MAURITIUS RESEARCH COUNCIL

IMPROVING THE USE IF POULTRY WASTE FOR CROP PRODUCTION PROJECT

Final Report

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Improving the use of poultry waste for crop production Project 95/32

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Executive Summary

The intensive crop production systems rely heavily on inorganic fertilisers, which exert a strong influence on the cost of production. There exists the possibility for reducing the cost of production with the use of local, potential sources of organic wastes like the poultry litter. With the reduced availability of the conventional source of organic fertiliser, (namely farmyard manure), farmers are resorting to the use of poultry litter. However; the quality of the poultry litter or manure used is highly heterogeneous and it is important to assess its nutrient contents in view of using it as a partial substitute for inorganic fertilisers. the storage and disposal of poultry litter is a potential source of environmental pollution.

The objectives of this study were firstly to assess the fertiliser value of poultry waste (litter and manure) in foodcrop production and secondly to investigate how poultry waste can be disposed so that it does not affect the environment.

The project consists of three components namely the determination of the nutrient qualities of poultry waste(both litter and manure), the composting of such waste and field trials to assess the fertiliser value of poultry composts.

All three activities were undertaken. Results indicate that poultry waste is alkaline in nature with pH varying from 8.5 in litter to 8.8 in manure. Poultry waste can thus contribute significantly towards improving the quality of the highly acidic leached soils found in the uplands of Mauritius. Poultry manure (9 175 ppm and 26.8 meq % respectively) is richer than litter (7 017 ppm and 20.8 meq %) in available P and K, but both represent good sources of K and P. Poultry manure contained less organic matter (31.6 % as opposed to 43.9 %) and was slightly richer in total N (2.6 %). The C:N ratio of poultry waste, ranged from 7:1 to 12:1, and indicates that N will be readily available to the plant. Composting of poultry waste with other carbon rich materials can be considered in a composting process.

The pile method was found to be effective for composting poultry waste. When poultry waste was composted in heaps above ground, maturity of the compost was reached after 8 to 10 weeks with litter and about twice as long i.e. 18 to 20 weeks in the case of manure. Composting lowered pH to near neutrality and decreased organic matter content probably owing to oxidation of carbon by microorganisms. Composting also brought about an increase in available P and K but the trends in changes in total N and in C:N ratio were less perceptible. Poultry compost, be it manure or litter, is slightly alkaline in nature (average pH: 7.65) and could thus prove to be a valuable resource for improving acidic soils in the superhumid areas of the country.

Field trials were carried out to assess the fertiliser value of composted poultry manure and litter. Results indicate that when manure was used at the rate of 50t/ha in cabbage the amount of mineral fertilisers can be reduced by two-thirds the level usually recommended i.e. 60 kg N, 80 kg P_2O_5 and 100 kg K_2O per hectare. However, results were not consistent with lettuce and cauliflower.

Acknowledgements

We wish to express our gratitude to the Mauritius Research Council for funding the project. We are particularly indebted to all the producers who provided waste samples and to the Agricultural Chemistry Division of the Ministry of Agriculture, Food Technology and Natural Resources for analytical support. We are also grateful to the technical staff of the Central Experiment Station and Wooton Experiment Station for assistance during project implementation.

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1 Introduction

Farmyard manure which has been used traditionally as a source of organic matter and nutrients for foodcrop production has become increasingly scarce and expensive as result of a persistent decline in local livestock activities. Foodcrop growers are therefore turning more and more to poultry waste as an alternative source of organic fertiliser.

Most local poultry farms are engaged in the rearing of two types of flocks namely laying hens which are kept for around 18 months, and broiler chickens which reach slaughter age after 6 to 8 weeks. Birds are either raised on the deep litter system whereby the floor is covered with wood shavings or sawdust to allow for mixing of droppings (broilers mainly) or on the battery system i.e. in cages where droppings are not mixed with any foreign material (layers mainly). Poultry waste used by foodcrop growers then consists either of a mixture of poultry manure, wood shavings and sawdust, referred to as litter, or of pure poultry droppings with little or no foreign material, called manure. Fresh poultry waste is normally dumped in the field to allow for decomposition and is not properly treated as such. Since decomposition takes time, there are risks of losing valuable nutrients mainly by leaching and volatilisation.

This study for improving the use of poultry waste in crop production was undertaken with a view to investigate the characteristics, composting, and fertiliser value of resulting composts in the production of cabbage, lettuce and cauliflower.

