EFFECT OF VARIOUS TYPES OF GULMOHAR COMPOST ON YIELD AND NUTRIENT UPTAKE OF MAIZE

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Abstract: Gulmohar (*Delonix regia* Boj. ex Hook.) belongs to family fabaceae, remains green for ten months in a year and having faster regrowth without maintenance, grows well in tropical and subtropical climate. It is a legume, so gives high nitrogen content. It is planted as an ornamental plant. Beside this, the foliage also can be used for green manuring and preparation of other organic manures.

The aim of the present investigation was to find out the effect of gulmohar compost prepared by aerobic (NADEP) and anaerobic (Bangalore) pit methods on productivity of fodder maize (*Zea mays* L.). The field experiment was conducted in research farm of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad. The experiment was conducted in plots of size 150 x 150 cm with six treatments and four replications. The composts were used as gulmohar vermicompost (GVC), gulmohar compost (GCO), green leaf manure (GLM) and dry leaf manure (DLM) with recommended fertilizer (N120:P80:K40) Kg/ha and absolute control. The fodder maize (*Zea mays* L.) var. 'African Tall' (Mahalaxmi) produced by Mahendra Hybrid Seeds Co. Ltd., Jalna was sown at a rate of 100 kg/ha. The physiological traits of the crop were noted at 78 days after sowing (DAS).

On the basis of statistical analysis it has been observed that all the values of fresh weight, dry matter, nitrogen, crude protein (Kg/ha) and reducing sugar (Kg/ha) were significant in all the treatments over CON. The percent increase over control for fresh weight and dry weight (Kg/ha) was found maximum with the fertilization of GLM. The nitrogen efficiency ratio for fresh vegetation was highest in the plots treated with DLM, while in case of dry matter (Kg/ha) was highest in the plots treated with GLM.

Green leaf manure and dry leaf manure prepared from gulmohar foliages are the best, active and cheapest source of plant nutrients working with high efficiency as compared to fertilizer treatment.

Key words: Gulmohar, Compost, Maize.

Introduction: Gulmohar (*Delonix regia* Boj. ex Hook.) belongs to family fabaceae, remains green for ten months in a year and having faster regrowth without maintenance, grows well in tropical and subtropical climate. It is a legume, so gives high nitrogen content. It is planted as an ornamental plant. Beside this, the foliage also can be used for green manuring and preparation of other organic manures.

Maize is almost an ideal forage crop. It is a quick growing high yielding, palatable and nutritious (Narayanan and Dabadghao, 1972; Relwani, 1979). In India, maize can be grown in wide range of climatic conditions. Different varieties of maize take from 60 to 90 days to harvest for fodder. The crop can be fed to cattle safely at any stage of growth. The yield of fresh fodder varies from 157 to 280 quintals per hectare (Narayanan and Dabadghao, 1972). The aim of the present investigation was to find out the effect of gulmohar compost prepared by aerobic (NADEP) and anaerobic (Bangalore) pit methods on productivity of fodder maize (*Zea mays* L.).

Materials and Methods:

Experimental site and design: The field experiment was conducted in research farm of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad, during Oct. 2006 – Jan 2007. The experiment was conducted in plots of size 150 x 150 cm with six treatments and four replications. The composts were used as gulmohar vermicompost (GVC), gulmohar compost (GCO), green leaf manure (GLM) and dry leaf manure (DLM) with recommended fertilizer (N120:P80:K40) Kg/ha and absolute control. The fodder maize (*Zea mays* L.) var. 'African Tall' (Mahalaxmi) produced by Mahendra Hybrid Seeds Co. Ltd., Jalna was sown at a rate of 100 kg/ha. The physiological traits of the crop were noted at 78 days after sowing (DAS).

