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"Comparative study of various Organic Manures on Growth of Spinach"

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Introduction:

Nutrients in the soils is necessary to maintain the good quality of soil results as higher crop productivity. To derive maximum benefit, the weed manures should be applied during land preparation and incorporated into the soil having adequate moisture about 2 to 3 weeks before sowing so that nutrients are made available to the plants.

Chemical fertilizers are relatively inexpensive, have high nutrient contents, and are rapidly taken up by plants. However, the use of excess fertilizer can result in a number of problems, such as nutrient loss, surface water and groundwater contamination, soil acidification or basification, reductions in useful microbial communities, and increased sensitivity to harmful insects (Chen 2006).

The decline in productivity has been associated with the onset of deficiencies of nutrients. Integrated use of weed manures has been found to be promising riot only in maintaining higher productivity.

Organic manure gives their multiple benefits due to the balanced supply of nutrients as well as increased soil nutrient availability due to increased soil microbial activity, decomposes harmful elements and fillup soils with micronutrients and increased soil water availability, soil texture and structure improvement helps roots and shoots development.

Materials and methods:

Field site and experimental design - The experiment was conducted in the Botanical garden of Dr. Babasaheb Ambedkar Marathwada University's Research farm, Aurangabad. The experimental design was a randomized block design [RBD] with fourteen treatments and three replications of compost, green and dry powder manures, compared with chemical fertilizer along with the control.

Treatments, composting process and pots size - The weeds were collected (uprooted at 10% flowering stage) from roadsides and fields near University campus. They were cut into small pieces as 4"-6" (10-15cm) with the help of traditional iron cutter and buried directly in green manure pots, 745gm/pots of size 29cm x 29cm x 14.5cm i.e. at the rate of 112800 kg/ha. The same amount of vegetation was kept for Natural drying under semi-shade condition for dry powder manure was determined by gravimetric method, and other same amount of vegetation was used for the preparation of compost, using Heap compost pit method (10 lit. water + 50gm Jaggery + 1kg cow dung + 1 lit. Cow's urine mixed well before spreading on every layer then polythene sheets covered on Heap compost pit) After 78 days the well fermented compost manure and dry plant powder manure was also incorporated in the pots of surface area 660.6 sq.cm. of size 29cm x 29cm x 14.5cm pots. The spinach seeds variety "All Green" produced by Sungro seeds limited, 207 Aradhana Bhawan, Azadpur, and Delhi l10033 was sown 2gm/ pot i.e. at the seed rate 30 kg/ha**,** frequent irrigations were given as per requirement. In a course of time regrowths were studied (recut).

Plant sampling - The green foliage was harvested during the early hours of the day at vegetative stage [35 and 72 DAS]. The vegetable yield obtained per pots was recorded on the field itself **[3]** and samples from each pots [100 gm] were immediately collected. chl.a, chl.b, total chl. **[1]** & leaf area from each regrowth was recorded and was kept in oven for further analysis**.**

Results and Discussion:

Estimation of the total leaf chlorophyll, leaf chlorophyll 'a' and 'b' was done using Arnon method (1949) at the age of 35 and 72 days were estimated by using 80 % acetone as a solvent for extraction of pigments **[1].**

Fig.1. Shows the morph-physiological traits of the spinach crop were noted at the age of 35 das, leaf area per plant was highest in the plot treated with *Tephrocia hamiltonni* dry manure followed by *Crotolaria notonni* compost manure and lowest in control followed by Mixed Weed Dry Manure was determined by gravimetric method **[6]**.

Fig.2. Shows the effect of legume weed manures on green leafy vegetable spinach at the age of 35 das, total chlorophyll was maximum in the plot treated with *Tephrosia* compost and then in the *Crotolaria notonii* compost manure followed by *Tephrosia hamiltonni* dry manure.

Fig.3 Shows Spinach contain good quantity vitamin 'C'. It was estimated after 35 days. Highest amount of vitamin 'C' was found on the plot treated with compost manure of *Crotolaria notonii* as 3.95mg/l00gm, then dry manure of *Cassia tora* as 3.29mg/l00gm and then followed by *Tephrosia hamiltonni* green manure as 3.21mg/l00gm and it was lowest on control as 2.42mg/l00gm. β-Carotene content was maximum in the compost of *Crotolaria notonii* as 3.92mg/l00gm and lowest in the control as 1.98mg/l00gm. Estimation of β-carotene and vitamin Cmg/100gm nutrient contents determined by using standard agronomic procedures **[4].**

Table. I. Shows the effect of legume weed manures on green leafy vegetable spinach at the age of 72 days. Estimation of chl.a, chl.b, and total chlorophyll in mg/gm was calculated. Total chlorophyll was maximum in the plot treated with dry manure of *Cassia tora* as 0.82mg/gm and then in the green manure of *Cassia tora* as 0.80mg/gm., the plant shows highest leaf area on *Tephrosia hamiltonni* dry manure as 138.02cm² followed by *Crotolaria notonii* compost manure as 136.46cm² then mixed weed compost manure and dry manure of *Cassia tora* as 127.08cm², and the lowest leaf area found on Control 38.54cm² **[5]**.

