EFFICACY OF COTTON WASTE COMPOST AND FERTINEMAKIL FERTILIZER ON THE GROWTH PARAMETER OF SUNFLOWER PLANTS

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ABSTRACT:- The efficacy of cotton waste compost alone and in combination with Fertinemakil fertilizer on sunflower crop was tested in the field of PCSIR Laboratories Complex Karachi, Pakistan. Individually all the treatment showed maximum plant growth character in terms of plant height, number of flowers, diameter of flowers, 1000 grains weight and oil contents. The highest significant improvement in plant growth characters were recorded in plots treated with cotton waste compost and cotton waste compost+ Fertinemakil fertilizer. The Fertinemakil alone showed less significant effect but it is a good source of organic fertilizer.

Key Words: Sunflower; Cotton Waste; Fertinemakil Fertilizer; Growth Parameter; Oil Content; Pakistan.

INTRODUCTION

The uses of organic wastes has emerged as a non hazardous and cost effective source of fertilizer around the world. Composting of organic wastes is a cost effective and environment friendly way of waste recycling (Hoitink and Fehy, 1986; Millner et al., 1998). Organic amendments are generally used for the improvement of crop, plant and increasing agricultural productivity. There are reports where organic amendments of soil enhance the activity of bio control agent in the suppression of plant pathogen (Cook, 1977). The organic matter in various forms and at various stages of decomposition can be used in soil for improvement of crop productivity (Terrance et al., 2004). Organic waste material are available in huge amount as farm and industrial waste such as sugar, cotton, food and rice industry (Lal, 2005; Kolay, 2000). Composted organic waste materials are regarded for their effectiveness to enhance crop yields compared to un composted material due to improvement in soil physical, chemical and biological properties and reduced mineralization rate (Ahmed et al., 2006).The organic manure and compost are important in sustainable farming by providing plant N - supply (Karasacth et al., 2002). In composting organic material biologically converts in to humus like substance which may be stored and applied without any environmental impact (Gallardo-Harva and Nogales,1997).

Cotton waste alone will adequately compost, but the addition of manure will increase the temperature (greater bulk density, greater water holding capacity), and the nutrient content (N, P, K and Ca) of the compost. Composting of cotton waste not only maintains farm hygiene, but

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provides an organic carbon resource rich in humus and other biologically stable carbon fractions to improve the fertility and structure of soil. Cotton waste, converted into compost with 76% yield rich in organic matter, was chemically compared with cow dung and posses 1.18%, 0.527% and 1.1% more nitrogen, phosphorous and potassium respectively (Naseem et al., 1988). It is reported that yield of Petra hydride increased 25% when by cow dung and garbage compost applied to soil (Naseem et al., 1987).

Sunflower is the important oilseed crop of Pakistan and used as a test crop because it can be grown throughout the year. The most important factor for maximizing the yield is good fertilizer that had increased sunflower growth substantially.

Pakistan is an agricultural country but is deficient and to fulfill its edible oil requirement; 2.78 mt of the oil is imported annually. Due to high price of edible oil thousands of tons of used oil is imported from gulf countries which is used after recycling in Pakistan. Sunflower being drought resistant is cultivated in Pakistan both as *rabi* and *kharif* crop.

If proper organic manure for sunflower crop is developed the farmer will also choose this valuable crop instead of cotton which is a cash crop of Pakistan.

MATERIALS AND METHOD

The experiment was carried out in randomized block design at experimental field of PCSIR Laboratories Complex Karachi, Pakistan. Three replications were maintained for each treatment. The sandy loamy soil was used, tilled thrice within two weeks before applying the treatment so as to facilitate the release of any residue left from prior experiment. The soil was irrigated on alternate days and weeds were regularly removed during experiment. The field was plotted with a plot size of 12m x 14m for all the replication.

The different treatments included cotton waste compost (T_1), Fertinemakil fertilizer (T_2) and combination of cotton waste compost and Fertinemakil fertilizer (T_3) @ 1 kg per plot applied prior to sowing of seed. The untreated crop served as control (T_4).

Cotton waste used in the experiment is the residue obtained from the cotton seeds after extracting oil and obtained from cotton industry, it contains essential plant nutrients and composted by conventional method of composting so that the rural population can prepare easily. All the material used in composting are organic material, including nitrogen (2.5%) phosphorus (92%) and potassium (1.4%).

Fertinemakil is a product of PCSIR Laboratories Complex Karachi, Pakistan. It is an organic fertilizer prepared from neem seeds rich in sulfur compound in addition to its intrinsic NPK values bitter terpeniods, a natural nitrification inhibitor.

Sunflower seeds were procured from local market and 20-25 seeds were sown on each plot in August 2008. The crop was harvested in November 2008. The temperature at the time of sowing varied from 25° to 30°C and irrigated as and when required. The different growth characters recorded were plant height, number of flowers per plot, diameter of flower and percent oil content was determined by using AOAC method. The data were subjected to an

analysis of variance with significant difference and mean identified by Duncan Multiple Range Tests.

