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Impact Of Organic Fertilizers On Soil Fungi

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Introduction

Ecological agricultural practices aim to improve biodiversity, biocirculation and soil bioactivity in order to achieve optimal social, environmental and economically sustainable natural systems (Samman et al. 2008). Abuse of fertilizers and pesticides has a negative impact on the environment and causes many problems related to food safety, quality and human and animal health. Agricultural research facilities (Agricultural Research Facilities) confirm the principles of natural ecosystems that support new concepts such as alternative agriculture, sustainable agriculture, soil quality, integrated pest management, integrated nutritional management, and even beneficial microorganisms. It has been studied by the National Academy of Sciences, 1989; Reganold et al., 1990; Parr et al. 1992. Microorganisms in agriculture, as inoculum for legumes for biological nitrogen fixation, are organic to control insect and plant diseases, improve crop quality and yield, and reduce the amount of organic matter present. It is an important component of additives and compost. They are nutritionally heterotrophic. Therefore, most fertile and productive soils have a high content of organic matter and therefore a large population of very different microorganisms. When organic wastes and residues such as animal manure, crop residues, green manure and municipal waste are applied to the soil, many of the endemic populations of microorganisms act as biological control agents and are transmitted to the soil through competitiveness. Antagonistic when controlling or suppressing sex phytopathogens. Many studies have shown that organic farming is more likely to take into account biological concerns than traditional farming (Stolze et al., 2000). Every year, the soil used in agriculture is supplied with a large amount of organic substances that are easily decomposed as crop residues and animal excrement, which greatly affects the vibration of soil microorganisms.

Microorganisms are widely used in natural and organic farming due to their ability to eliminate problems associated with the use of fertilizers and pesticides. Organic additives such as urea, FYM and vermin-compost stimulate the growth and activity of soil microorganisms and then mineralize soil nutrients. Soil nutrients can be recycled using fertilizers from livestock and compost made from agricultural waste. Fertilizer management within crop rotations has a significant impact on yield and crop quality. The use of synthetic pesticides poses serious environmental problems and new, more environmentally friendly

organic and biological options are being valued to prevent and control phytopathogens. Therefore, this organic approach may be an effective solution if other chemical options are unsuccessful (Baniasadi et al., 2009). Compost can be used as a source of organic matter because it competes well for nutrients, antibiotic production, infestation with pathogens, and activation of disease resistance genes. By adding organic matter as fertilizer to soil treated with pesticides, the population of soil microorganisms can be restored, and by considering organic farming, the diseases of modern chemical farming can be reduced. Interactions such as mycorrhiza, legume nodules, and the production of antibacterial compounds that inhibit the growth of pathogens are beneficial to agriculture. The use of a wide variety oforganic soil amendments increases the diversity of microorganisms. The combination of various crop residues, animal manure, green manure and municipal waste that are regularly applied to the soil increases microbial diversity compared to applying just one of them. By protecting the soil microflora, you can improve the nutrient cycle that regulates the soil decomposition process.

Effect of nutrition on soil fertility:

In soil solutions, the major and micronutrients available to plants are the result of decomposition by organic matter. By manipulating the properties of the soil, you can maintain soil quality and plant productivity through organic farming. M.S. Clark et al. Published by 1998. Gaur et al. , 2002 states that organic and low input farming increased organic carbon, soluble phosphorus, exchangeable potassium and pH, and reserve pools of stored nutrients, maintaining relatively stable EC levels after 4 years. Organic farming improves organic matter content and nutrient instability, as well as soil physics and chemistry. In the Indian situation, using FYM and green manure maintains high levels of Zn, Fe, Cu and Mn in rice and wheat crop rotations.

The composting material adds a lot of carbon and increases heterotrophic bacteria and their activity in the soil. L. R. Bulluck et al., 2002 report that organic fertility changes improve beneficial soil microorganisms, reduce the number of pathogens, reduce total carbon and cation exchange capacities, reduce bulk density, and thereby improve soil quality.

Objectives:

Keeping in view the importance of organic fertilizers, present study was conducted with the following objectives.

- To determine the productivity of crops by the application of farm yard manure as fertilizer.
- To study the role of these organic manures in increasing the microbial population in the crop fields.

The advantages of using organic fertilizers for crop growth and soilfertility:

Fertilizers used in agriculture are classified into three types: chemical, organic and bio-fertilizer based on their production process. The advantages of organic fertilizers are:

1. Organic fertilizers help in maintaining balance nutrition, to keep plants healthy.
2. They enhance biological activity and improve root growth.
3. They improve nutrient mobilization from organic and chemical sources.
4. They help in decomposition of the toxic substances.