Conclusion: On the basis of result obtained, it can be concluded that all the treatments of organic manure worked well should be considered as an alternative to chemical fertilizers.

Abbreviations: Chl.-chlorophyll, **Cn.Co.-***Crotolaria notonni* compost manure, **Cn.DM.-***Crotolaria notonni* dry manure, **Cn.GM.-***Crotolaria notonni* green manure, **CFU.-c**hemical fertilizer urea **CON..-**control, **Ct.Co.-***Cassia tora* compost manure, **Ct.DM.-***Cassia tora* dry manure, **Ct.GM.-***Cassia tora* green manure, **DAS**-Days after sowing, ha.-hectare, kg.-Kilogram, **Kg/ha**-Kilogram per hectare, **MxW.Co.-**mixed weed compost manure, **MxW.DM.-**Mixed weed dry Manure, **MxW.GM.-**Mixed weed green manure, **S.E.-**Standard error, **Th.Co.-***Tephrocia hamiltonni* compost manure, **Th.DM.-***Tephrocia hamiltonni* Dry Manure, **Th.GM.-***Tephrocia hamiltonni* green manure, **wt.-w**eight.

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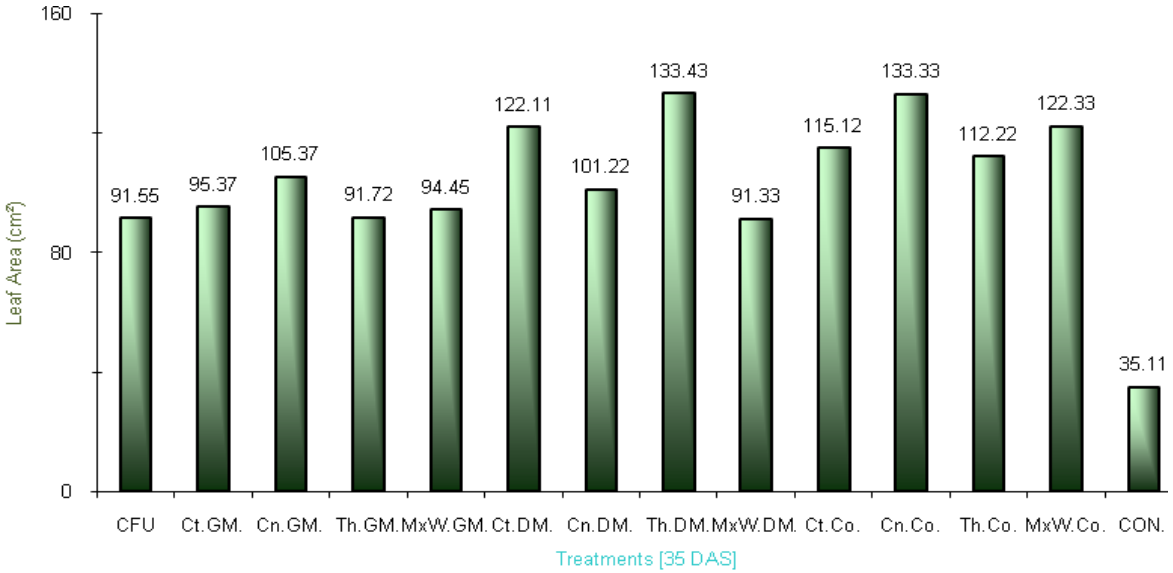

Fig. 1. - LEAF AREA OF SPINACH PLANT LEAVES ON DEFFERENT WEED MANURE.

