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EFFICACY OF DIFFERENT TYPES OF ORGANIC MANURE ON GROWTH PARAMETERS OF CoCN4 HYBRID NAPIER

[*]Dr. B. Rajesh Kumar and Dr. S. Saraswathi
Veterinary University Training and Research Centre,
Tamilnadu Veterinary and Animal Sciences University (TANUVAS),
District Collectorate Campus, Sathuvachari, Vellore – 632009
E mail: drrajeshvet2008@gmail.com (**Corresponding Author*)

Abstract: A field experiment was conducted in Ramapuram village of Kaveripakkam block of Vellore district, Tamil Nadu. The experiment was laid out with three replications per treatment in all the fields viz., Farm yard manure, Poultry manure and Vermicompost. The CoCN4 Hybrid Napier fodder slips were planted as per the standard agronomic practices. The growth parameters of the fodder crop were recorded on 30th, 60th and on 90th day (harvest). Results revealed highly significant difference between treatments on the observation day (30, 60 & 90 days) on growth parameters of the CoCN4 Hybrid Napier viz., Plant height, leaf length, leaf width, number of tillers and leaves. Among the organic manures, Vermicompost recorded significantly higher growth parameters when compared to other treatments. Hence farmers could utilize Vermicompost which have more advantage in terms of increased growth parameters than other organic manures in their field.
Keywords: Organic manures, Growth parameters, Bio mass yield, CoCN4 Hybrid Napier.

Introduction

Manures are organic materials derived from animal, human and plant residues which contain plant nutrients in complex organic forms. They release nutrients after their decomposition. The organic matter of the soil can be replenished and maintained by the application of animal manure as it is considered to be the store house of plant nutrients. In inorganic fertilization, the fertilizers which are applied to agricultural systems were absorbed directly by plants or converted into various other forms through the oxidation process. Excess nitrogen is lost in ionic or gaseous form through leaching, volatilization and denitrification (Tamme *et al*., 2009). It is evident that there is close relationship between excessive application of nitrogen fertilizers and environmental problems such as eutrophication, the greenhouse effect and acid rain (Gastal and Lemaire, 2002). Rationalizing fertilizer application is an important issue for sustainable agriculture because it can reduce the negative effects of farming on the surrounding environment (Zebarth *et al.,* 2009). Although, chemical fertilizers play a crucial role to meet the nutrient requirement of the crop, persistent nutrient depletion is posing a

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greater threat to sustainable agriculture. Therefore, there is an urgent need to reduce the usage of chemical fertilizers and in turn increase the usage of organics. Organic manures help in improvement of soil structure, aeration and water holding capacity of soil. Further, it stimulates the activity of microorganisms that makes the plant to get the macro and micro-nutrients through enhanced biological processes, increase nutrient solubility, alter soil salinity, sodicity and pH (Alabadan *et al*., 2009). Hence, keeping all the facts in view an experiment was conducted to compare the efficacy of different types of organic manures viz., Farm yard manure (FYM) ,Poultry manure (PM) and Vermicompost (VC) in CoCN4 Hybrid Napier grass on growth parameters under different treatments.

Materials and Methods

The experiment was conducted in Ramapuram village of Kaveripakkam block of Vellore district in five farmer's field. A composite soil sample was collected at a depth of 0 - 15 cm in all the experimental fields prior to the study and analysed for the physico chemical properties. The experiment was laid out with three replications per treatment in all the fields viz., T1 - Farm yard manure (FYM @ 5t/acre), T2 – Poultry manure (PM @ 2.5t/acre) and T3- Vermicompost (VC @2.5t/acre). The basal manure was applied in all the experimental fields and the land was ploughed twice by a tractor with chisel ploughing followed by harrowing. The fields were brought to fine tilth and laid out in to proper plot size (6 x 4 m). The CoCN4 Hybrid Napier fodder slips were planted at 50 x 50 cm spacing and the first irrigation was done on the same day of planting and thereafter as and when required. The necessary after care operations such as hand weeding were done as per the requirement. Also 5 plants were tagged in each plot initially on 15^{th} day to study the growth parameters of the fodder crop on 30^{th}, 60^{th} and 90^{th} day (harvest). Plant height was recorded from base of the plant to tip of the terminal leaf on main stem and expressed in cm (Muthukumar *et al.,* 2005). The leaf width (W) and length (L) of the leaf samples were measured from tip to tip at the widest part of the lamina and leaf length (cm) was measured from end to end (Sezer *et al.,* 2009). The data collected on growth parameters between treatments were subjected to one way Analysis of Variance (ANOVA) by SPSS 13.0 to find the significant difference between treatments and days and interpretation of data was done as per the procedure described by Gomez and Gomez (1984).

Results and Discussion

The mean values of plant height, leaf length and leaf width (in cms) for CoCN4 Hybrid Napier (Table 1) varied from 37.51 to 51.21, 48.36 to 56.37 and 2.54 to 2.94 respectively on

30th day and on 90th day it varied from 141.04 to 182.03, 66.84 to 79.24 and 3.96 to 4.47. On the other hand, the mean values of number of tillers and number of leaves varied from 8.67 to 11.13 and 60.13 to 73.83 on 30th day and on 90th day it varied from 17.53 to 24.03 and 159.90 to 194.27. Highly significant difference ($P<0.01$) was evident between treatments and days on the growth parameters of the fodder crop.

