plant life. Organic manures are low-cost there may be no aspect results impact it improves the bodily residences of soil. Fertilizer is frequently artificial, prepared in factories it does not provide humus to the soil, fertilizer are rich in plant nutrients, it's miles costly. It causes damage to the living organism's gift within the soil.

The objectives of organic manufacturing mechanism are to helping and sustaining healthy ecosystems, soil, farmers, meals production and the economic system. Natural agriculture is gaining international attention to lessen and get rid of the unfavourable outcomes of synthetic fertilizers and pesticides on human health and environment. Organic fertilizers are surroundings pleasant for the reason that they're from organic sources.

The natural fertilizers offer nutritional requirements, suppress plant pest populations and growth the yield and high-quality of agricultural crops in approaches much like inorganic fertilizers. Organic depend is an important soil element influencing the physical, chemical and microbiological houses of soil to a super quantity. All bodily residences of soil are laid low with changes in organic be counted levels of soil. A natural fertilizer improves soil pH and boom micro- organism diversity and interest. Excessive utility of chemical fertilizers reduces plant performance due to soil physical functions and lack of micronutrients. Inorganic fertilizer stays on the floor of the soil after heavy rain ensuing in leaching. It adversely influences our surroundings from time to time badly impacts the health of individual.

Historically farm backyard manure is the handiest natural supply of manure carried out to coriander. Natural fertilizer inclusive of farm yard manure, hen manure, compost and vermi-compost are used. These are surroundings friendly evaluate to inorganic. Particularly fowl manure materials extra nitrogen and phosphorous to the plant as examine to different organic fertilizers. Organic fertilizer performs a vital position in nutrient availability without having undesirable effect at the environment. Use of compost has positive effects in term of progressed soil fertility.

Details of fertilizers:-

1) Farm Yard Manures:-

Farm Yard Manure (FYM) refers to the decomposed mixture of dung and urine of farm animals along with litter and left over material from roughages or fodder fed to the cattle. On an average well decomposed FYM contains 0.5% N, 0.2% P2O5 and 0.5% K2O.

2) Poultry Manure:-

The poultry manure is excreta of poultry birds. The excreta of birds ferment very quickly. On an average poultry manure contains 3.03% N, 2.635 P2O5 and 1.4% K2O.A

3) Compost:-

Compost is an organic matter that has been decomposed in a process called composting. This process recycles various organic materials.On an average the compost contains 0.8% N, 0.4% P, 0.4% K. Moisture up to 15-25%.

4) Vermicompost:-

Vermicompost is the product of the composting process using various species of worms, usually red wigglers, white worms and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials and vermicast. Vermicast is the end product of the breakdown of organic matter by earthworms. Vermicompost contains 0.51-1.6% N, 0.19-1.02% P and 0.15-0.73% of K.

5)Vermiwash:-

Vermiwash is a liquid that is collected after the passage of water through a column of worm action. Vermiwash is a clear and transparent, pale yellow coloured fluid. Vermiwash contains 0.005% N, 0.0025% P and 0.063% K

Development of technology is needed for fulfilment of plant nutrients through organic resources and their application in a balanced way for maintaining soil productivity. Organic farming proves many advantages for soil as well as it improves plant and human health. It also recycles and regenerate the waste into wealth and can wipe out the use of chemical in the form of fertilizers, pesticides or insecticides and help to build the

balanced sustainable model for eco-friendly environment. The application of organic fertilizers not only produced the highest and sustainable crop yield but also improves the soil fertility and productivity of land.

Soil is a mixture of organic matter, minerals, gases, liquids and organisms that together supports life. Soil is a medium for plant growth as a means of water storage and supply.