RESULTS AND DISCUSSION

The results of experiments conducted during August – November, 2010 indicated that all the growth parameters increased after treatments (Table 1). Both treatments viz., cotton waste compost (T_1) and Fertinemakil fertilizer combination with cotton waste compost (T_3) increased the plant growth parameter as compared to control. Greater plant height was observed in cotton waste compost application followed by the Fertinemakil fertilizer. Cotton waste compost significantly increased the number of flowers as compared to combination of cotton waste compost and fertinemakil fertilizer whereas plant height, number of flowers plot significantly increased in cotton waste compost. Maximum 1000 grain weight was observed in compost followed by compost + Fertinemakil. The cotton waste compost is better fertilizer than locally available cow dung manure and chemical fertilizer if applied in proper dosages in combination with cow dung manure 1:1 and result in a significant improvement in yield of crop (Khatib et al., 1988). Although the diameter of flowers was significant in all three treatments, there was a considerable variation in oil content in all treatments (Table 1). Greater oil content was observed in Fertinemakil fertilizer + cotton waste compost (T_3) as compared to other treatments.

The result obtained from the cotton waste compost revealed that it has a positive effect on both growth and yield of sunflower compared to other treatments. Cotton waste compost can be used as a replacement of chemical fertilizer because it does not affect the soil condition and also reduce pollution while Fertinemakil fertilizer improve soil fertility and decreases soil pathogens. Melo and de-Oliverira (1999) reported that positive effect of organic manure on plants growth and yield were not only due to availability of essential minerals but also due to provision of plant growth influencing material such as auxin, amino acid and vitamins produced by their decay which promotes the plant growth.

The use of cotton waste will not only solve the problem of disposal of agricultural waste but also will open

Table 1. Effect of different fertilizers treatments on growth parameter of sunflower

S. No.	Treatment	Plant height (cm)	No. of flowers plot^{-1}	Diameter of flower	1000 grains weight	Oil content (%)
1.	Cotton waste compost (T_1)	168.95 ± 2.87	33.0 ± 1.89	19.3 ± 2.71	69.85 ± 0.53	27.660
2.	Fertinemakil fertilizer (T_2)	110.40 ± 1.49	20.0 ± 0.89	19.2 ± 2.78	61.64 ± 1.52	30.170
3.	Fertinemakil fertilizer + cotton waste compost (T^3)	104.00 ± 9.30	13.6 ± 3.90	17.4 ± 1.49	67.38 ± 2.72	25.293
4.	Control (T_4)	82.73 ± 1.60	7.2 ± 1.07	10.5 ± 0.92	38.00 ± 2.20	9.472

area of earning for rural population and eventually will uplift their socio economic condition. The use of organic material will increase the organic content of soil. Besides, chemical fertilizer are imported or locally manufactured by utilizing our foreign exchange. The sunflower crop in Pakistan is not widely cultivated because season of cultivation of sunflower and cotton is the same. By using cotton waste if the production of sunflower seeds is enhanced, the farmer will attract towards this crop, which is also one of the edible oil producing crop. The price of edible oil is increasing day by day and edible oil is imported on large scale so the production of edible oil locally will not only ease our poor people but will reduce the prices of edible oil in the market.

LITERATURE CITED

Ahmed, R., A. Khalid, M. Arshad, Z. A. Zahir, and M. Naveed. 2006. Effect of raw (un- composted) and composted organic waste material on growth and yield of maize (*Zea mays*. L.). Soil and Environ. 25(2):135-142.

Cook, R.J. 1977. Management of the associated micro biota. In. J.G. Horsfall, and E.B. Cowling (eds.). Plant Diseases, Vol.1. Academic Press, New York. p.145-160.

Gallardo - Lara, E. and Nogales, R. 1987. Effects of town refuse compost on the soil plant system: A review. Biol. Wastes, 19:35-62.

Hoitink, H.A.J., and P.C. Fehy. 1986. Basis for the control of soil born plant pathogens with compost. Ann. Rev. Phytopathol. 24:39-114.

Karasacth, A., T.M. Hennicsen, and L.R. Bakken. 2002. Temporal changes in mineralization and immobilization of N during degradation of plant material: implication for the plant N supply and nitrogen losses. Soil. Biol. Biochem. 34:789-799.

Khatib, R., F.R. Malik, T. Abbas, N.F. Usmani, and S.S. Hussain. 1988. On the effect of cotton waste compost, zarkhez and cow dung manure on sunflower yield. Pakistan J. Sci. Ind. Res. 31(7):512-515.

Kolay, A.K. 2000. Basic concept of soil science.2nd edition. New age international publication, New Delhi, 256.

Lal, R. 2005. World crop residues production and implication of its use as a bio-fuel. Environ. Intl. 31:575-584.

Melo, J. P.L. and de-Oliveira, A. P. 1999. Garlic production as a function of different water levels and bovine manure in soil. Horti-ultura, Grasilerira, 17:11-15.

Millner, P.D., L.J. Sikora, D.D. Kamfman, and M.E. Simpson. 1998. Agriculture uses of bio solids and other recycleable municipal residues.In: Agricultural Uses of Municipal, Animal and Industrial byproducts. p. 9-44.

Naseem. F.U., R. Khatib, and S.S. Hussain. 1987. Studies on bioconversion. Part III. Conversion of domestic garbage into compost using three different techniques. A comparative study. Pakistan J. Sci. Ind. Res. 30:(10): 772-776.

Naseem. F. U., R. Khatib, F.R. Malik, and S.S. Hussain. 1988. Studies on bioconversion. Part V. Conversion of cotton waste into

compost. Pakistan J. Sci. Ind. Res. 31(10):740-742.

Terrance, D.L., M. Liebman, C.A. Cambardella and T.L. Richard. 2004. Corn response to composting and time of application of solid swine manure. Agron. J. 96(1):214-233.