5. They enhance colonization of mycorrhizae, which improve P supply.
6. They increase organic content of the soil, which improves nutrient exchange capacity, increase soil water retention, promotes soil aggregates and buffer soil against acidity, alkalinity, salinity, pesticides and toxic metals.
7. They release nutrients and contribute to organic N and P in the soil and also supply micro-nutrients.
8. They supply food and enhance the growth of micro-organisms and earthworms etc,.
9. They suppress certain plant and soil-borne diseases and parasites.

These advantages need to be integrated in order to achieve optimum performance for crop growth by maintaining the soil fertility.

Some soils areusually dominated by antagonistic microorganismsthat produce profuseamounts of antibiotics, and therefore are disease-suppressive in nature. These includefungi of the genera Penicillium, Trichoderma,andAspergillus etc. The antibioticsproduced by these antagonistic mycoflorahave biostaticand biocidal effects on soil-borne plantpathogens, including Fusariumwhichwould have an incidence lesser than other fungi. Therefore crops planted insuch soils are rarely affected by diseases or insect pests.

Organic sources of plant nutrient:

Nutrient concentrations depend on the source, conditions, and storage location. The N, P, and K content of fresh FYM ranges from 0.01 to 1.9% on a dry weight basis due to the different fertilizer production and storage properties (A. Inoko, 1984 & Z. I. Zhu et al., 1984). H.L.S. Tandon, 1992, reported that well-rotted FYM contained an average of 0.5 percent N, 0.2 percent P2O5, and 0.5 percent K2O. A. C. Gaur, 1992 found that applying 25 tha-1 well-rotten FYM could add 112 kgN, 56 kg P2O5, and 112 kg K2Oha-1. Several researchers around the world have demonstrated various benefits of using FYM for soil properties and plant productivity (RT Prabhakar et al., 2010). Organic farming improves soil fertility and produces healthy plants in terms of energy and nutrient consumption. Fungi also serve as the basis for the plant's ability to survive transplant shock. Plants depend on each other's fungi because the survival of plants depends on how they function and vice versa.

Materials and Methods:

Freshly collected soil samples from the fields which were treated with pesticides were weighed in equal amount, and taken in separate large gunny bags, so that 25 Kg of soil can be filled. To each bag 5 kg of FYM was mixed separately. Moisture status of the amendment soil samples was maintained at 70% relative humidity. The bags were stored at room temperature and detailed analysis was made after 10 days of amendment. One of the bags with the soil samples to serve as control was without any amendment.

Fertiliser (kg/plot)	Source	Dose (tonnes/ha)	Dose Kg/bag
Farm Yard Manure (FYM)	Dried cow dung	5	5

Results:

A total of 227 colonies were isolated from the soil samples of all the crop soils treated with FYM (Table 67).From the soil sample of Rice crop a total of 86 colonies were obtained having a mean value of 7.81, which constituted to 37.8%. From the Sun flower soil samples 67 colony counts were obtained with a mean value of 6.09, which constituted to 29.51%. From the soil samples of Pigeon pea a total of 74 fungal colonies were obtained having a mean value of 6.72, which constituted to 32.59% frequency. Comparing the 3 crops no significant variation in the fungal population was observed. Nevertheless fungal population was comparatively higher in rice field soils followed by pigeon pea then the sun flower field soils.

Significant variation was observed in all 3 crop fields. Table 68non-significantly indicates the fungi isolated from samples treated with organic fertilizer (FYM) with p value 0.722001.The total count of soil fungi was found to be significantly higher than that in the soil treated with pesticides. Shannon's Index showed that rice field soil had a slightly higher species diversity value (3.20) than pigeon pea (3.07) and sun flower (3.01). Simpson's Index of dominance showed a higher value in sun flower (0.13) and lower value in rice field soils (0.11) indicating higher diversity in rice. The Dominance Index and the Equitability Index were higher in case on rice field soils with 0.887 and 0.926 respectively with higher species dominance and diversity. Berger-Parker Dominance Index was lowest in rice with 0.1977 which is highest in species evenness followed by sun flower 0.209 and ground nut 0.2297. Margalef's Richness Index and Mehinick's Index were higher in sun flower field soils with 2.378 and 1.344 respectively, followed by pigeon pea 2.323 and 1.279 and rice 2.245 and 1.186 respectively indicating the lowest value rice with highest richness Table 69.

