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Effect of Bio-Manures on Green Forage Yield of Oat in Irrigated Conditions

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ABSTRACT
A field experiment was carried out during winter season of 2008-09 and 2009-10 to study the effect of nutrient management by using value added bio-manures in Oat crop in sandy loam soil at Fodder Farms of Indian Veterinary Research Institute, Bareilly, U.P., India. Result indicated that application of vermi bio-manure @ 10t/ha(T_2) produced maximum oat green fodder yield 390.5 q/ha over the control (T_1) 270.8q/ha, followed by vermi ; NADEP 50 : 50 (T_7) yield 374.6q/ha, followed by FYM : NADEP 50 : 50 yield 365.7q/ha (T6) , followed by Vermi : FYM : 50 :50 (T_5) produced yield 348.6q/ha green fodder yield of Oat. Application of FYM 10t/ha produced green fodder yield 311.7q/ha and lowest by application of bio-fertilizers (T8) produced 300.6 q/ha green forage yield of oat. The dry matter yield was also in the similar trend. This trials was conducted under collaborative Research project-Recycling of animal and farm waste and application of their value added products in sustainable crop production and animal husbandry. The results indicate that application of vermi-compost @ 10t/ha is suitable for recommendation of manures under organic fodder production. The trial was conducted in sandy loam soils in irrigated conditions of Bareilly district of western Uttar Pradesh. The author is PI of the sub project under which trial was conducted.
Keywords : *Organic manures, Fodder, Yield, Dry matter, Bio-fertilizer*

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INTRODUCTION

Although, chemical fertilizer are playing a crucial role to meet the nutrients need of the crop. The imbalance and continuous use of chemical fertilizers has adverse effect on soil physical, chemical and biological properties thus affecting the sustainability of crop production, besides causing environmental pollution. The increased dependence on agro-chemicals including fertilizers has led to several ill effects on the environment. In the process of finding an alternative to chemical agriculture, the organic farming is gaining a gradual momentum. Organic farming seems to be more appropriate because it considers the important aspects like sustainability of natural resources and environment. Organic agriculture is healthier not only to human and animals but also to environment, because they are produced without the use of synthetic inputs such as chemical fertilizers, pesticides and hormones [3]. Of late, there is a growing awareness among the farmers to cultivate crop under organic farming system because of escalating cost of chemical fertilizers, decreased soil fertility in respective of organic matter, secondary and micro nutrients, environmental and health concerned due to pesticides usage and expected premium prices for the organically produced crops. One of the important aspects in organic farming that needs attention is the soil fertility management to optimize the productivity of crops/cropping systems. The use of manures from live stock is an important way of recycling or out turning nutrients to the soil. Organic manures influence soil productivity through their effect on soil physical chemical biological properties. The management of

manures within a crop rotation can have large effects on fields and crop quality. Generation of information regarding the influence of organic management practices on cropping systems productivity soil fertility and economics is important to the farmers and community of large [7].

The value added bio manures through improved indigenous technical knowledge management : vermin bio manure, farm yard manure and NADEP compost were prepared from live stock dung and farm wastes at IVRI, Izatnagar. These bio manures were applied in forage production to study there performance individually.

Hence, an experiment was conducted with two objectives. The objectives were : (1) To evaluate different bio-manures as source of nutrients in relation to fodder productivity and quality [2] To study the change in nutrients status of soil as influenced by different bio-manures.

MATERIAL AND METHODS

The following details are given as under:

Technical Programme (2009-10) was implemented and two trials were conducted.

Experiment 1 : Rabi : Berseem Kharif –Sorghum + Cowpea forage crop were grown.

Experiment 2 : Rabi : Oat Kharif : Maize + Cowpea forage crop were shown

Treatments = 8 Replication : 4, Plot Size : 5 x 4m^2, Design : R B D was followed.

T1 : Control, T2 : Vermicompost (10t/ha), T3 : NADEP (10t/ha), T4 : FYM (10t/ha), T5 : Vermi-Compost : FYM (50 : 50), T6 : FYM : NADEP (50: 50), T7 : Vermi-Compost : NADEP (50 : 50), T8 : Bio-Fertilizer. The above experiment was conducted at ICAR-IVRI Fodder form to evaluate the above technical programme.