Details of Soil properties:-

1) **Soil pH:-**
   Soil pH is the measure of acidity or alkalinity of a soil. The pH scale goes to 0-14. The most acid soil is 0.0 and most alkaline soil is 14.0. The soil pH can affect plant growth in several ways. The soil may contain adequate nutrients yet plant health may be limited by an unfavourable pH level. Some plants will grow in a more acid soil and some at a more alkaline level.
2) **Soil EC:-**
   EC is the measure of total dissolved salts in a solution. EC is a meaningful indicator of water quality, soil salinity and fertilizer concentration. Therefore knowing EC levels can help plant production and more cost effective use of plant inputs and less shrinkage. The EC of soils varies depending on the amount of moisture held by soil particles. Sands have low conductivity; silt has a medium conductivity and clay have a high conductivity.
3) **Nitrogen :-**
   Soil nitrogen (N) exists in three general forms: Organic nitrogen compounds, ammonium ions and nitrate ions. The nitrogen is not directly available to plants, but some can be converted to available forms by microorganisms.
4) **Phosphorous:-**
   Phosphorous (P) is a vital component of ATP, the energy unit of plants. ATP forms during photosynthesis, thus phosphorous is essential for the general health and vigour of all plants. Phosphorous stimulates root development, increased stalk and stem strength, increased flower formation and seed production and improvement in crop quality.
5) **Potassium:-**
   Potassium (K) is an essential nutrient for plant growth. Soil can supply some K for crop production, but when the supply from soil isn't adequate a fertilizer program must supply the K. Potassium is associated with the movement of water, nutrients and carbohydrates in plant tissue. Potassium also helps regulate the opening and closing of the stomata, which regulates the exchange of water vapour, oxygen and carbon dioxide. If K is deficient or not supplied in adequate amounts, it stunts plant growth and reduces yield.
6) **Soil Moisture:-**
   Soil moisture is a measure of how wet and dry the soil is. Each plant species needs a different range of soil moisture in order to absorb water and nutrients efficiently and stabilize the plant. Soil moisture serves as a solvent and carrier of food nutrients for plant growth. The yield of a crop is more often determined by the amount of water available rather than the deficiency of other food nutrients. Soil water acts as a nutrient itself.

The present study was conducted with the objectives to study the influence of different organic fertilizers on growth and yield of coriander.

Thus keeping the influence of organic fertilizers with different composition on growth and yield of coriander and properties of soil.

Objectives:-

1) To collect and study different types of organic fertilizers.
2) To study effect of application of different ratio of organic fertilizer on crop production.

3) To study comparative analysis of different fertilizer on soil properties.

Material and Methods:-

Sources of Fertilizers:-

1) Farm Yard Manure

2) Poultry Manure

3) Compost

4) Vermicompost

5) Vermiwash

Material:-

1) Tray

2) Soil

3) Seeds of coriander

4) Weighing balance

5) Labels

6) Plastic bags

7) Scale etc.

Methods:-

The experiment entitled "Effects of different organic fertilizers on soil properties, growth and yield of coriander (*Coriandrum sativum*) was conducted during 2018-2019 at Department of Environmental Science, KTHM College, Nashik.

The experiment was laid out with single factor treatments. Different sources of organic fertilizers were used such as Farm yard manure, poultry manure, compost, vermicompost and vermiwash. Where poultry manure was applied to higher nitrogen content as compared to others. The seeds were sown at 5th February 2019. The trays were prepared one day before seed sowing. The experiment was conducted at the terrace. Organic fertilizers were applied to each tray according to the experimental design. The soil and organic fertilizers were mixed in proportion of 80:20 and 60:40 respectively for each fertilizer. There were two trays of each manure one in proportion of 80:20 and another of 60:40. A single tray consist approximately 2kg and 300gm of soil. Therefore for 80:20 proportions we took 1kg 84gm of soil and 0.46gm of fertilizer. And for 60:40 proportions we took 1kg 38gm of soil and 0.92 gm. of fertilizer.

The soil used for the experiment was medium black. The representative soil samples were collected from field. The soil samples were air dried and sieved through 2mm sieve. Then the soil sample used for experiment and for chemical analysis. The soil samples were analysed before fertilizer application to the soil. The soil analysis was carried out at NHRDF, Chitegaon, Nashik. The sieved soil is used for experiment.

The seeds were sown at a depth of 1-2 cm. the cultural practices such as thinning, weeding and irrigation were performed at their proper time. FYM, poultry manure, compost and vermicompost was applied during tray preparation. Whereas vermiwash was applied after sowing the seeds through irrigation water. Vermiwash was applied after seven days interval. The soil was analysed in order to study the nutritious status of soil such as nitrogen, phosphorous, potassium, organic content and pH of soil.