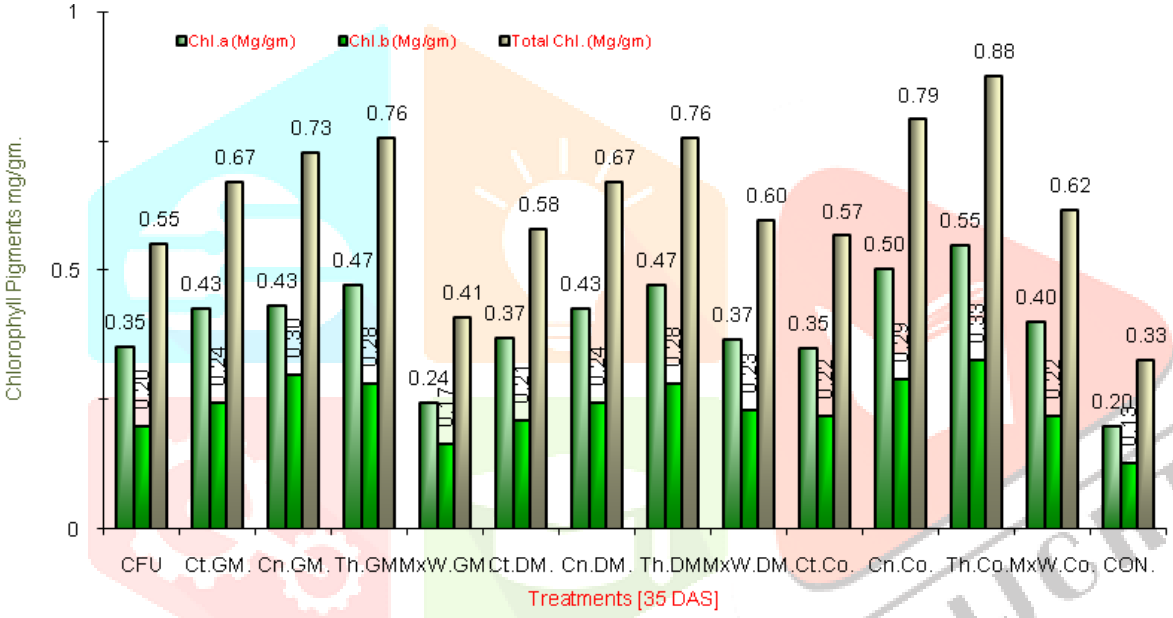

Fig. 2. - ESTIMATION OF CHL'a', CHL'b, & TOTAL CHL. FROM SPINACH VEGETATION.

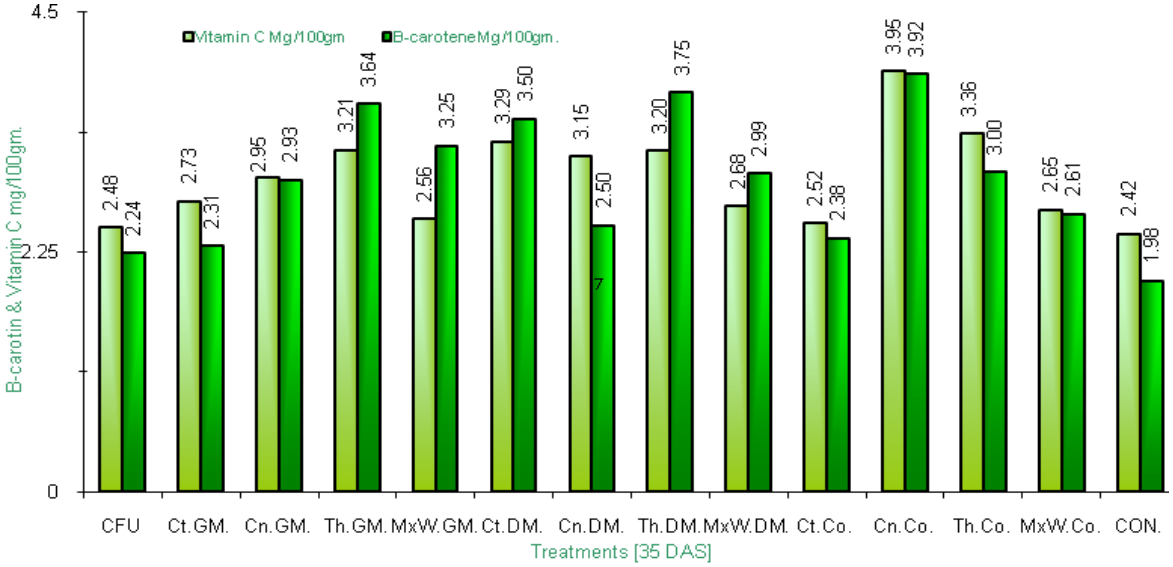

Fig. 3 - ESTIMATION OF Vitamin C mg/100gm & β-Carotene FROM SPINACH LEAF VEGETATION.

Table :-I: Estimation of 'chl.a', 'chl.b', 'total chl.' & leaf area of spinach vegetation cultivated on diff. weed manure [72 DAS].

Treatments	(Mg/gm)			Leaf Area (c.m^2.)
	Chl.a	Chl.b	Total Chl.	
1} CFU	0.46	0.25	0.71	93.75
2} Ct.GM.	0.51	0.29	0.80	97.40
3} Cn.GM.	0.41	0.23	0.64	109.38
4} Th.GM.	0.42	0.25	0.66	95.83
5} MxW.GM.	0.39	0.24	0.63	96.88
6} Ct.DM.	0.51	0.30	0.82	127.08
7} Cn.DM.	0.38	0.23	0.60	102.60
8} Th.DM.	0.44	0.27	0.72	138.02
9} MxW.DM.	0.33	0.19	0.52	95.83
10} Ct.Co.	0.42	0.23	0.65	104.17
11} Cn.Co.	0.46	0.27	0.73	136.46
12} Th.Co.	0.50	0.29	0.79	116.67
13} MxW.Co.	0.37	0.21	0.58	127.08
14} CON.	0.22	0.15	0.38	38.54
S.E. =	0.025	0.024	0.042	
C.D. =	0.052			