RESULTS AND DISCUSSION

Organic Manures : On an average organic manure treatment recorded better yield. Since the nutrient release from organic source is slow, the crop which required higher rate of nitrogen application like oat. Organic manures responded better to Berseem than oat especially in the initial year. Organic nitrogen applied as farm yard manures is slowly available over a long period compared to vermin compost. This often limits plant growth due to mismatch between crop nutrient demand and nutrient supply from organic source especially during initial phase of conversion from conventional to organic management system. The reduction in total productivity under organic manure was 5.8% in the first year 4.8% in the second year when compared to conventional crop production.

Among the means available to achieve sustainability in agricultural production, organic manures and bio-fertilizers play an important and key role because they exert beneficial effect on the soil physical, chemical and biological properties of soil for sustenance of soil quality and future agricultural productivity [4]. The farmyard manure (FYM) itself contains reasonable amounts of nutrients which become available to plants upon decomposition besides enhancing availability of native as well as applied nutrients [2]. Vermicompost contains micro site rich in available carbon and nitrogen [6]. Worm cast incorporated soils are also rich in water soluble P [1] and contained two to three times more available nutrients than surrounding soils which encourages better plant growth yield.

Bio-fertilizers – Combined inoculation of bio fertilizers over Rhizobium or Azotobactor or PSB (Phosphorus solublizing bacteria) alone and no bio fertilizers gave better results. Probable increase in N availability in soil due to symbiotic N fixation in the soil having low available N might have augmented the growth of crop whereas effect of PSB was not as pronounced possibly due to medium level of P in the experimental soil. However, their combined application exhibited complimentary effect resulting in better over their soil inoculations. It was further evident that the effect of bio fertilizers was more with good moist condition. Rhizobium and PSB seed inoculation in berseem and azotobactor and PSB in oat crop recorded higher over control treatment. The phosphate solubilizing microorganisms (Pseudomonas) play an important role in conversion of unavailable inorganic P(Ca-P, Fe-P and Al-P) into available inorganic P forms through secretion of organic acids and enzymes (10). Keeping the points in view the present experiment was undertaken with the objects to find out the productivity and profitability of black gram as influencd by nutrient management under organic farming.

Highest in Oat green fodder (390.7 q/ha) was recorded with the application of 10 t/ha Vermi-bio-manure. Maximum yield in green fodder of Berseem (518.4 q/ha) was obtained with the application of 10 t/ha ver-bio-manure (Table 1).
Among the various value added products the performance were in order of Vermi-bio-manure > FYM > NADEP in enhancing dry matter yields. The results demonstrated that value added manures could be an alternative and viable technology to utilize different types of wastes efficiently for sustaining crop production and maintaining soil fertility.

Table-1 : Green Fodder and dry matter yield of oat crop as influenced by bio-manures

Treatments	Green Fodder (q/ha) (Mean)	Dry matter yield (q/ha) (Mean)
T1 : Control	270.3	62.5
T2 : Vermi-manure (10 t/ha)	390.7	87.6
T3 : NADEP (10 t/ha)	311.2	68.3
T4 : FYM (10t/ha)	328.5	74.5
T5 : Vermi : FYM (50 : 50)	348.4	80.2
T6 : FYM : NADEP (50 : 50)	365.6	82.4
T7 : VERMI : NADEP (50 : 50)	374.2	85.7
T8 : Bio-fertilizers	300.4	65.3

CONCLUSION

India scenario – Currently, India ranks 33rd in total land under organic cultivation and 88th position for agricultural land under organic crops to total farming area. As per 2006-07 data, the cultivated area under certification was 3,39,113 ha. Including wild collection area, the total area under certification was around 2.8 million ha (www.apeda.com). Madhya Pradesh has 1.63 lakh ha of area under organic certification followed by Maharashtra (1.15 lakh ha).

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