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Impact of farm yard manure on agronomy of Pedilanthus-a potential Petro-crop

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*Abstract:*The plant is characterized by its milky white latex, which flows profusely from a slight wound. Experiment was set with different dosages offarm yard manure to observe its effect on biomass and biocrude production. Growth showed a gradual increase with the increase in FYM. While percent dry weight was maximum at14.4t/ha supply. Biocrude was maximum at 28.8t/ha supply.

Index Terms **- fertilizers, Biomass, Latex, Petro-crop, Hydrocarbon,Hexane, Extractable.**

I. INTRODUCTION

Arid regions of Rajasthan which do not support agriculture still are hospitable toa wide variety of plant species, rich in polyisoprenes and other highly reduced hydrocarbon compounds. The rapidly increasing cost of petroleum and the recognition that these plants can substitute for the finite source of energy have made the people think of developing agrotechnology of these amenable indigenous plants. The plant *Pedilanthustithymaloides* var. green (common name Zig Zag plant belonging to family Euphorbiaceae) is a dominant shrub of Rajasthan's gardens. It is also found throughout the plains of India. It is native to Mexico (Dressler, 1957) and is now cultivated for ornamental purposes in most tropical and subtropical countries. The plant is characterized by its milky white latex, which flows profusely from the slight wound.This report is a trial of improving biomass and latex production by providing Farm Yard Manure to the soil. It is hoped that this will shed some light on its large scale cultivation.

II. MATERIALS AND METHODS

The humus less soil obtained from 1 to 2 m depth in the uncultivated regions was taken for experiments. 4 kg of soil was filled in the thoroughly washed earthen pots after mixing with the required amount of farm yard manure. The parameters were studied on individual plants basis except hydrocarbon extract was studied on percent dry weight basis. Combinations tried were 2.7 t/ha, 14.4 t/ha, 28.8 t/ha, 57.6 t/ha, 115.2 t/ha, 230.4 t/ha, 460.0 t/ha of farm yard manure. These sere applied as single basal dosages. Plants were harvested after six months of growth and studied for parameters of length, fresh weight and dry weight of aboveground and underground parts, hexane extractables, sugars, chlorophyll a, b and total chlorophylls.

III. RESULTS

- A gradual increase in shoot and root length was observed in soil with the increase in farm yard manure. Fresh weight and dry weight of aboveground parts also increased at farm yard manure from 7.2 to 460.8 t/ha. The fresh weight and dry weight of underground parts increased gradually up to the supplementation of 28.8 t/ha farm yard manure and then decreased gradually up to 230.4 t/ha and became a constant at further increase in dose.
- Percent dry weight of aboveground parts was maximum at 14.4 t/ha and that of underground parts up to 28.8 t/ha which then decreased gradually at further increase in dosages of farm yard manure.
- Hexane extractables were more than in control plants in all the combinations. A gradual increase in hexane extractables was observed from 7.2 to 28.8 t/ha followed by a gradual decline with further increase in dosages of farm yard manure (57.6, 115.2, 230.4 and 460 t/ha).All combinations showed increased sugar content over the control.
- A gradual increase was observed in the sugar content of plants grown in 7.2 to 28.8 t/ha farm yard manure followed by a gradual decline at higher dosages.
- There was a gradual increase in chlorophyll a, b and chlorophyll contents from control to 28.8t/ha followed by a gradual decline in subsequent dosages. However, at least three dosages, the decline was very little.

IV. DISCUSSION

Indian soils are usually very poor in organic matter as well as nitrogen. In the above experiment while plants were treated with FYM which is prepared from buffalo dung, maximum dose gave the nest plant height and maximum fresh weight of the plant.

FYM of buffalo dung is bulky organic manure. Manure value of this is- water 18.1%, organic matter 31.67%, minerals 73.40%, nitrogen 0.5-1.5%, phosphorus 0.4-0.8%, potash (K2O) 0.5-1.9%, C/N ration 9.5, pH 7.36 degree C. (Yagodin, 1984). Thus it contains a larger amount of nutrients. Higher will be the dose of farm yard manure, maximum will be the nutrient supply to the plants.