Collection, treatments and plot size: The fresh vegetation of Gulmohar (*Delonix regia* Boj. ex Hook.) was collected from the Dr. Babasaheb Ambedkar Marathwada University campus, brought to laboratory and chopped into small pieces (2 to 3 cm) by iron cutter. Equal amount (13333 kg ha^{-1}) of leaf vegetation was used for the preparation of gulmohar vermicompost (GVC), gulmohar compost (GCO), green leaf manure (GLM) and dry leaf manure (DLM). The fresh vegetation of Gulmohar was spread on the hygienic floor and subsequently sprayed with 5 % urea and single super phosphate (SSP) and another lot of fresh vegetation was also sprayed with 5 % dung slurry to enhance the composting process. These pretreated materials were arranged alternately along with well-composted inoculum and soil on each layer in the aerobic tanks and anaerobic pits. Sufficient water was sprinkled in order to maintain the optimal moisture (50 to 70) over the material. The pits were enclosed with dung-mud paste to prevent loss of

moisture or heat and allowed to decompose. The trenches were watered whenever the dampness was less than 50. The pits were again irrigated and closed by dung-mud mixture. Finally, amorphous, dark brown, well-fermented composts were obtained. The uniformly mixed samples (100 g) of each treatment were collected immediately from the pits for nutrients analysis.

Chemical analysis: The chemical analyses were done by adopting standard analytical methods. The chlorophyll contents (a, b and total) were estimated (Arnon, 1949), using 80 % acetone as a solvent for the extraction of pigments. Ash values were obtained by burning the moisture-free samples in a muffle furnace at 600°C for 2 hours and calcium (Ca) Content was calculated by titrating the sample against 0.01 N $KMnO_4$ solution using methyl red as indicator (AOAC, 1995). Nitrogen (N) was estimated by micro-Kjeldahl method after digesting the sample with Conc. H_2SO_4 (Bailey, 1967) and crude protein (CP) was then calculated by multiplying N value with 6.25 as specified by AOAC, (1995). The dry samples were boiled in distilled water, filtered and amount of water soluble reducing sugars was determined in the filtrate by using Folin-wu tubes (Oser, 1979). The amount of phosphorus was measured following Fiske and Subba Rau (1925) as described by Oser (1979). Potassium (K) Content was determined on a flame photometer (model Mediflame- 127) as suggested by Jackson (1973). Taking in to consideration the yield of dry matter and N content in it, total N accumulated by above ground biomass was calculated for each treatment. The amount of extra N accumulated was worked out by subtracting the amount of N accumulated in control or untreated. With the help of extra N accumulated and that supply with either urea or various compost, the efficiency of nitrogen used by the plants was calculated.

Statistical analysis: All the results were statistically analyzed using analysis of variance (ANOVA) test and treatment means were compared using the least significant difference (C.D., p = 0.05) which allowed determination of significance between different applications (Mungikar, 1997) .

Results and Discussion:

Analysis of Gulmohar compost: The equal amount of fresh vegetation was used for the Green manure, Dry leaf manure, and for the preparation of Compost and Vermicompost i.e. 13333 Kg ha^{-1}. The analysis of Gulmohar compost as fresh weight per plot, Kg ha^{-1}, DM, N, P, K content, Ash percentage Carbon percentage and C : N ratio respectively, showing the input for the experiment (Table 1).

Table 1: Analysis of *Gulmohar* compost

Treatment	Fresh wt total	Fresh wt. Kg ha^{-1}	Dry Matter Kg ha^{-1}	N %	P %	K %	Ash %	C %	C:N
GVC	60.00	16667	10340	0.67	0.53	0.65	39.00	22.50	33.58
GCO	68.00	18889	9858	0.88	0.65	0.52	28.00	16.00	18.18
GLM	48.00	13333	3867	1.50	1.07	0.72	5.50	3.00	2.00
DLM	18.00	13333	4161	1.25	0.55	1.00	6.80	3.95	3.16

All the values are means of two replicates

GVC = *Gulmohar* Vermi compost, GCO = *Gulmohar* compost, GLM = Green leaf manure, DLM = Dry leaf manure.