2 Objectives

(i) to replace partly if not totally the amount of inorganic fertilisers used in foodcrops production by poultry wastes.

(ii) to dispose poultry waste usefully so that it does not affect the environment.

3 Materials and Methods

3.1 Sampling and characterisation of wastes

Eight poultry farms were selected on basis of flock type, rearing capacity and accessibility, as presented in Table l. A total of 33 waste samples, measuring about one kg each, were collected from these farms, at 2 to 3-month intervals depending on availability, during the period April 97 to March 98. The material was air-dried and sub-sampled for determination of pH, total N, available P and K, organic matter and C:N ratio.

Table l: Particulars of farrns selected for waste sarnpling

Narne of Farin	Location	Size*	Type of flock and raising system	Type of waste collected
Mauritius Fann Lid.	Riche Bois	Large	Broiler on deep litter	Litter
Ceres Ltd	Eau Bleue	Large	Layer in batteries	Manure
Poultry Breeding Centre (Governmental)	Reduit	Large	Parent stock on litter Layer in batteries	Litter and manure
Mon Bois Poultry (Governmental)	Mon Bois	Medium	Layer on litter	Litter
Sadick Poultry Farm	La Marie	Medium	Broiler on litter Layer in batteries	Litter and manure
Chicken Master	Castel	Medium	Layer in batteries	Manure
Camp Levieux	Camp Levieux	Sinai\	Broiler on litter Layer in batteries	Litter and manure
Belle Mare NFOYF**	Belle Mare	Small	Broiler on litter	Litter

* Size:

Small	No. of birds < 1000
Medium :	1000 ≤ No. of birds < 5000
Large	No. of birds ≥ 5000

** NFOYF: National Federation of Young Farmers

3.2 Compost-making

As initially stated out in the project protocol it was proposed to produce composts in pits and in pile above-ground. Composting in pits was discontinued for practical reasons like difficulty in setting, difficulty in turning, difficulty in removing the compost and reluctance on the part of labourers to be in touch with the foul-smelling poultry manure in the pit. It was also envisaged to compost biogas spent slurry (solid matter) and to compare with composted poultry litter and poultry manure. However, it was not possible to prepare compost from the slurry because of the very small amount produced (I kg per 50 kg manure) during anaerobic digestion of poultry manure. This is due to the fact that poultry manure is poor in straw or fibre content.

Compost-making was adapted from the pile method above-ground . Litter and manure were heaped separately above the ground in piles 2.0 m long, 2.0 m wide and 1.5 m high and the heaps were turned every two weeks. Six such heaps, three each to manure and litter, were set up between April 97 to August 97 at the Central Experiment Station, Reduit to monitor temperature changes occurring within the composting mass. Temperature was actually recorded every two or three days from the centre and sides of the mass. The compost was considered mature when most of the original material had become moist, soft, deep-brown or blackish in colour and when its temperature had stabilised to near ambient temperature.

The initial material (fresh waste) and the final product (compost) were analysed along same lines as for samples mentioned at (i).

3.3 Field experimentation

Twelve field trials were conducted at the Central Experiment Station, Reduit, between June 96 and June 98 to assess the effects of composted poultry waste used solely or in combination with mineral fertilisers applied at 0 (no fertiliser) or 1/3 or 2/3 or full complement of the amounts actually recommended, on the performance of cabbage (Brassica oleracea var. capitata cv KK Cross), cauliflower (Brassica oleracea var.

oleracea cv Locale). and lettuce (Lactuca saliva cv Mignonette). Similar trials were carried out at Wooton Experiment Station, Curepipe between February 97 to August 98 . The Central Experiment Station is situated at 310 m above sea level is located in the humid zone, with an long-term average rainfall of l 519 mm annually. The soil belongs to the Low Humic Latosol type. The Wooton Experiment Station is situated at 555 m above sea level is located in the superhumid zone, with an long-term average rainfall of 3800 mm annually. The soil belongs to the Latosolic Brown Forest type.

