

Effect of Different Manure on Growth and Biochemical Characteristic of *Sorghum Vulgare Moench*

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Abstract:- For present study cereal crop *Sorghum vulgare Moench* – Poaceae was selecte Different namely, chemical fertilizers, poultry manure and farmyard manure were chosen for pot culture studies. Effect of different manures on growth parameters such as shoot length, root length, fresh weight and dry weight of *Sorghum vulgare Moench* were analyzed on 10th, 20th and 30th day. Effect of different manures on biochemical characteristics such as chlorophyll a, chlorophyll b, total chlorophyll and carotenoids content of *Sorghum vulgare Moench* were analyzed on 10th, 20th and 30th day. Among the different manures, poultry manure enhanced of *Sorghum vulgare Moench* than other manures. Poultry manure applied *Sorghum vulgare Moench* showed the high content of chlorophyll a, chlorophyll b, total chlorophyll and carotenoids than other manures.

Keywords:- *Sorghum vulgare Moench*, Chemical fertilizers, Poultry manure and Farmyard manure.

I. INTRODUCTION

Soil productivity maintenance is a major constraint of tropical agriculture system. Crop cultivation is usually moved between fields to utilize only fertile soils for some years without use of fertilizers. However, this cannot be sustained to meet increased demand of an increasing population. Tropical soils are adversely affected by sub – optimal soil fertility and erosion causing deterioration of the nutrient status and changes in soil organism populations (Akandeet *al.*, 2010). Animal manure had been used as a source of local fertilizers in the many developing countries across the globe for many centuries. Proper use of manure and compost is essential for both a production and environmental for good helathy. Applying rates that are too low can lead to nutrient deficiency and low yields. On the other hand too high a rate can lead to nitrate leaching, phosphorus runoff, accelerated eutrophication of lakes and excessive vegetative growth of some crops. Thus, understanding how to manage manure is important for any farming operation with livestock that relies on manure as a major source of nutrients as well as for vegetable producers who have access to an economical supply of manure, compost or other organic nutrient source. Chemical fertilizers nutrients contained in manure are released more slowly and are stored for a longer time in the soil ensuring longer residual effects, improved root development and higher crop yields. Mineral fertilizers are used to provide soil nutrients in order to maintain optimum soil fertility

conditions and healthy growth of plants and quality yield. Chemical fertilizers help the growing crops to withstand stress conditions and in some cases these were used to correct plant nutrients deficiencies. There are also various reports on the preferences of mineral fertilizer in the growth and productivity of crops. The poultry industry is one of the largest and fastest growing agro-based industries in the world. There is an increasing demand for poultry meat mainly due to its acceptance by most societies and its relatively low cholesterol content. Farm yard manure one of the agricultural sustainable for wastes. Once of the major problems is the accumulation of large amount of wastes, especially manure intensive production. Most of the manure and litter produced by the poultry industry is currently applied to agricultural lands. Poultry manure is an excellent organic fertilizer, in contrast to chemical fertilizers; it adds organic matter to soil that improves soil physical, chemical and biological/ microbial properties of soil like soil structure, nutrient retention. aeration, soil moisture holding capacity, water infiltration and phosphorous availability to plants (Garg and Bahla, 2008). Application poultry has increased nitrogen level of the soil up to 53%.

Organic manure is an excellent fertilizer containing, high level plant growth in the farm yard manure. nitrogen, phosphorus, potassium and micro-nutrients for healthy growth of plants. used for the biogas plant of FYM. Poultry manure supply macro and elements not contained in the organic manure. Potassium is required in least amount by many crops and it is important for maintain the osmotic potential and rigidity of plant cells; hence it plays a vital role in water relations in the plant. Several workers have reported the use at several organic materials especially cow dunk, poultry dropping refuse and biohumus as soil amendment substrates, suitable for increasing crop production. The present study is an attempt to evaluate the effect of different manures on growth and biochemical characteristics of *Sorghum vulgare Moench*. Hence, the present study was carried out with the following objectives:

- To evaluate the effect of different manures on growth of *Sorghum vulgare Moench*.
- To evaluate the effect of different manures on biochemical characteristics of *Sorghum vulgare Moench*.
- Evaluation.