Table 2: Analysis of total aerial biomass of Maize plants (Age of crop: 89 DAS)

Treatment	(Kg ha^{-1})				Mineral content (%)					
	Fr. wt.	DM.	N	TRS	TRS	N	P	K	CP	Ca
GVC	26111	4699	68	205	4.37	1.44	0.99	0.80	9.00	0.25
GCO	25833	4825	70	327	6.77	1.46	0.68	0.40	9.13	0.23
GLM	25278	4762	60	266	5.59	1.25	0.89	0.50	7.81	0.25
DLM	25000	4589	70	307	6.68	1.52	0.84	0.30	9.50	0.24

FER	21944	4183	87	148	3.54	2.08	0.87	0.40	13.00	0.20
CON	11389	2414	30	95	3.93	1.25	0.74	0.40	7.81	0.19
S.E. ±	**2323**	**378**	8	**37**	**0.57**	**0.12**	**0.05**	**0.07**	**0.78**	**0.01**
C.D.(p=0.5%)	**5970**	**971**	20	**96**	**1.46**	**0.31**	**0.13**	**0.18**	**2.00**	**0.03**

All the values are means of four replicates

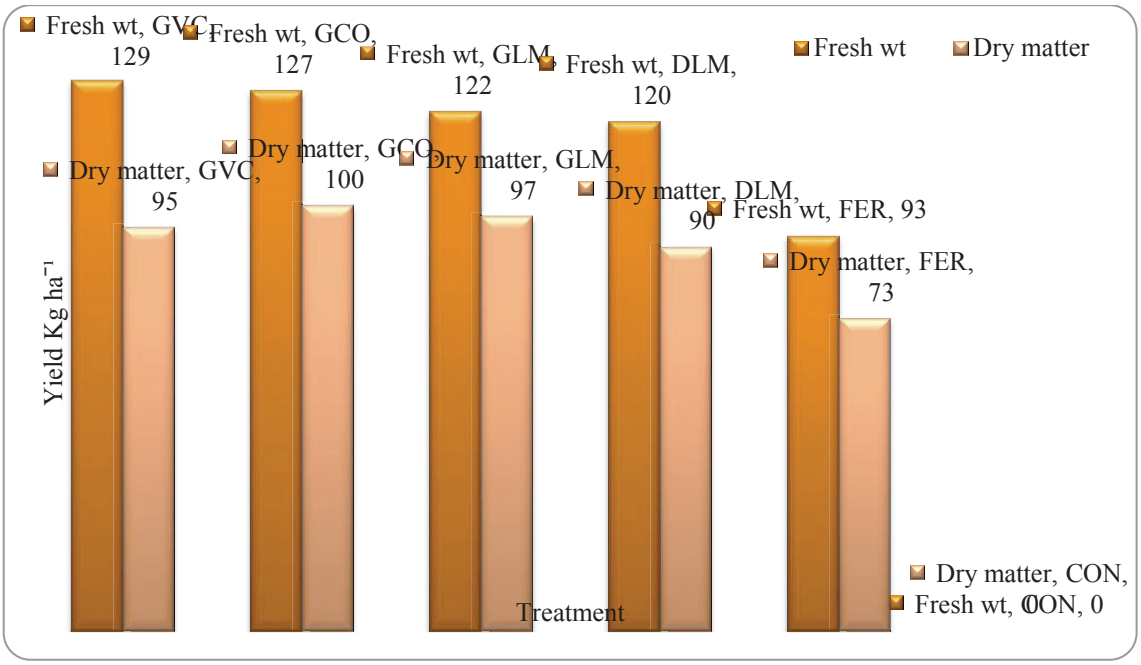

Fig. 1: Per cent increase over control.