All trials were laid down in randomised block designs with four replicates. Plot size was l m x 4 m for lettuce, 3 m x 3 m 60 for cabbage and 3 m 75 x 4 m 80 for cauliflower. The three crops were grown according to recommendations contained in the Guide du petit exploitant. Ministry of Agriculture and Natural resources ,1995. The fertiliser treatments applied on a hectare basis were for:

(a) lettuce

T1: 50 t FYM, 135 kg N, 75 kg P_2O_5 and 90 kg K_2O (recommended practice)
T2: 50 t litter or manure, 135 kg N, 75 kg P_2O_5 and 90 kg K_2O
T3: 50 t litter or manure
T4: 50 t litter or manure, 45 kg N, 25 kg P_2O_5 and 30 kg K_2O
TS: 50 t litter or manure, 90.0 kg N, 50 kg P_2O_5 and 60 kg K_2O

(b) cabbage

T1: 50 t FYM, 90 kg N, 120 kg P_2O_5 and 150 kg K_2O (recommended practice)
T2: 50 t litter or manure, 90 kg N, 120 kg P_2O_5 and 150 kg K_2O
T3: 50 t litter or manure
T4: 50 t litter or manure, 30 kg N, 40 kg P_2O_5 and 50 kg K_2O
T5: 50 t litter or manure, 60 kg N, 80 kg P_2O_5 and 100 kg K_2O

(c) cauliflower

T1: 50 t FYM, 84 kg N, 115 kg P_2O_5 and 150 kg K_2O (recommended practice)
T2: 50 t litter or manure, 84 kg N, 115 kg P_2O_5 and 150 kg K_2O
T3: 50 t litter or manure
T4: 50 t litter or manure, 28 kg N, 38 kg P_2O_5 and 50 kg K_2O

TS: 50 t litter or manure, 56 kg N, 76 kg P_2O_5 and 100 kg K_2O

FYM, compost and inorganic fertilisers with the exception of N were applied to experimental plots three days prior to transplanting. For lettuce, half the amount of N fertiliser was applied at transplanting and the remainder 10 days after whereas for cabbage and cauliflower N was applied as topdressing 15 days after transplanting.

Phytosanitary control measures in lettuce were limited to a soil drench of Dursban 4E *(Chlorpyrifos)* at 3g/L directed against ants after basal fertiliser application. In cabbage. to guard against attacks by snails *(Achatina fulica)* and cutworms *(Agrostis ipsilon)* snail pellets (3% *me/aldehyde,* 2% *carbaryl)* and agro-cutworm baits (10% *sodium fluosilicate)* respectively were applied around newly transplanted seedlings. Dursban 4E at the rate of 3g/L was applied as soil drench against ants as in lettuce. Two weeks after transplanting, Decis *(cyano-phenoxybenzyl)* at the rate of 0.5 mL/L was sprayed on two occasions at weekly intervals to protect against leaf caterpillars. As preventive control measures against Diamond Back Moth *(Plutella xylostel/a),* Vertirnec 1.8 EC *(abameclin)* was sprayed alternatively with Suntap 50 % *(lhiocarbamate)* or Cascade *(flufenoxuron)* at 0.5 mL/L, 1.0g/L and 0.5 mL/L respectively. Three to four applications were done fortnightly or weekly, depending on rainfall conditions. *Crocidolomia* and *Plutella* attacks were observed in all trials but were kept under check. Black rot of cabbage caused by *Xanthomonas campestris* was successfully controlled by weekly applications of Champion *(cupric hydroxide)* at the rate of 3 g/L. Spraying was stopped 3 weeks before harvest. The preventive measures applied to cabbage were adopted for caulifiower. Control measures were successful and it was observed that cauliflower was less attacked by diamond back moth than was cabbage. Control over irrigation was also used as a means for keeping the disease al bay. Moreover, infected leaves were removed lo prevent disease spread.

Crops were harvested by cutting just below the node of the first leaf. Total fresh weight, fresh head weight, head diameter and head circumference were parameters recorded at harvest for cabbage and cauliflower and fresh weight and head diameter for lettuce.

4 RESULTS AND DISCUSSION

4.1 Waste characterisation

Results of chemical analysis of waste samples collected from the different farms are presented in Table 2. Statistical analysis revealed that the differences observed in organic matter content between litter and manure were not significant at 5 % level. By virtue of its composition, litter (43.9 % OM) is richer than manure by about 40%, which indicates clearly that soil organic matter will be better improved by its application than by manure.

Slight non-significant differences in pH of litter were obtained among farms, in contrast to manure, where the pH of samples taken from large farms (pH: 8.3) were significantly lower than those from small (pH: 9.2) or medium-sized farms (pH: 9.1).