II. MATERIALS AND METHODS

The details of selection of crop for pot culture studies and evaluation of growth and biochemical characteristics of selected crop during the course of this investigation are explained in this chapter.

A. Selection of crop

Cereal crop *Sorghum vulgare* Moench – Poaceae was selected for pot culture studies based on its easy availability, surviving capacity, growth capabilities and economic value.

B. Pot culture studies

For pot culture studies, different manures such as chemical fertilizers, poultry manure and farmyard manure were selected. The detail of experimental set up is given in Table 1. The growth parameters such as shoot length, root length, fresh weight and dry weight of *Sorghum vulgare* Moench were analyzed on 10th, 20th and 30th day. The biochemical characteristics such as chlorophyll a, chlorophyll b, total chlorophyll and carotenoids content of *Sorghum vulgare* Moench were analyzed on 10th, 20th and 30th day. The procedure adopted for the analysis of growth parameters and biochemical characteristics of *Sorghum vulgare* Moench is presented in Table 2 and 3 respectively.

III. RESULTS AND DISCUSSION

Effect of different manures on growth parameters such as shoot length, root length, fresh weight and dry weight of *Sorghum vulgare* Moench on 10th, 20th and 30th day are

presented in Table 4, 5 and 6 respectively. Effect of different manures on growth parameters such as shoot length, root length, fresh weight and dry weight of *Sorghum vulgare* Moench on 10th, 20th and 30th day are presented in Figure 1, 2 and 3 respectively.

Effect of different manures on growth of *Sorghum vulgare* Moench on 30th day is presented in Plate 1. Effect of different manures on biochemical characteristics such as chlorophyll a, chlorophyll b, total chlorophyll and carotenoids content of *Sorghum vulgare* Moench on 10th, 20th and 30th day are presented in Table 7, 8 and 9 respectively.

The results of the analysis of effect of different manures on growth and biochemical characteristics of *Sorghum vulgare* Moench are discussed hereunder. Among the different manures, poultry manure showed the better growth parameters such as shoot length, root length, fresh weight and dry weight. Similar result was reported by Olaiya *et al.* (2015) in lady's finger (*Abelmoschus esculentus* L.) in forest- savannah transition ecology of Nigeria. Aba *et al.* (2011) reported that the application of 10t/ha of poultry manure per annum gave the best yield attributes in both clones. Okolipso *et al.* (2015) reported the application of poultry manure had more effect on the vegetative growth of cucumber compared to mixture poultry manure and chemical fertilizers. Muhammad Arfan-ul-Haq *et al.* (2015) reported that the quality of bitter melon (*Momordica charantia* L.) was found to be the best by the application of poultry manure.

