Utilization of *Ipomoea carnea* as a Source of Plant Nutrients.

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ABSTRACT

Ipomoea carnea Jacq. Sub sp. fistulosa (Mart. Ex Choisy) D. Austin is a native of South America but now found all over India. Grows in dense populations along river beds, banks, Canals and other water logged (wetland) areas. *Ipomoea carnea* is a member of family Convolvulaceae & distributed in tropical & warm temperate region. It is able to spread rapidly vegetatively where as the horizontal branches rapidly root along the downward side in contact with ground and give origin to many erect side branches. The laid down branch becomes a functional stolon which persists & keeps mother & daughter plant connected. It has the capacity to produce substantial biomass per unit area per unit time. It is a ornamental plant due to its variety of flowers, which appear pale rose, pink, light violet or whitish blue.

Ipomoea carnea has been used as folk medicine. Its ash is used for the treatment of skin disease. Only external application have been recommended due to poisonous nature of the plant. The plant extract is used as insecticide against malerial vector, Anopheles Stephensi (Mosquito). The dried powdered leaves contain alkaloids, reducing Sugars, glycosides and tannins.

The high cellulose and volatile solid content of the plant material is responsible for its successful bio gasification. It is used as ornamental hedge, fuel & against insects pests, especially cotton boll worms.

Key words:- Ipomea , chlorophyll, Nitrogen, Crude protein, R. sugar.

INTRODUCTION

Weed biomass is one of the easily available sources of organic matter and plant nutrients, which hitherto have not received required attention. The favorable climatic condition leads to the production of huge weed biomass on waste land. The biomass production in weeds roughly ranges

from 5-20 t/ha depending upon the weed species, season and growing conditions. Biomass of weeds like *Ipomoea carnea* produces 15-20 t/ha Biomass per year (Rajkhowa *et, al*., 2005).

Ipomoea carnea Jacq subsp. *fistulosa* (Mart. ex Choisy) D. Austin. In India it is commonly known as 'Beshram' and 'Mahananda' in (Marathi) Maharashtra. *Ipomoea carnea* grow in dense population along river beds, banks, canals and other waterlogged (wetland) areas. The farmers use it as hedge plant along the field edges. These ornamental uses and reproduction by seeds have aided the plant to disseminate into new regions, especially in terrestrial habitats. It can be cause obstruction and difficulties in the proper use for cultivated lands and water courses. The rapid growth rate, spread, and adaptability from aquatic to xerophytic habitats indicate that this plant may potentially become another ecological disaster like water hyacinth.

MATERIALS AND METHODS

The field experiment was conducted in the farm at Mahal patane, Taluka satana Dist. Nashik .The experiment design was a randomized block design (RBD) with six treatments and four replications.

Raw material and composting Process:

The fresh vegetation of weed Ipomoea ***(Ipomoea carnea, spp. Fistulosa)*** was collected early in the morning from different localities and chopped into small pieces

(2-3cm). Equal amount (1.25 kg/pot) of weed biomass was used for the preparation of Green manure, Dry leaf manure. Compost and vermicompost. For preparation of compost this material was placed into pit (90x90x90 cm.) and then added cow dung, soil and weed plant material layer by layer and sprinkled water. Sprinkling of water was done as per requirement. Finally the compost pit was sealed with dung-mud mixture to prevent loss of heat and moisture. After partial decomposition first turning was given after 15 days for homogeneous decomposition, sufficient water was sprinkled to maintain moisture. Finally amorphous, dark-brown, well fermented compost was obtained. The uniformly mixed samples (100 gm) each were collected immediately from the pit for nutrient analysis.

For vermicomposting same procedure was applied, only with the addition of the worms in the pits after every layer. (Worms variety *Eudrilus eugeniae* and *Icenia foetida*).

Identification of earthworm was done by the method prescribed in fauna of India and Adjacent countries by Julka (1988). The prepared vermicompost was used for field trials. Fresh vegetation of *Achyranthes* was used for the preparation of green manure and directly applied for field trials. Equal amounts of vegetation of Achyranthes was used for the preparation of Dry leaf manure (DLM) and after drying used as DLM.

All the prepared manure (GM, DLM, Comp, VC) were applied to appropriate pots except chemical fertilizer (NPK) and control pots. The samples (100gm) of each treatment were randomly collected immediately before manure were applied to the plots and kept in oven at (90^0c) for dry weight and nutrient analysis. The Spinach (*Spinach oleracea* L.)Variety "All green" developed by Abhijeet Seeds 7/8., Manekshaw Nagar, Dwarka Nashik-422011.was sown in the research plots of size 1.5x1.5 m. at the rate of 30kg / ha.