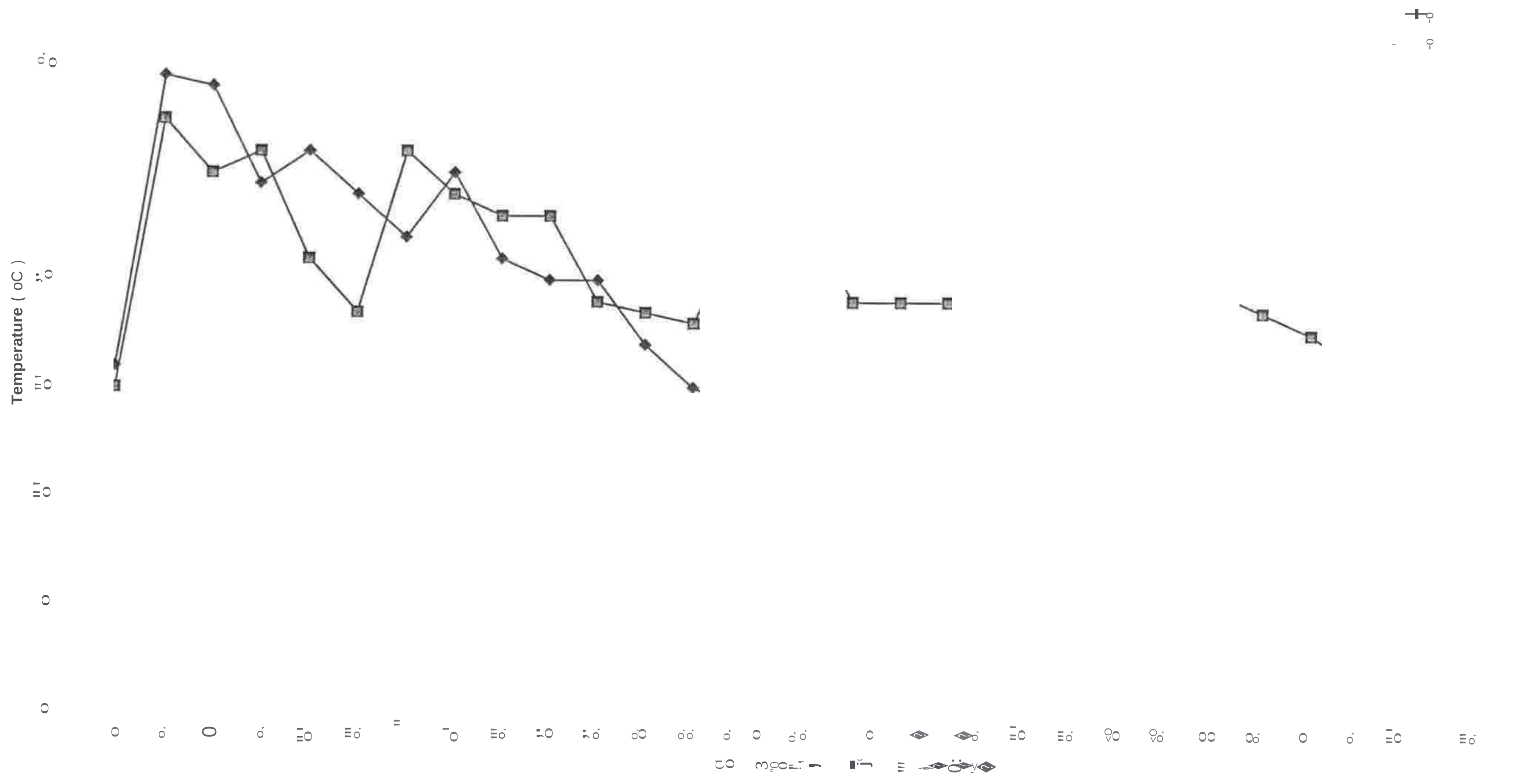
Table 2: Characteristics of poultry wastes **according to farm size**

FARM SIZE	LITTER						MANURE					
	pl\	Total N (0/0)	Av.•P (ppm)	Av K (rneq%)	OM (%)	CIN	pH	Tota! N (%)	Av.P (ppm)	Av K (mcq %)	OM (0/0)	CIN
Small	8.6	21	4 426	I I.6	44.2	12	9.2	2.6	5 942	36.1	34	8
Medmm	81	20	9 06.\	28.0	42,4	15	91	2.7	7 194	29.4	30 7	8
Large	8.8	3.5	7 562	22.7	45.0	8	83	2.6	12 773	19.5	31 2	7
Mean	8.5	25	7 017	20.8	439	12	88	2.6	9 175	26 8	31 6	8

"uv.. available

Total N, available P and K, and C:N ratio of litter varied significantly with farm size. Litter from large farms were found to contain significantly higher levels of N (3.5 %) as opposed to small (2.1 %) and medium farms (2.0 %). This could be due to less wastage of feeds by small and medium poultry growers and/or utilisation of higher quality feeds i.e. feeds richer in proteins, by large growers. As regard available P and K contents. lower values were recorded from small farms in comparison with large and medium ones. On the other hand, C:N ratios were significantly higher in small (C/N: 12) and medium (C/N:

Figure 1



15) farms than in the larger units (C/N: 8). These differences arose from the higher N content of litter from large farms, as already pointed out.