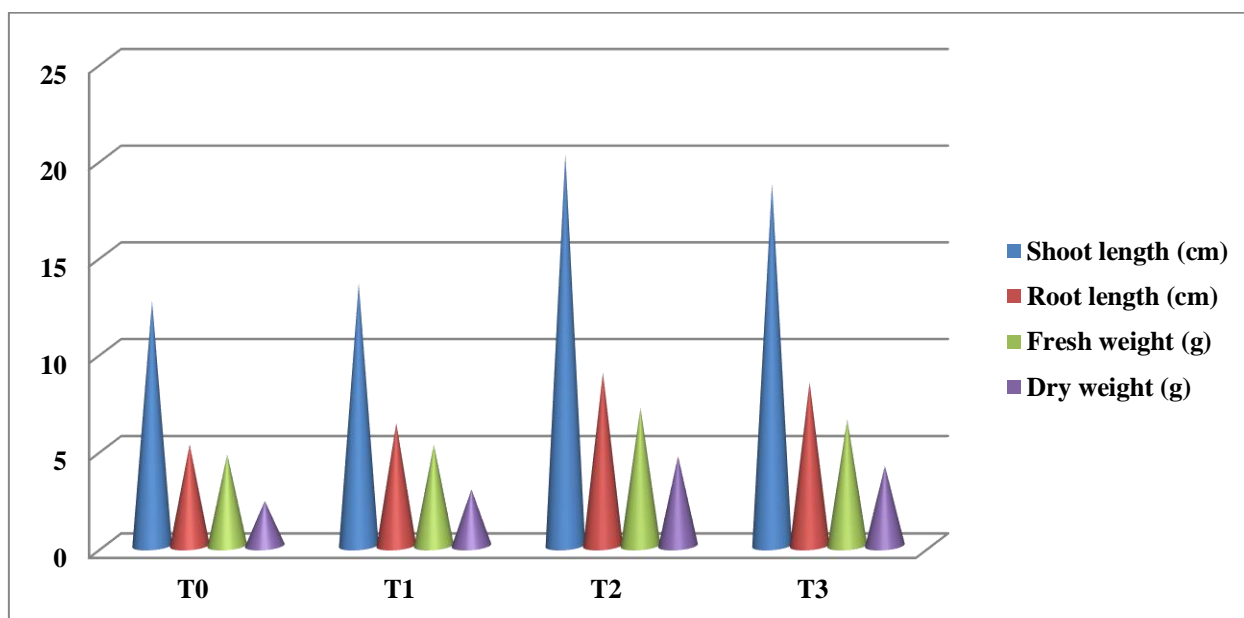


Fig 1:- Effect of different manures on growth parameters of *Sorghum vulgare* L. on 10th day

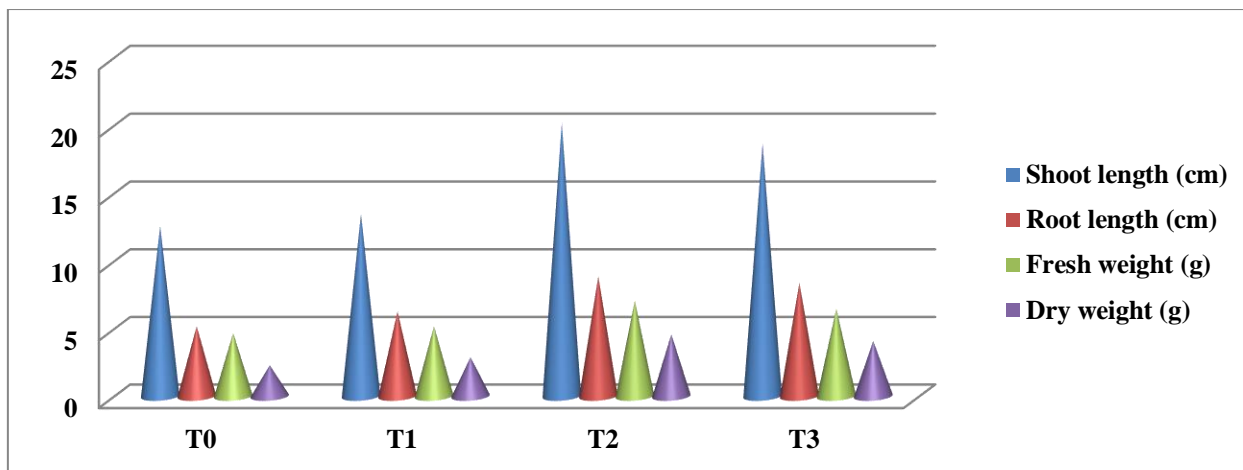


Fig 2:- Effect of different manures on growth parameters of *Sorghum vulgare* L. on 20th day