It could be observed from the results that there is steady increase in the growth parameters studied during the experimental stage of the fodder crop. Organic manure acted as a reservoir of nutrients and these nutrients are released during humification, thus supplying the necessary elements for plant growth. The applications of P stimulated leaf expansion enhanced more light interception for photosynthetic activity and high assimilate accumulation (Chiezey and Odunze, 2009). The growth could be due to cell division and enlargement stimulated by nitrogen nutrition. Also it could be attributed to lesser soil compaction and better soil aeration due to application of organic manure during the early growth period which provided uniform distribution of nutrients in soil profile due to timely and proper application of the nitrogen fertilizer to the field (Iqbal *et al*., 2012). In general nitrogen promotes rapid vegetative growth and increases the crop yield. Nitrogen being a major macronutrient is an integral component of cholorophyll, ATP, enzymes and nucleic acid, plays a vital role in metabolic activities and cellular respiration. Hence application of N promotes not only growth characteristics (plant height, leaves per plant, stem diameter, leaf area, green fodder yield and dry matter percentage) but also enhances quality parameters (Ayub *et al*., 2003). Among the various treatments, Vermicompost recorded significantly higher growth parameters. This might be due to greater root extension under phosphorus application which would have helped in greater uptake of nutrients and ultimately improved the growth parameters. Furthermore, higher photosynthates produced under Vermicompost treatment would be due to better nitrogen and phosphorus availability, better translocation within plants and favourable sink source ratio of photosynthates.

Plant growth is the function of photosynthetic activity of plants and translocation of photosynthates within the plant which ultimately depend on their capacity to utilize available nutrients. Initial boost of nitrogen would have helped in higher chlorophyll formation and ultimately higher photosynthesis resulted in more plant height. Nitrogen is also known to contribute for cell elongation (Joshi *et al*., 2016). Vermicompost contains micro nutrients such as Calcium (Ca), Magnesium (Mg), Zinc (Zn) and Manganese (Mn). It is a good source of organic matter which would have improved the physico-chemical properties of soil and

there by resulted in better plant growth parameters compared to other treatments. Maximum number of leaves/ tillers might be due to fact that application of Vermicompost provided adequate nitrogen which is associated with high photosynthetic activity and vigorous vegetative growth. Vermicompost is a good source of organic matter which would have improved the physico-chemical properties of soil and also includes some plant growth promoters such as auxins and gibberellic acid (Jamir *et al.,* 2017).

It could be concluded that Vermicompost recorded significant increase in growth parameters when compared to other treatments and the farmers could realize the importance of organic manure which serves environment friendly. Hence it could be recommended that farmers could adopt this environment friendly technique for increased renewed income generation and sustainable livelihood.

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Table: 1

Growth parameters (Mean± SE) of CoCN4 Hybrid Napier under different types of Organic manure

S.No	Growth Parameters	Treatments	Days			Level of Significance	
			30th day	60th day	90th day	Between treatments	Between days
1.	Plant Height (in cms)	T1 (Farmyard Manure)	37.51 ± 0.01^{cz}	69.50 ± 0.80^{fv}	141.04 ± 1.11^{is}	**	**
		T2 (Poultry Manure)	44.30 ± 0.53^{by}	85.96 ± 0.79^{eu}	171.92 ± 1.75^{hr}	**	**
		T3 (Vermicompost)	51.21 ± 0.54^{ax}	93.61 ± 0.56^{dt}	182.03 ± 1.39^{gq}	**	**
2.	Leaf Length (in cms)	T1 (Farmyard Manure)	48.36 ± 0.61^{cz}	56.95 ± 0.79^{fv}	66.84 ± 0.64^{is}	**	**
		T2 (Poultry Manure)	51.72 ± 0.66^{by}	59.69 ± 0.78^{eu}	70.15 ± 0.74^{hr}	**	**
		T3 (Vermicompost)	56.37 ± 0.60^{ax}	64.01 ± 0.68^{dt}	79.24 ± 1.04^{gq}	**	**
3.	Leaf width (in cms)	T1 (Farmyard Manure)	2.54 ± 0.03^{cz}	3.17 ± 0.03^{fv}	3.96 ± 0.03^{is}	**	**
		T2 (Poultry Manure)	2.78 ± 0.02^{by}	3.38 ± 0.02^{eu}	4.24 ± 0.04^{hr}	**	**
		T3 (Vermicompost)	2.94 ± 0.04^{ax}	3.72 ± 0.03^{dt}	4.47 ± 0.03^{gq}	**	**
4.	Number of Tillers	T1 (Farmyard Manure)	8.67 ± 0.26^{cz}	15.13 ± 0.30^{fv}	17.53 ± 0.29^{is}	**	**
		T2 (Poultry Manure)	10.27 ± 0.25^{by}	16.87 ± 0.31^{eu}	19.90 ± 0.38^{hr}	**	**
		T3 (Vermicompost)	11.13 ± 0.27^{ax}	21.50 ± 0.43^{dt}	24.03 ± 0.46^{gq}	**	**
5.	Number of Leaves	T1 (Farmyard Manure)	60.13 ± 0.88^{cz}	110.40 ± 2.82^{fv}	159.90 ± 2.91^{is}	**	**
		T2 (Poultry Manure)	67.17 ± 0.93^{by}	126.01 ± 2.81^{eu}	173.27 ± 3.09^{hr}	**	**
		T3 (Vermicompost)	73.83 ± 1.11^{ax}	143.10 ± 2.68^{dt}	194.27 ± 3.56^{gq}	**	**

Means bearing same superscripts within columns and rows of individual growth parameters do not differ significantly

** *- Highly Significant (P<0.01).*