Application of FYM generally increases the total N, P and exchangeable K contents, and also increases the pH, organic carbon and moisture gradually increasing the fungal population. From the 3 crop soils treated with FYM Aspergillusniger was predominant in the isolations (48 colonies) contributing to 21.14% followed equally by Penicilliumaurentiogriseum and P.chrysogenum with 23 colonies each accounting to 10.13% occurred second in the order of dominance of the total fungi isolated from Rice, Sun flower and Pigeon pea agricultural soils Table 67. The least obtained colonies were that of Trichodermaharzianum with 4 colonies contributing to only 1.76% followed by Fusariumsolani with 6 colonies contributing to 2.64%. After the application of pesticides there was a drastic fall in the fungal population to 103.73 which later has increased to 227 colonies by the application of FYM. Soil amended with FYM or an organic fertilizer not only suppresses the growth of population of pathogenic fungi but also stimulates the growth of antagonistic fungi. Hence the positive influence of FYM on the structure of soil fungal assemblages is noteworthy. FYM applied to the soil generally create favourable conditions for the development of antagonistic fungi, especially those that belonging to genus Aspergillus, Penicillium and Trichoderma thus increasing their population. Thus these fungi produce antibiotic and parasitic effects on the pathogenic fungi, therefore they can be used in bio-control of plant pathogens.

From the 1Lt pesticides treated soil samples only 103.73 fungal colonies were obtained, but the frequency has risen to double or triple after treating the soil with FYM. It is therefore evident that the FYM has a positive impact on harbouring favourable conditions for the development of fungal species. The number of fungal species among pesticides treated soils and FYM treated soils were 39.1 and 86 respectively in the soils of rice fields,

30.9 and 67 colonies respectively were obtained from the sun flower field soils and 33.73 and 74 fungal colonies respectively were isolated from the pigeon pea field soils. The application of farm yard manure remarkably increased the fungal population, when compared to that of population found when pesticides were used.

Discussion:

Fungi are known to derive their energy from living organic matter, not from photosynthesis. From the tip of the hyphae, it secretes complex biopolymers such as hydrolases, starch, cellulose, and lignin. Numerous studies have shown that microbial growth is clearly controlled by the content of available organic carbon. The increase in the total number of mycoflora in the soil may be due to the improvement of soil structure by increasing soil moisture retention capacity, aeration and drainage, which promotes better root growth and better nutrient absorption. According to Shinjiro Kanazawa, Susumu Asakawa, and YasuoTakai 1988, the number of mushrooms in the plot with chemical fertilizer (CF) and FYM + CF is much higher than in the plot without fertilizer (NF), and there is no difference in the number was CF- and FYM + CF plots. These results indicate that fertilizers and fertilizer applications affect the number of microorganisms in the sample. With the long-term use of fertilizers and FYM, the germ count increased compared to the NF plot, especially the FYM + CF plot. FYM incorporation affects soil properties, plant growth, and fungal populations and species. Microbial activity occurs faster when maximum organic matter and favorable conditions are available. Fungi are prone to decomposition and most often propagate to spoilage of organic waste. When applied to soil, organic fertilizers provide a readily available substrate for fungi, increasing the number of fungi there through the increase in Deuteromycotina species.

Melo&DeOliveira, 1999, the positive effect of organic fertilizers on plant growth and yield is due to the availability of essential minerals as well as the provision of materials that affect plant growth, such as auxins, amino acids and vitamins. It suggests that. Produced by their rot, it promotes plant growth. The effect of organic fertilizers on plant growth and soil fertility depends on the application rate. The amount of organic fertilizer applied depends on the estimated N demand of the crop and the N supply from the organic fertilizer, but not on the amount of RK Nagar et al., 2016. Fungal populations were severely affected by the application of crop residues, including organic fertilizers and phosphorus compost. The highest fungal population was recorded with FYM + phosphorylated compost. Hole et al., in (2005), changes in microbial biomass act as parameters that allow a clearer and faster response to the application of organic and inorganic fertilizers to soil, ultimately to its potential and effective fertility. According to the results of LekaMandic et al. In 2011, it was suggested that well-rotten farm fertilizers caused the largest increase in bacterial counts, potato yields and stem height. The results showed that the maximum increase in bacterial counts was due to the use of fertilizer on solid farms, similar to the results of this study. Solid fertilizers bring large amounts of beneficial microorganisms and phytohormones to the soil, increase the amount of organic matter, improve the water and air conditions of the soil, thereby strengthening the mineralization process, the number of soil microorganisms and enzymatic activity. (Mandal et al., 2007; Zhong et al., 2010). Fertilizers help improve soil production characteristics and maintain the ecological state of the soil. A national project on soil health and fertility management is a program initiated by the government in 2008-09 to

promote the balanced and prudent use of chemical fertilizers in combination with organic fertilizers, based on soil testing. In 2004, a national project, organic farming, was launched to promote the use of organic fertilizers.