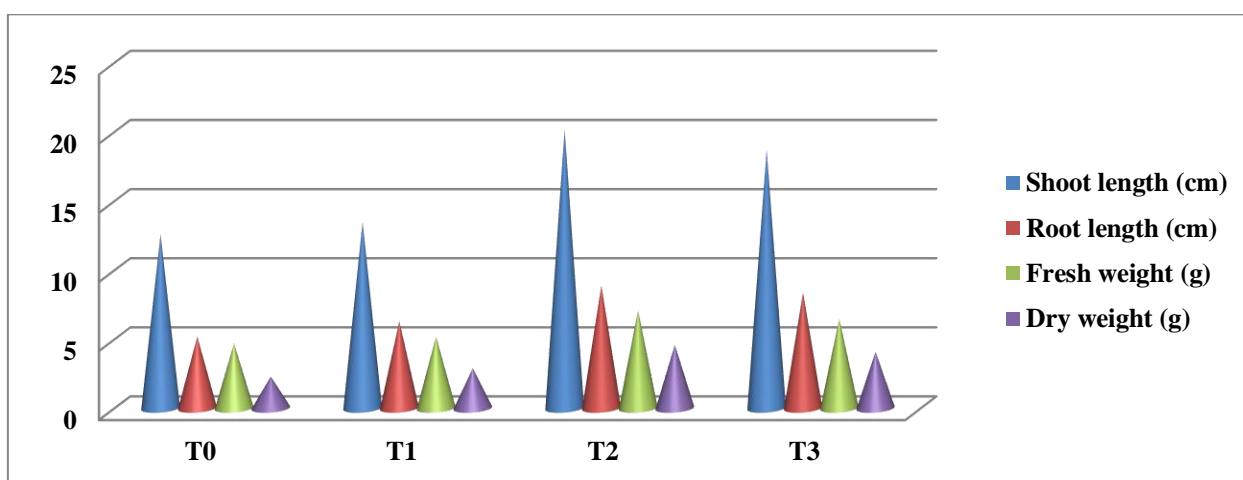


Fig 3:- Effect of different manures on growth parameters of *Sorghum vulgare* L. on 30th day

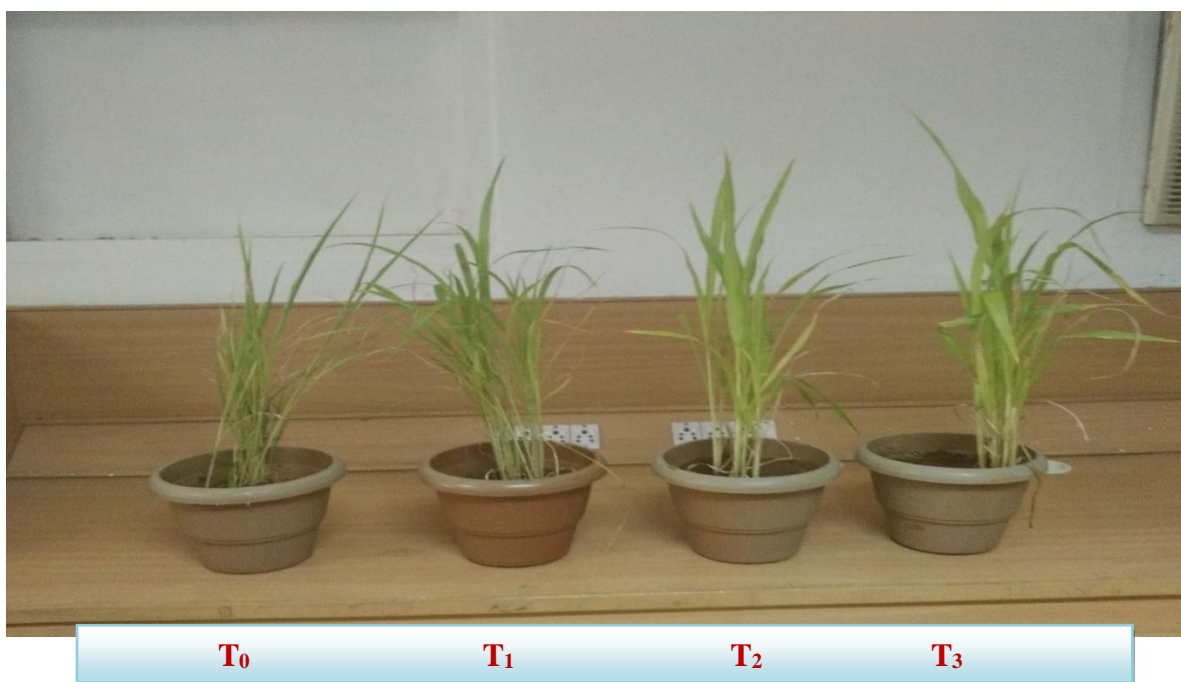


Fig 4:- Effect of chemical fertilizer, farmyard manure and poultry manure on Plate growth of *Sorghum vulgare* L. on 30th day