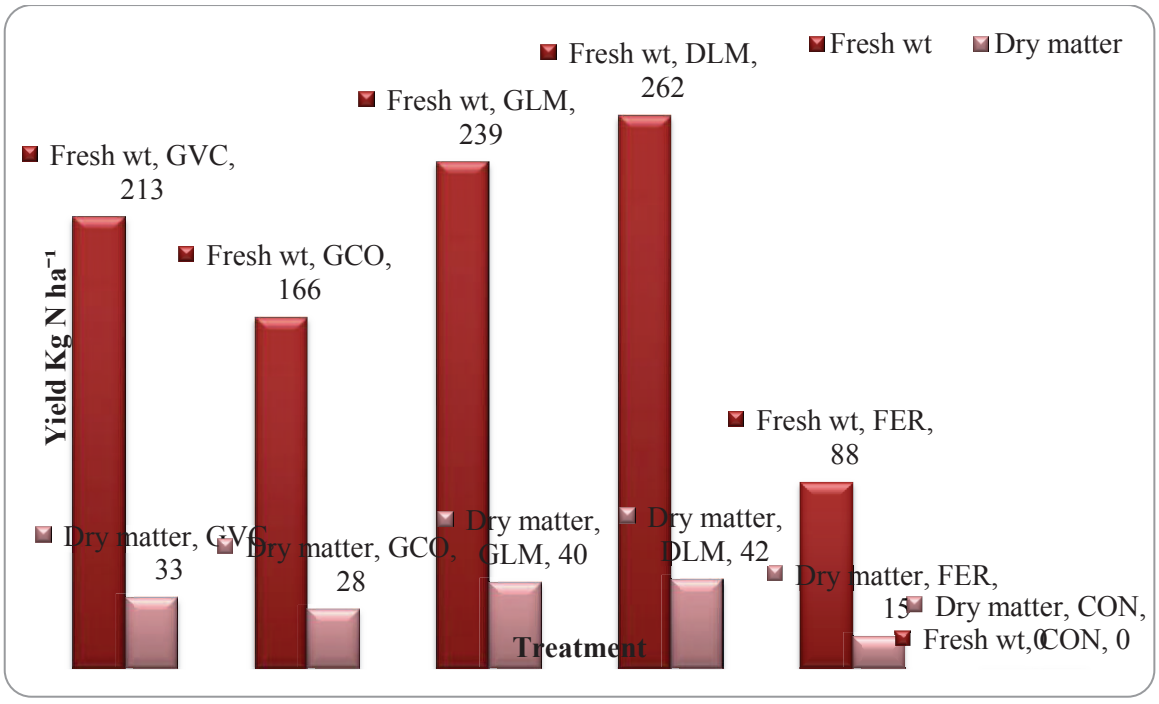

Fig. 2: Nitrogen efficiency ratio.

Analysis of Maize crop: The average yield of fresh aerial biomass (Kg ha^{-1}) of maize was highest in the plots received with vermicompost amendment followed in order by compost, green leaf manure, dry leaf manure, fertilizer and lowest in control. The dry matter of maize was found maximum in the

treatment of GCO, followed in order by GLM, GVC, DLM and FER, while it was lowest in CON. The nitrogen content (Kg ha^{-1}) was found maximum in the treatment of FER, followed in order by DLM, GVC, GLM and GCO, while it was minimum in CON. The total reducing sugar content (Kg ha^{-1}) was observed maximum in the treatment of GCO, followed by DLM, GLM, GVC and FER, while it was found minimum in CON. (Table 2).

Per cent increase over CON and N efficiency ratio: The per cent increase over CON for fresh weight was found maximum with the treatment GVC followed in order by GCO, GLM, DLM treatments and minimum in FER applied plots. The per cent increase over CON for dry weight was maximum with the treatment followed by GCO, GLM, GVC, DLM, and minimum in FER (fig. 1), while the nitrogen efficiency ratio for fresh vegetation and dry matter was highest in the plots treated with DLM, followed by GLM, GVC, GCO application and then in FER treatment, where N was supplied through urea given the lowest efficiency (Fig. 2).

All the results are calculated on the dry matter basis and the values are the means of four replicates.

Conclusions: The application of vermicompost and compost prepared from gulmohar foliage statistically increased the growth, nutrient uptake and yield of maize.

On the basis of statistical analysis it has been observed that all the values of fresh weight, dry matter, nitrogen, crude protein (Kg/ha) and reducing sugar (Kg/ha) were significant in all the treatments over CON. The percent increase over control for fresh weight and dry weight (Kg/ha) was found maximum with the fertilization of GLM. The nitrogen efficiency ratio for fresh vegetation was highest in the plots treated with DLM, while in case of dry matter (Kg/ha) was highest in the plots treated with GLM.

The use of fresh vegetation and dry leaf manure proved to be the best source of nutrient as compared to the compost and vermicompost. The preparation cost and time for compost and vermicompost will also reduce the nutrient contents by the microorganism which all can be saved by using green manure and dry leaf manure. This green vegetation which is available throughout the year free of cost, having better plant nutrient and best regrowth capacity of vegetation.

Green leaf manure and dry leaf manure prepared from gulmohar foliages are the best, active and cheapest source of plant nutrients working with high efficiency as compared to fertilizer treatment.

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