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STUDIES ON ORGANIC FERTILIZING POTS

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Considering the heavy losses of plants and growth set-back during transplantation as well as the availability of agro-wastes, organic fertilizing pots were prepared and experiments conducted. The main ingredients for various sets of pots included different composts, biogas slurry and cowdung manure. The binding materials used included wheat hull, paper pulp, dried and chopped reed plants and clay.

The results of comparative efficiency of different sets of pots have been represented by three tables. A histogram has also been provided to show the comparative growth of plants in different categories of pots after a period of six months. The fertilizing pots made from American and Chinese composts as well as biogas slurry were found more effective as compared to those made from Indian compost and cowdung manure. In control pots the plants were stunted, yellowish in colour and undernourished.

Key words : Organic, Fertilizing, Pots.

INTRODUCTION

It has been universally observed by plant scientists, horticulturists and nurserymen that when a seedling is transplanted from an earthen pot to the soil, there is generally a growth set-back. Frequent mortality of seedlings has also been experienced. The problems of growth set-back and frequent mortality of seedlings could be reduced by the use of fertilizing pots made from organic materials and composted plant wastes etc. as done in our experiments.

In the world of diminishing resources and increasing needs, each opportunity for the use of waste materials must be utilized. Proper utilization of agro-wastes available in huge quantities cannot be denied when they could be easily converted to useful items [1]. Biomass in the form of agricultural wastes and residues has already contributed significantly to civilization and it is also a source of energy [2].

Keeping in view the utility of organic pots on one hand and the availability of large quantities of agro-wastes, improvised plastic moulds in different sizes and shapes were fabricated in the laboratory and finally one was selected for the said purpose. Pots made from different combinations of composts, biogas slurry, cowdung manure and binding materials were tested for different qualities needed for the desired results. Such pots offer several advantages over other methods of crop establishment. These include minimal losses at the time of transplantation; faster re-establishment of plants, particularly under unfavourable conditions, such as hot, cold and dry weathers. Uniformity of plant size is also maintained specially in the initial stages of growth. The organic pots provide all the nutritional requirements necessary for the healthy growth of the seedlings.

At the time of transplantation the organic pots are buried in the soil. In due course, the roots of the seedlings grow out from the sides and bottom of the pot which is in the process of biodegradation. Such organic pots are very much in demand in many developed countries and are used in forestry, horticulture and agriculture nurseries etc. [3, 4].

MATERIALS AND METHODS

Various types of locally produced composts were used as principal ingredients in the preparation of fertilizing pots [5, 6]. Biogas slurry and cowdung manure was obtained from the market. All ingredients were ground and sun-dried at a temperature ranging between 37-42^{o} which minimised the number of bacteria and fungi [7].

Paper pulp, wheat hull, clay and pieces of dry reed plants were used as binding materials. Old newspaper pieces were first soaked in water for 10–15 days and a homogenized paste was obtained by mixing it manually. It was then dried, powdered and stocked to be used for making the pots.

These were prepared using different permutations and combinations of composts, biogas slurry, cowdung manure etc. with binding materials.

The percentages used have been indicated in Table 1. The ingredients were mixed and homogenized to be moulded into pots. Longitudinal section of the mould is given in Fig. 1. The moulded pots were sun-dried for a period of 4–9 days as required by the composition of each. Different sets of fertilizing pots (Fig. 2) were tested for durability

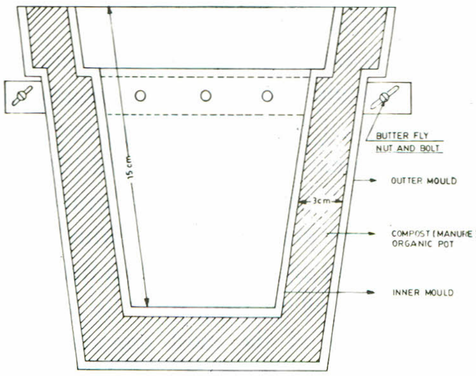

Fig. 1. Longitudnal section of mould for organic fertilising pot.