S.No.	Treatment	Red Soil (kg)	Sand (kg)	Chemical fertilizers	Poultry Manure (gm)	Farmyard Manure (gm)
1.	T ₀	1 Kg	1 Kg	–	–	–
2.	T ₁	1 Kg	1 Kg	Full dose	–	–
3.	T ₂	1 Kg	1 Kg	–	5.20g	–
4.	T ₃	1 Kg	1 Kg	–	–	5.20g

Table 1. Experimental set up

Full dose (100%) – Nitrogen – 0.055g/kg; Phosphorous – 0.10g/kg
Potassium – 0.015g/kg

S. No.	Parameters	References
1.	Shoot length (cm)	Arts and Marks, (1971)
2.	Root length ”	Buriset <i>al.</i> (1969)
3.	Total fresh weight (g)	”
4.	Total dry weight ”	”

Table 2. Procedure followed for the growth characteristics of crops

S. No.	Parameters	Reference
1.	Chlorophyll a (mg/g f w)	Arnon, (1949)
2.	Chlorophyll b (mg/g f w)	”
3.	Total chlorophyll (mg/g f w)	”
4.	Carotenoids (u mole g f w)	”

Table 3. Procedure followed for the biochemical characteristics of the crops

S. No.	Parameter	T ₀	T ₁	T ₂	T ₃
1.	Shoot length (cm)	6.3	8.2	11.9	13.5
2.	Root length (cm)	2.3	3.5	5.5	6.8
3.	Fresh weight (g)	1.2	1.7	2.5	2.7
4.	Dry weight (g)	0.7	0.9	1.2	1.4

Table 4. Effect of different manures on growth characteristics of *Sorghum vulgare* L. on 10th day

S. No.	Parameter	T ₀	T ₁	T ₂	T ₃
1.	Shoot length (cm)	8.1	10.3	15.2	18.6
2.	Root length (cm)	4.6	5.9	7.3	7.8
3.	Fresh weight (g)	3.3	4.1	5.8	6.4.
4.	Dry weight (g)	1.5	1.9	2.8	3.5

Table 5. Effect of different manures on growth characteristics of *Sorghum vulgare* L. on 20th day

S. No.	Parameter	T ₀	T ₁	T ₂	T ₃
1.	Shoot length (cm)	12.6	13.5	20.2	18.7
2.	Root length (cm)	5.2	6.3	8.9	8.4
3.	Fresh weight (g)	4.7	5.2	7.1	6.5
4.	Dry weight (g)	2.3	2.9	4.6	4.1

Table 6. Effect of different manures on growth characteristics of *Sorghum vulgare* L. on 30th day

S. No.	Parameter	T ₀	T ₁	T ₂	T ₃
1.	Chlorophyll a (mg/g f w)	1.163	1.237	2.542	2.370
2.	Chlorophyll b(mg/g f w)	0.809	0.937	1.450	1.278
3.	Total chlorophyll(mg/g f w)	1.972	2.174	3.992	3.648
4.	Carotenoids (u mole g f w)	0.047	0.089	0.113	0.103

Table 7. Effect of different manures on biochemical characteristics of *Sorghum vulgare* L. on 10th day

S. No.	Parameter	T ₀	T ₁	T ₂	T ₃
1.	Chlorophyll a (mg/g f w)	2.316	2.920	4.756	4.073
2.	Chlorophyll b(mg/g f w)	1.489	1.819	2.302	2.141
3.	Total chlorophyll(mg/g f w)	3.805	4.739	7.058	6.214
4.	Carotenoids (u mole g f w)	0.066	0.118	0.1633	0.146

Table 8. Effect of different manures on biochemical characteristics of *Sorghum vulgare* L. on 20th day

S. No.	Parameter	T ₀	T ₁	T ₂	T ₃
1.	Chlorophyll a (mg/g f w)	3.637	3.734	5.435	5.157
2.	Chlorophyll b(mg/g f w)	1.980	2.242	2.874	2.641
3.	Total chlorophyll(mg/g f w)	5.617	5.976	8.309	7.798
4.	Carotenoids (u mole g f w)	0.085	0.98	0.189	0.154

Table 9. Effect of different manures on biochemical characteristics of *Sorghum vulgare* L. on 30th day

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