Fertilizer application and plant sampling:

The fertilizers were applied at the recommended levels of 40N:30P:30K Kg/ha as urea: single super phosphate: muriate of potash to fertilizer treatment alone. Entire amount of P_2O_5 and K_2O was applied as basal dose for all the pots at the time of cultivation and N was supplied (10.4 gm urea / pot) at 30 days after sowing (DAS). The fresh aerial biomass yield obtained per pot was recorded and kept in oven at 90^0C for 48 hrs. The dried samples were weighed, finally milled, sieved and stored in labeled air tight polythene bags for nutrient analysis.

ANALYSIS:

Chemical analysis -

The chemical analysis was done by adopting standard analytical methods. The chlorophyll contents (a, b and total) were estimated (Arnon, 1961), using 80 % acetone as a solvent for the extraction of pigments. Vitamin C content was also estimated from fresh material. 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 analyzed by titrating the sample against 0.01 N $KMnO_4$ solution using methyl red as an 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 sugar was determined in the filtrate by using Folin-wu tubes (Oser, 1979). The amount of phosphorus was measured following Fiske and Subba Rau (1972) as described by Oser (1979). Potassium (K) content was determined on a flame photometer (model Mediflame- 127) as suggested by Jackson (1973).

Statistical analysis -

All the results were statistically analyzed using standard statistical method of analysis of variance (ANOVA) test and treatments means were compared using the least significant difference (C.D. p = 0.05) which allowed determination of significance between different applications (Mungikar, 1997, 2003).

RESULTS AND DISCUSSION

Growth analysis

Table-1 The growth analyses of Spinach were done at 45 and 64 DAS. During growth analysis, height of the plant in cm. was highest in GM (45.27), followed in order by COMP, (44.7), DLM (43.22), VC (41.20), NPK (36.10) and lowest in CON (34.95). Number of leaves per plant was maximum in COMP (13.5) followed in order in by DLM (13.0), VC (12.7), GM (12.0), NPK (11.7) and minimum in CON (9.0). Leaf area was found more in COMP treatment (84.5), followed by VC (79), DLM (73.9), GM (72), NPK (70.7) and lower in CON (66.3) treatment. Similarly circumference and height of root also observed in growth analysis, along with fresh weight and dry weight.

Chlorophyll contents of spinach:

The incorporated *Ipomoea* organic manures had significant influence on leaf chlorophyll contents (a, b and total) of spinach. Chlorophyll a, chlorophyll b and total chlorophyll contents varied from 0.685 to 0.966, 0.725 to 1.066 and 1.41 to 2.02 mg / g leaf fresh weight respectively at first harvest **(Fig. 1**). Highest amount of total chlorophyll was found in COMP treated spinach followed in order VC, DLM, NPK and GM lowest in CON. At the second harvest, chlorophyll a, chlorophyll b and total chlorophyll contents varied from 0.61 to 0.83, 0.49 to 0.713 and 1.10 to 1.54 mg / g leaf fresh weight respectively **(fig. 2**). The maximum amount of total chlorophyll

was observed in the treatment of COMP followed by VC, DLM, GM, NPK and minimum in CON.

The chlorophyll content can potentially provide an estimate of the N status of crops (Matsuzaki *et. al*., 1980).. The higher chlorophyll values in leaves on pots treated with organic manure are of importance because photosynthetic activity and crop yield increase with increased chlorophyll content of leaves (William *et. al.,* 1990; Ramesh *et. al*., 2002).

Chemical Analysis of Spinach

Table 2 Total nitrogen yield (gm/pot) was found maximum in the treatment of COMP (0.235), followed in order by VC (0.186), DLM (0.175), GM (0.156), NPK (0.079) and least in CON (0.048). Crude protein amount (gm/pot) was found maximum in the treatment of COMP (1.468), followed in order by VC (1.162), DLM (1.093), GM (0.975) and NPK (0.493) while it was found minimum in CON (0.300) **fig-6** Total reducing sugar (gm/pot) was highest in DLM (0.420), followed in order by COMP (0.387), VC (0.321), GM (0.266) and NPK (0.165) while it was found lowest in CON (0.145) **Fig-7**. All the results were statistically analyzed and found significant over control. Nitrogen is one of the essential nutrients involved as a constituent of biomolecules such as nucleic acids, coenzymes and proteins (Sharma *et. al.,* 1995).