Experimental details:-

In the present experiment 5 fertilizer treatment with two combinations each considered. Details of experiment are given as below:-

1) No of fertilizer: - 5

2) No of combinations: - 2

3) No of total treatment: - 10

4) No of trays: - 10

5) No of plants per tray: - 70

6) Name of crop: - Coriander

7) Variety: - Krishna 333

8) Date of sowing: - 5th February 2019

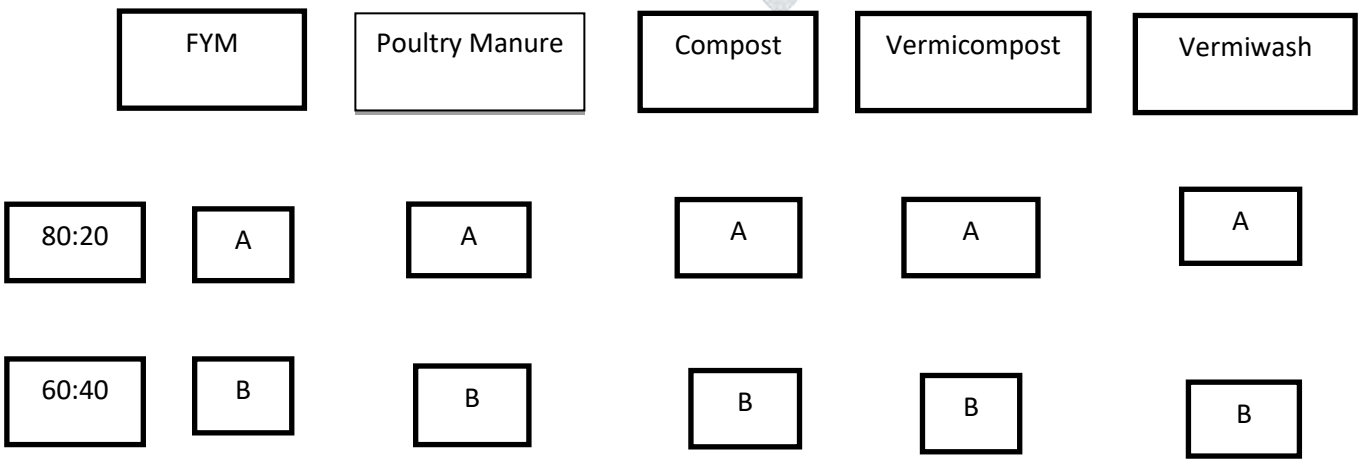
9) A is readings of: - 80:20 proportion

10) B is readings of: - 60:40 proportion

Layout of experiment:-

The experiment was two proportions. The plan of layout as per below.

Layout Plan



Observations to be recorded:-

The following observations were recorded on ten randomly selected plants from each treatments and proportion. Mean values of following observations were calculated.

1) Days to germination: - The data regarding days to germination is presented in above table.
2) Plant height: - Ten plants were selected randomly in the tray for recording the observations of this character. Plant height was measured from the ground level to the growing tip of the main branch.
3) Number of leaves: - This observation was recorded by counting the number of leaves in each plant. Then the average number of leaves per plant was calculated.
4) Soil analysis: - The soil is analysed two times before the fertilizer application and after harvesting of coriander. The difference of soil characteristics were recorded in it.

1)Effect of different fertilizers on plant height 45 days after sowing :-

1) Plant height 45 days after sowing (A- 80:20)

Name of fertilizer	FYM	Poultry Manure	Compost	Vermicompost	Vermiwash
Average height of plants	8.76	5.96	6.97	9.80	8.17

Table 1

2)Plant height 45 days after sowing (B -60:40)

Name of fertilizer	FYM	Poultry Manure	Compost	Vermicompost	Vermiwash
Average height of plant	5.64	-	4.96	5.82	6.15

Table 2

Effect of different fertilizers on number of leaves of plant:-

1) Number of leaves 45 days after sowing (A- 80:20)

