

Liquid organic manure is a boon for organic cultivation of crops

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ABSTRACT

Low concentration of nutrients in organic manures can not overcome the problem of nutrient deficiencies. The foliar application of mineral nutrients by means of spray offers a method of supplying nutrients to higher plants more rapidly than root application. Foliar application seems essential part of cultivation when available water in top soil is scarce and there is decline in nutrient availability during growing season. Mineral nutrients become growth limiting factor. Conditions are more prevailing in high calcium carbonated soil (calcareous soil) where nutrient availability especially Fe is restricted. In limited phloem mobility of calcium, repeated sprays of calcium can mitigate the problem of calcium in growing crops. Thus enriched liquid organic manure were prepared by different locally available materials like HGPR(34/74) gypsum, pyrite, neem leaves, nimboli, aloe vera, dhatura, aak, non edible cakes and cow urine. These naturally available bio degradable wastes were allowed to decompose by earthworm (*Eisenia foetida*). Vermicomposted enriched material were analysed for different nutrient content. Enriched manure was dissolved in water and cow urine in different ratio. The nutrient value was found highest in enriched vermicompost to traditional composting. Total water soluble nutrients were higher with dilution to 1:30 (enriched organic manure and water). Addition of cow urine appreciably increased all nutrients. Total water soluble calcium was higher in gypsum treated organic manure. Nitrogen, phosphorus, sulphur and iron content were high in enriched liquid organic manure. Higher concentration of calcium in liquid organic manure inhibits the incidence of disease. Most of the parasitic fungi invade the apoplasm by releasing pectolytic enzymes which dissolves the middle lamella. The activity of these enzymes is strongly inhibited by liquid enriched organic manure. This enriched liquid manure can easily be prepared by farmers, is eco-friendly and helpful in organic production and protection of crops.

Key words : Coriander, Enriched vermicompost, Gypsum, Pyrite

INTRODUCTION

The gravity of the environmental degradation and human health hazards have drawn the attention of the researchers and planners towards findings out ecologically sound, viable and sustainable organic farming systems. The progress of organic farming will largely depend on generation of new technology (Dahama, 1997). Soil application of organic manures alone can not fulfill the nutrient requirement of crops so, for additional supply of nutrients. There is a need to develop enriched liquid organic manure which can supply adequate nutrients as well as have insecticidal/ fungicidal property.

An attempt has been made to prepare liquid organic manure (All purpose organic vermicompost wash) using cow dung, non-edible cakes, neem leaves, nimboli, aloe vera, dhatura, aak, HGPR (34/74), gypsum, pyrite and cow urine and was analyzed for different nutrient contents.

MATERIALS AND METHODS

For preparation of all purpose enriched vermicompost raw materials like fresh cow dung, neem leaves, aak leaves, aloe vera, dhatura, tobacco leaves were chopped and HGPR (34/74), gypsum, pyrite were collected and mixed in the ratio of 25:10:5:1:3:1:1 + crop residues (Total for 100 kg material) on wt./wt. basis. This material was allowed to decompose for 20-25 days till the temperature

of the degraded material becomes suitable for vermicomposting. Earthworm (*Eisenia foetida*) and bioinoculants were introduced in this material for vermicomposting. After 60-65 days the fully decomposed all purpose organic vermicompost is harvested and was used as base material for preparation all liquid organic manure. The material was diluted in different ratios with water and mixed with 20% cow urine and analyzed for their nutrient contents. The analysis was done by the standard procedures as given by Jackson (1973). The determination of potassium was done by flame photometer and micronutrients were analyzed by using AAS (Lindsay and Norvell 1978).

RESULTS AND DISCUSSION

Nutrients compositions and active ingredient of raw materials viz. cow dung, non-edible cakes, neem leaves, aak leaves (*Calotropis* sp.), aloe vera, dhatura (*D. innoxia*), tobacco, cow urine are presented in Table 1. The data showed that nitrogen contents of different raw material used varied from 0.35 to 5.8%. The highest nitrogen contents was in neem leaves and neem cakes i.e. 5.8% and 5.2%, respectively. The P₂O₅ per cent varied from traces to 1.9%. Similarly K₂O% varied from 0.30 to 1.50 per cent. Neem leaves, neem cake and cow urine were found to be rich source of potash, N and P₂O₅ the active extracts or ingredients responsible for biocidal