Manure fertilizers supply crops not only with the inorganic nutrients but also with CO2 when decomposed in the soil. This provides favorable conditions for air supply and thus a good growth to the plant. The concept has been reported in cereals20 to 25 tons/ha require to 100 of CO2 & potatoes and vegetables equal to 40 to 50 t/ha required 200 to 300 kg CO2 (YAGODIN,84).

The positive growth response of the planets to the added farm rad manure indicates enhanced nutrient availability. There was gradual increase in aboveground biomass at all the dosages of FYM applied. Fresh weight and dry weight of underground parts increased gradually upto 28.8 t/ha and then decreased gradually upto 230.4 t/ha and become constant at further increase. Apparently the availability of nutrients increases the rooting density several fold in the zones where the concentration of nutrients, especially nitrogen was high (Garwood and Williams, 1967).

The supply of organic fertilizers improves the substrate capacity of the soil by increasing the water holding capacity. It also meets their energy requirements. As a result of the microbial activities, large volumes of carbon dioxide are evolved which upon dissolution in soil water, increase mineralization of insoluble minerals present in the soil (Raghvan, 1964). This results in increased availability of mineral nutrients to the plant. The decomposition of the humus provides carbohydrates, mineral nutrients like N, P, S in mobile form.

Increase in hexane extractables at lower dosages was observed. Farm yard manure supplies considerable amounts of calcium. Possible the Ca2+ which constitutes 7.5 % of the dry latex weight is important for latex biochemistry (Nemethy et al., 1983). Recently calcium binding protein calmodulin has been isolated and purified from E. lathyrism (Piazza et al., 1986). The calmodulin is important in plant cells, for both the regulation of free Ca2+ in cytosol and enzyme activation (Marme, 1983; Dieter, 1984). It activates a number of key enzymes such as phospholipase (Leshem et al., 1984) and NAD kinase by forming a calcium/calmodulin enzyme complex with the enzymes (Dieter, 1984). The enzymes might play an important role in biosynthesis of terpenoids. It is reported that lower dosages of Ca2+ in soil are absorbed by metabolic activity of plants, while at higher levels it is taken up by diffusion (Mass, 1969). This diffusion might in turn be regulated by overall anionic composition of the soil solution, affecting the ionic balance in the rhizosphere and root cells. Supply of FYM upto certain level (28.8 t/ha) increased chlorophyll contents and sugars.

V. CONCLUSION

Farm Yard Manure increased the biomass production successively whereas; lower dosages of FYM increased hexane extractables.

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Table-1 Effect of different dosages of farm yard manure on plant growth, hexane extractables, sugars and chlorophyll contents of *Pedilanthus tithymaloides* var. *green*

Treatment (t/ha)	Length(cm)		Fresh wt.(g)		Dry wt.(g)		Dry wt.(%)		HE (%)	Sugar (mg/g)	Chlorophyll (mg/g)		
	AG	UG	AG	UG	AG	UG	AG	UG			Chl a	Chl b	Total
Control	27.80	30.45	44.00	29.07	5.68	4.13	12.91	14.21	4.33	40.00	0.68	0.37	1.05
7.2	32.53	36.00	55.23	29.33	7.43	4.34	13.45	14.80	5.37	73.00	0.55	0.52	1.37
14.4	33.27	36.07	55.25	29.50	7.88	4.40	14.26	14.92	5.48	78.00	0.91	0.52	1.43
28.8	34.93	38.35	74.95	37.47	9.06	7.15	12.09	19.08	5.75	94.00	0.94	0.56	1.50
57.6	36.10	39.11	75.85	37.30	9.13	7.05	12.04	18.90	5.25	86.00	0.90	0.54	1.44
115.2	39.66	39.11	90.87	36.80	9.85	6.45	10.84	17.53	5.24	66.00	0.88	0.54	1.42
230.4	47.00	39.43	103.50	35.60	10.68	6.15	10.32	17.28	5.22	59.00	0.88	0.53	1.41
460.8	50.83	43.06	126.83	35.60	12.50	6.15	9.86	17.28	5.16	51.00	0.87	0.53	1.40
'F' test			Sig.		Sig.		Sig.		Sig.	Sig.			
SEM +			1.05		1.07		3.89		1.01	1.04	0.74		
CD at 5%			2.15		2.19		7.97		2.07	2.13	1.52		
CD at 1%			2.90		2.96		10.75		2.79	2.87	2.05		

Sig = Significant, wt. = Weight, HE= Hexane Extractable