Table -1 Growth Analysis of *Spinach* cultivated on *Ipomoea* weed

Treatment	Height of the plant (cm)	Circumference	No. of leaves Per plant	Leaf area (sq/cm)	Height of Root (cm)
COMP	44.70	4.2	13.5	84.5	13.57
DLM	43.22	3.8	13.0	73.9	10.65
VC	41.20	4.5	12.7	79.0	11.65
GM	45.27	3.7	12.0	72.0	8.90
NPK	36.95	4.1	11.7	70.7	9.0
CON	34.10	3.4	09.0	66.3	7.7

Table 2. Total yield of *spinach* (first and second harvest)

Treatments	Total Yield / pot (gm)				
	Fresh wt.	Dry wt.	Nitrogen	Crude Protein	R. Sugar
COMP	222	29.12	0.235	1.468	0.387
DLM	222	30.03	0.175	1.093	0.420
VC	180	24.89	0.186	1.162	0.321
GM	190	23.37	0.156	0.975	0.266
NPK	168	15.37	0.079	0.493	0.165
CON	138	14.26	0.048	0.300	0.145
S.E.	**13.3**	**2.74**	**0.028**	**0.018**	**0.046**
C.D.	**34.1**	**7.04**	**0.073**	**0.046**	**0.118**

Fig-1 chlorophyll content of *Spinach* as influenced by different *Ipomoea* manures (45 days)

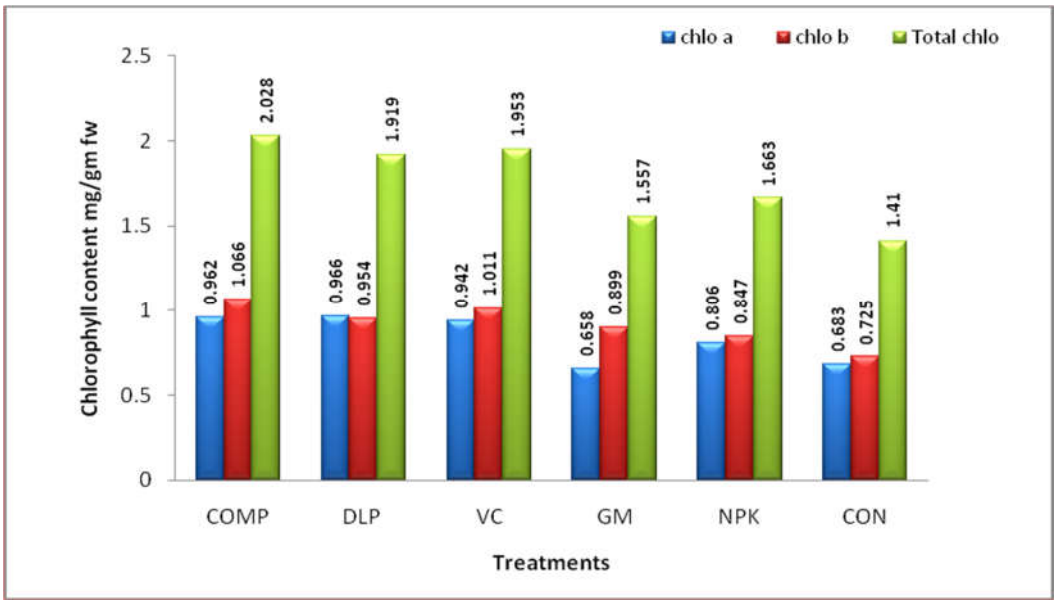


Fig-2 chlorophyll content of *Spinach* as influenced by different *Ipomoea* manures (64 days)