Name of fertilizer	FYM	Poultry Manure	Compost	Vermicompost	Vermiwash
Average number of leaves of plant	6.8	5.5	5.7	8.3	6.6

Table 3

2) Number of leaves 45 days after sowing (B- 60:40)

Name of fertilizer	FYM	Poultry Manure	Compost	Vermicompost	Vermiwash
Average number of leaves of plant	5.5	-	4.7	5.2	5.9

Table 4

Soil nutrients before planting and after harvesting:-

1) Soil nutrients before planting and after harvesting (A- 80:20)

	pH	EC	OC (%)	N(kg/ha)	P(kg/ha)	K(kg/ha)	CaCO3 (%)	Moisture (%)
Before planting	7.43	1.12	1.17	609.2	147.16	1456.0	5.7	8.41
After harvesting								
FYM	7.65	2.54	4.44	1220.0	151.09	7168.0	8.9	16.09
Poultry manure	7.40	3.67	6.66	1841.8	174.83	10415.0	7.3	28.02
Compost	7.8	2.52	6.66	1841.8	170.7	3539.2	8.1	24.92
Vermicompost	7.24	3.81	6.66	1841.8	184.45	5936.0	6.7	24.51
Vermiwash	8.19	1.17	1.17	609.2	149.1	3584.0	75	20.53

Table No -5

2) Soil nutrients before planting and after harvesting (B- 60:40)

	pH	EC	OC (%)	N(kg/ha)	P(kg/ha)	K(kg/ha)	CaCO3 (%)	Moisture (%)
Before planting	7.43	1.12	1.17	609.2	147.16	1456.0	5.7	8.41
After harvesting								
FYM	7.76	1.33	2.22	598.6	135.39	4592.0	6.6	23.92
Poultry manure	7.33	4.37	8.88	2463	186.41	1360.0	8.9	4.41
Compost	7.83	3.06	6.66	1841.8	151.09	6272.0	9.0	15.94
Vermicompost	7.47	2.28	8.88	2463.0	178.56	6048.0	7.9	25.74
Vermiwash	7.99	1.64	1.28	670.8	156.97	2688.0	6.7	21.66

Table No- 6

Result and Discussion:-

The data on influence of various fertilizer doses on growth and yield were recorded and analysed in order to find out the impact of different treatment application.

1) Days to germination:-Data regarding days to germination is presented in table 2. Late germination occurs in poultry manure tray. The quick germination occurs in FYM and compost tray. In Vermicompost and vermiwash germination occurs 15 and 14 days after sowing respectively.

2) Plant height: - The plant height was significantly different in different fertilizer treatment. The maximum plant height was recorded in the 80:20 proportions in Vermicompost (A-9.8). The lowest plant height was recorded in the Poultry Manure (A-5.96). The maximum plant height was recorded in the 60:40 proportions in Vermiwash (B-6.15) and the lowest plant height was recorded in Poultry manure.

3) Number of leaves: - The organic fertilizer significantly affected number of leaves. The maximum number of leaves for 80:20 proportions was recorded in vermicompost (A-8.3) and lowest number of leaves was

recorded in poultry manure (A-5.5). The maximum number of leaves was recorded for 60:40 in Vermiwash (B-5.9) and minimum number of leaves was recorded in Poultry manure.

Organic fertilizer improves organic status and electrical conductivity of the soil that results good quality of the crop. Organic fertilizer increases soil aggregation, aeration and water holding capacity

Using sustainable and environmentally friendly organic materials can increase fertility without negative effect on human health and environment.

Conclusion:-

Use of organic fertilizers beneficially affected plant height, number of leaves, organic status, electrical conductivity of soil, water holding capacity of soil as well as yield and yield component of crop. The study illustrates that the vermicompost shows the best result on plant growth and height and number of leaves. For the determination of an appropriate ratio of organic fertilizer experiment may be repeated at different locations for proper analysis.

Based on above results it is concluded that the vermicompost influenced the growth yield and quality attributes of coriander crop than the other organic fertilizer (FYM, Poultry manure, compost and vermicompost) and hence recommended for the better crop yield.

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