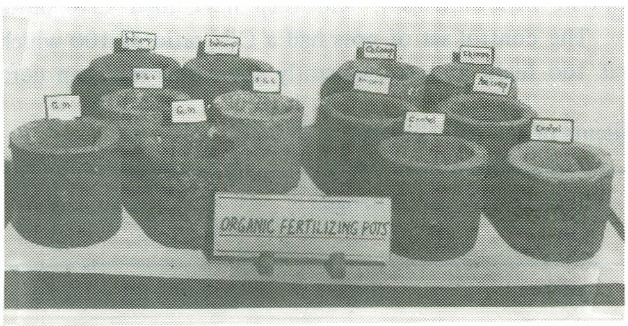

Fig. 2. Different sets of fertilizing pots used in the experiments.

against watering and weather conditions. A set of control was also kept for comparison. These pots were devoid of compost and any other nutrients.

Organic fertilizing pots having different compositions were filled with sterilized manure and river bed soil. Seeds of *Leucaena leucocephala* (Lam.) de Wit. (Ipil-Ipil) were sown in different sets. This plant was selected for our experiments on the basis of its importance for providing forage and wood, and its usage in reforestation and soil improvement [8, 9]. In some parts of central America and Southern Asia, people also eat young leaves and seeds of Ipil-Ipil [10]. For convenience, different compositions used for making fertilizing pots as well as their biodegradation periods and other details have been represented by self explanatory Tables (1–3). A histogram has also been provided showing the growth of Ipil Ipil plants in different categories of organic pots after a period of six months (Fig. 3).

RESULTS AND DISCUSSION

Growing seedlings in organic pots has several advantages which have already been mentioned in the introduction. Besides other uses, these pots could also be utilized for intercropping to save time and labour. This also makes

Table 1. Showing different compositions used for making fertilizing pots.

Category of pots	Principal ingredients		Binding ingredients %				pH of soil/ compost	Organic matter of soil/compost %	C/N ratio of soil/compost
			Clay	Paper pulp	Wheat hull	Read (cat-tail)			
A	Control	0%	25%	25%	25%	25%	7.95	3.84	100
B	Chinese compost	40%	0%	20%	40%	0%	7.15	30.0	12.8
C	American compost (BARC)	40%	0%	20%	40%	0%	7.20	26.8	14.1
D	Indian compost (WINDROW)	40%	0%	20%	40%	0%	7.70	18.7	8.5
E	Biogas slurry	40%	0%	20%	40%	0%	7.4	23.8	16.6
[illegible]	Cowdung manure	40%	0%	20%	40%	0%	7.5	61.4	26.7

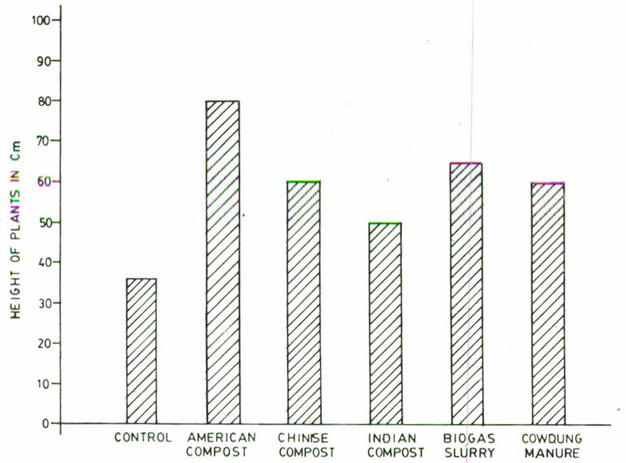

Fig. 3. Histogram showing the growth of ipil-ipil plants in different catagories of organic pots after six months burial.

possible an early off-season introduction of fruits and vegetable crops in the market.