Moisture plays a major role in the colonization of microorganisms. The beneficial effects of fertilizers on increasing fungal populations have been reported by many workers (Jadhaw et al., 1997; Gunapala and Scow, 1998; Marianari, 2000; Karmegan and Daniel, 2000; ICRISAT and APRLP, 2003), nutrient content supplied for this reason. Toyoto et al., 1999 experiments showed that fertilizer changes in farms have a significant impact on soil microbial community structure. LiinaEdesi et al. According to 2013, the results showed that ORGFYM (including cow dung) tended to have higher microbial soil biomass. The carbon (Cmic) and nitrogen (Nmic) of the microbial biomass were slightly higher with the ORG-FYM treatment. AlokBharadwaj et al., 2011 results showed that levels of organic carbon, organic matter, potassium, etc. in fertilizer additives increase with increasing dose. Similarly, thousands of fungal populations per gram of soil were 2.7 in natural undisturbed soil. In reclaimed soil, the population changed from 2.5 (10 m yard mist reclaimed soil) up to 3.1 (20 m yard mist reclaimed soil). According to Shaikh NF andGachande BD 2016, organic input in the field increased the population and yield of rhizosphere and non-rhizospheremycoflora compared to the inorganic input applied in the field. In organic areas, rhizosphere populations range from 36.8×10^3 to 51.2×10^3 CFU / g soil (201011), 38.4×10^3 to 52.0×10^3 CFU/g soil (201112), 43.6×103 to 54.3×10^3. CFU/soil 1g (201213).Manjunathas et al., 2009 economic results are best when applying farm fertilizer at a rate of 7.5 t ha1 using Jeevamruth compared to treating 100% recommended fertilizer amount (RDF) (Rs 25,475 ha1). Net income (Rs.27,384 ha^{1}) was shown. According to Sunflower (Helianthus annus L.)Visser and Parkinson 1992, there is a strong positive correlation between soil mycofloraand organic farm yields. This suggests that in organic fields, the higher the population of mycoflora in the soil, the higher the yield. It has been found that the addition of organic matter added to the soil gradually alters the structure of the microbial community, which improves the gradual improvement in soil quality and ultimately contributes to increased yields. Venkateswarlu (2000) and Sharma et al. from.(1983). Shaikh, N.F., Gachande B.D (2014). , Shown that the largest number of fungal populations was observed (4.6×10^3 CFU ml1).

Conclusion:

Organic farming can create more sustainable agriculture and the environment by improving soil quality, improving crop production and promoting the conservation and conservation of natural resources. Biologically mediated processes can improve crop growth, yield and quality. It also helps improve soil fertility, fertility and soil productivity. Increasing mycofloral populations in soil improves the availability of nutrients to crops and ultimately increases crop growth and yield. The main purpose of this study is to reduce the use of fertilizers and pesticides. The benefits of using organic fertilizers only appear when they are established, predominantly stable and active in the soil. Organic farming can provide high quality food without compromising soil health and the environment. However, it is necessary to identify plants / products for organic production that meet the requirements of the international market. However, choosing organic at the same time is not affordable, as it involves food and nutrition security efforts. In addition to green manure, it is important to use other organic fertilizers such as animal manure to support soil microbial activity and the

abundance of microbial indifferent microbial communities. Organic fertilizers, such as farm fertilizers, increase mycofloral populations and soil yields compared to inorganic fertilizers applied in the fields. Inorganic fertilizers adversely affect the population and yield of mycoflora. Therefore, it is clear that there is a positive correlation between fungal populations and yields in the organic field compared to the inorganic field. Research results suggest that organic fertilizers can be used to increase microbial and plant yields and achieve sustainable development of environmentally friendly fungal populations. This will facilitate the expansion and promotion of organic farming in the region. Plant nutrients, an important element of sustainable agriculture, are essential to crop production in order to provide healthy food to the ever-growing world population.

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