Table 1: Nutrient composition of raw material

Sr. No.	N %	P ₂ O ₅ %	K ₂ O %	Active Ingredient
Cow dung	0.40	0.20	0.30	-
Calotropis spp.	0.35	0.12	0.36	O- Pyrocatechlic acid and Ascorbic acid
Tobacco	1.12	0.84	0.80	Alkaloids nicotine
Neem cake	5.20	1.10	1.50	Nimboicinol
Castor cake	4.00	1.90	1.40	-
Cow urine	1.00	Traces	0.5-1.0	Hormones, Vitamins, enzymes and antibodies
Aloe vera	-	-	-	Aloin and emodin
Datura (<i>D. innoxia</i>)	-	-	-	Alkaloids
Neem leaves	5.80	1.50	1.50	Azadirachtin
Nimboli	-	-	-	Nimbanol

activity (biopesticide/ fungicide) of different raw materials like aak, dhatura, neem, nimboli, aloe vera, tobacco are also presented in Table 1. The Azadirachtin, meliacin are

Table 2 : Nutrient composition of all purpose organic enriched vermicompost

Character	value
N %	2.30
P ₂ O ₅ %	4.92
K ₂ O %	1.60
Ca mg kg ⁻¹	4.54
S mg kg ⁻¹	1.65
Mn mg kg ⁻¹	290
Zn mg kg ⁻¹	82.20
Cu mg kg ⁻¹	35.5
Fe mg kg ⁻¹	94.48
C:N ratio	11.73
Moisture %	26
Organic carbon %	27.0

effective bio pesticides (Satyavir, 2005). Like wise nicotin, aloin, emodin, nimbanol etc. are efficient bio pesticides.

The chemical analysis of finally decomposed all purpose (Table 2) revealed that it contained N, P₂O₅ and K₂O were 2.3, 4.92 and 1.60 per cent, respectively, Mn, Zn, Cu, Fe, Ca, S were 290, 82.20, 35.5, 94.48, 4.54, 1.65

Table 3 : Total water soluble nutrient composition of vermiwash

Vermi wash (Solid: water)	pH	EC (d Sm ⁻¹)	N (%)	P ₂ O ₅	K ₂ O	Ca (mg kg ⁻¹)	Mg	S
1:4	8.2	1.7	0.3	253	1264	208	12.0	374
1:5	8.6	1.9	0.4	317	1640	232	14.4	483
1:10	8.5	2.7	0.4	743	1800	288	14.4	1280
1:15	8.7	3.9	0.6	1077	1900	456	24.0	1991
1:20	8.6	4.4	0.6	1387	2320	540	48.0	2690

mg kg⁻¹, respectively. The moisture percentage was 26 and the C:N ratio was 11.73 which clearly indicates that the vermicompost is fully decomposed.

This material was diluted by tap water in different ratios and were thoroughly mixed and liquid part was filtered after 24 hours. The liquid organic manures/ decoctions were analyzed for their nutrient contents. Data presented in Table 3 and 4 show that pH, EC of N,P, and K varied from 8.2 to 8.7, 1.7 to 4.4 dSm⁻¹, 0.3 to 0.6%, 253 to 1387, 1264 to 2320 mg kg⁻¹, respectively and Ca, Mg and S varied from 208 to 540, 12 to 48, 374 to 2690 mg kg⁻¹ respectively. As regards the micronutrients Zn, Mn, Fe varied from 49.60 to 70.50, 180 to 260, 5000 to 8100 mg kg⁻¹, respectively. It is clear from the data that maximum concentration of nutrient was found in 1:20 ratio. It is suggested that 1:20 ratio is the best ratio for preparing liquid organic manure and can be successfully used for crop production and protection in different crops. It is a boon for standing crops. It can be used for drenching or as fertigation in drip system. It can also be applied as 20 per cent spray in standing crops.

Table 4 : Total water soluble micronutrient composition of vermicompost

Vermiwash (Solid : water)	Zn	Mn	Fe	Cu
	mg kg ⁻¹			
1:4	49.60	180	5000	15.5
1:5	50.15	190	5500	20.0
1:10	54.60	210	6000	22.0
1:15	65.23	245	7500	25.0
1:20	70.50	260	8100	30.0

Conclusion:

It can be concluded that

- Application of all purpose organic rich vermiwash will be beneficial for the crop production, and application of this vermiwash along with enriched vermicompost as soil application will boost yield and quality of crops.
- It will provide both macro and micronutrients for plant growth.
- It will provide growth –promoting substances,

which stimulate plant growth.

– Antibiotic substances produced will control plant pathogens and biocidal property of neem and aak will help in controlling insects and pests.

The technique is simple and can easily be adopted by farmers doing organic farming.

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