The principal and binding ingredients were selected on the basis of nutrient values, binding quality and their availability in general. The principal ingredients were composts in which organic matter content and C/N ratios were as shown in Table 1. Organic matter in abundance acts as a stimulant to soil micro-organisms. When the organic matter decomposes in the soil, ammonia is first released and NH_4 ions are oxidised to NO_3 which is utilized by the seedlings [11]. One of the most important factors of compost is the C/N ratio. It provides a guide to the progress of decomposition. Agro-wastes such as wheat-hull and straw contain little nitrogen, and thus have high C/N ratio. The control set of pots had a C/N ratio of 100 which was too high, and consequently there was nitrogen defi-

Table 2. Showing different ingredients of soil and compost.

S. No.	Sample of compost used	Ash %	Carbon %	Nitrogen %	K %	P %
1.	Control soil	61.6	34.2	0.34	2.0	0.10
2.	Chinese compost	70.0	16.6	1.30	3.0	0.42
3.	American compost (BARC)	73.2	14.9	1.05	0.65	0.46
4.	Indian compost (WINDROW)	81.3	10.4	1.22	1.12	0.42
5.	Biogas slurry	38.6	38.0	2.3	1.42	0.54
6.	Cowdung manure	76.2	22.7	0.85	1.25	0.31

Table 3. Showing factors involved in drying and biodegradation of organic pots.

Category of pots	Principal ingredients	Drying period of pots in sunlight	Day temp. $0^{o}C$	Relative humidity	Watering period	Biodegradation periods under soil
A	Control	7–8 days	34^{o}	36.0	daily	90 days
B	Chinese compost	5–6 days	35^{o}	54.0	”	45 days
C	American compost (BARC)	4–5 days	36^{o}	53.5	”	30 days
D	Indian compost (WINDROW)	6–7 days	37^{o}	17.0	”	60 days
E	Biogas slurry	5–6 days	33^{o}	58.5	”	45 days
F	Cowdung manure	6–7 days	33^{o}	51.5	”	50 days

ciency which was indicated in retarded growth and yellowing of leaves. For healthy growth, the C/N ratio of compost should not go beyond 20 [12, 13].

The best growth of seedlings was observed in American compost (C/N ratio–14.1). The pots with biogas slurry (C/N ratio–16.6) and chinese compost C/N ratio 12.8) had also healthy seedlings. Plants in pots with cowdung manure (C/N ratio 26.7) and Indian compost (C/N ratio 8.3) were not as healthy when compared to that of American and Chinese composts as well as biogas slurry. It seems that the C/N ratio of 14.1 provides the optimum quantity of organic matter required.

Table 3 shows different constraints against which organic pots were tested. Drying period of different sets of organic pots depended on the principal and binding ingredients used. The drying time for control pots was the maximum (7–8 days) because they included non-porous clay with high water retention capacity, whereas, the pots made from American compost had the shortest drying period (4–5 days) due to high porosity and comparatively less water retention capacity. All the pots, irrespective of composition, were watered daily and remained intact upto 3 months while Ipil Ipil seedlings grew. No cracks were observed in any of the pots used for experiments. When the seedlings attained a height of 20 cm the organic pots were buried in the soil to record the time taken for disintegration. The best organic pots (containing American compost) biodegraded in the shortest period of 30 days. It is said that this method of composting is a better method in which the organic matter present in the compost in speedily converted into a simpler form through accelerated biodegradation, resulting in healthy growth of seedlings. In our experiments also the best results were obtained with American compost. Pots made from Chinese compost and biogas slurry disintegrated in 45 days and here also a healthy growth was observed. Pots made from Indian compost and cowdung manure biodegraded in more than 45 days and the growth of the seedlings was not satisfactory. Control pots on the contrary took 90 days to disintegrate under soil.

Precisely it could be said that when an organic fertilizing pot is made from a well balanced manure, it taken lesser time for disintegration and speedily supplies the necessary nutrients for the healthy growth of seedlings.

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