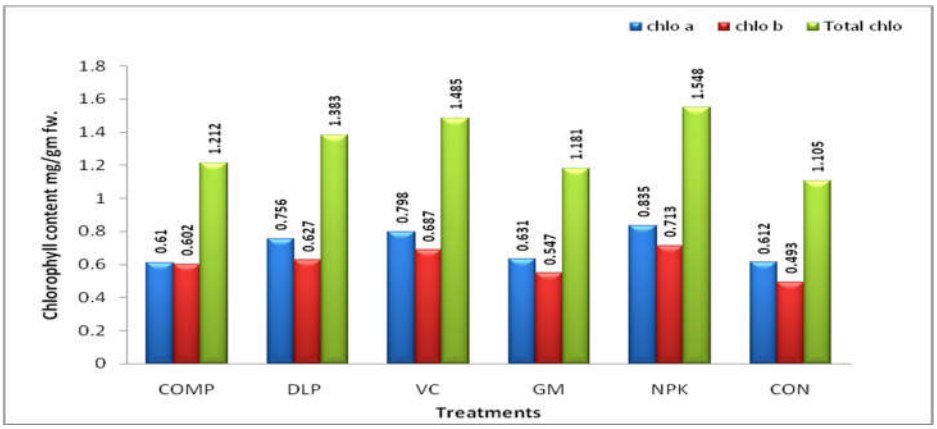


Fig-5 Total fresh wt. and Dry wt. influenced by Ipomoea manure

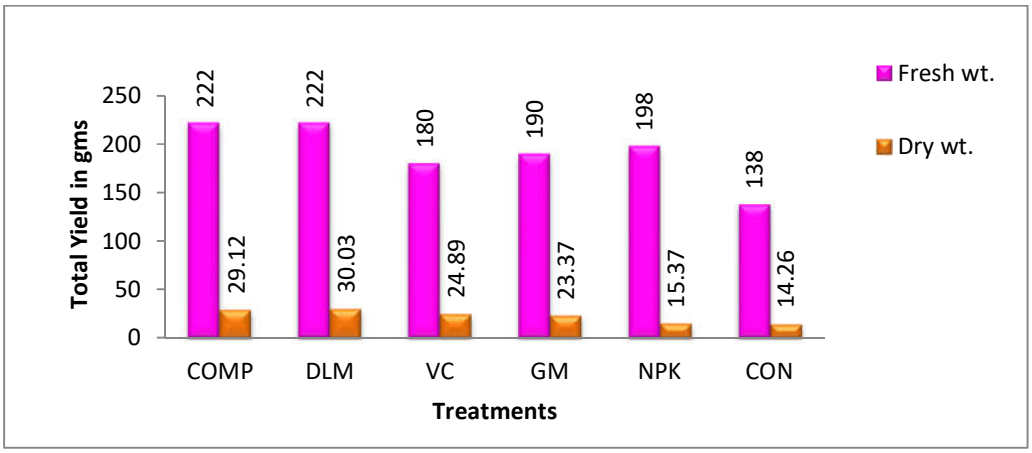
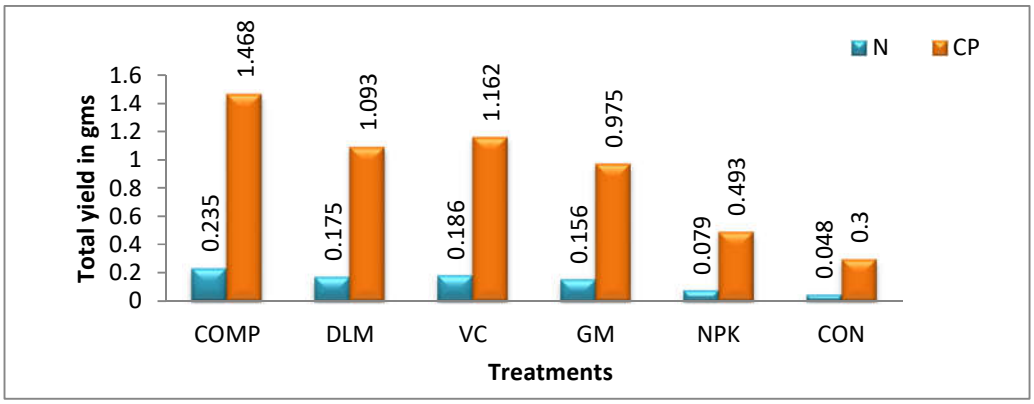


Fig-6 Total Nitrogen and Crude protein influenced by Ipomoea manure



Conclusions

Based on these results, it is evident that application of *Ipomoea* organic manures increased the yield and nutrient contents in spinach. The results concluded that the maximum amount of fresh weight was found in compost and dry leaf manure followed by green manure, vermicompost, NPK and lowest in control. Similarly dry weight was found maximum in Dry leaf manure followed in order by compost, vermicompost, green manure, NPK and lowest in control. The highest percentage of total chlorophyll was observed in compost treatment. Total nitrogen and crude protein was found more in compost treatment. **Total reducing sugar was found highest in dry leaf manure treatment. The percent increase over control for fresh weight was maximum in dry leaf manure treatment.** Similarly dry matter was found highest in dry leaf manure and compost treatment. Ipomoea weed **Dry leaf manure has been found more ideal manure enhancing the yield and nutrient uptake of leafy vegetable crop spinach**.

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