In contrast to litter, farm size did not bear significantly on the NPK content and C:N ratio of manure. The latter was found to be slightly richer in total N than litter (2.6% as opposed to 2.5%) on account of its being not freely mixed with foreign material.

The C:N ratio of poultry waste, which ranged from 7:1 to 12:1, appears too low for proper decomposition. This ratio should lie between 20:1 to 30:1 for proper composting. The carbon content of poultry waste can be raised fairly easily in the local context by mixing it with carbon-rich materials such as sawdust, cane straw, dried grasses or **bagasse.**

4.2 Temperature studies during compost-making

The temperature profiles of both manure and litter composting masses are illustrated in Figure 1. In the case of litter, it was observed that the temperature rose to around 60 °C after 5 days and was maintained for about one week. Subsequent rises in temperature after turning - indicated by arrows in the figure -. resulted from the exposure of fresh surfaces to microbial attack and from improved aeration of the composting mass. The litter compost matured after 60 to 70 days under the experimental conditions which prevailed (protection from rainfall and sunshine) and at an average air temperature of around 20°C.

Manure took twice as long, i.e.18 to 20 weeks to mature under these same conditions. The maximum temperature reached (55°C) was lower by 5°C in comparison with litter. This difference can be attributed to a relatively lower rate of microbial activity in the heap due to its inherent lower C:N ratio. Regular turning of the composting mass would thus be required to aerate and to continuously expose new surfaces to microbial action. The incorporation of carbon in the form of chopped straw, grasses or bagasse should also help towards speeding up the process.

4.3 Characteristics of composted poultry wastes

Table 3 shows the differences in composition between the initial wastes and the final composts. Composting lowered pH to near neutrality and decreased organic matter content probably owing to oxidation of carbon by microorganisms. Composting also brought about an increase in available P and K but the trends in changes in total N and in C:N ratio were less perceptible .

Table 3: Composition **of fresh** wastes **and ensuing composts undergoing field-testing**

Type of waste	pH	Total N (%)	Available P (ppm)	Available K (meq %)	O.M (%)	C:N ratio
Fresh litter (air dried)	8.60	1.40	3 135	11.92	32.05	13
Comoosted litter	7.20	1.42	10 800	39.62	27.84	9
Fresh manure (air dried)	8.60	2.23	3 038	12.92	29.25	10
Composted manure	7.65	0.94	13 414	15.36	14.74	11

Poultry compost, be it manure or litter, is slightly alkaline in nature (average pH: 7.65) and could thus prove to be a valuable resource for improving acidic soils in the superhumid areas of the country.

4.4 Evaluation of composts on performance of lettuce, cabbage and cauliflower

4.t.l Lettuce -- Central Experiment Station, Reduit

Results of trials on lettuce carried out at Reduit, are presented in Table 4. In both trials involving litter composts. fresh weight was not significantly affected by any of the treatments imposed. Best yields (2.60 kg/m" in the first trial and 3.13 kg/m^2 in the second) were consistently obtained when litter compost was used in combination with recommended rates of mineral fertilisers. The same treatment also produced crops with significantly larger head diameter (22 cm) in the first trial . This finding was confirmed in the second trial, even if differences then were not significant and a reduction in diameter observed, with the largest diameter standing at 18 cm. Similar results were obtained with farmyard manure. It is worth noting that litter compost alone produced lettuce with lowest mean fresh weight and diameter.

Table -t: Yield (Y) in kg/rn^2 and menu diameter **(MD) in** cm **of lettuce** grown **on poultry** compost, Central Experiment Station, Rcduit, (1996-98)

Treatment	Liner				Manure			
	1st trial		2nd trial		1st trial		2nd trial	
	Y(kgim')	MD (cm)	Y(kgim')	MD (cm)	Yfkg/rn")	MD (cm)	Y(kg/m^2)	MD (cm)
Tl	*	*	3.00	18	*	*	2.03	22
T2	2.58	22:t	3.13	18	3.63[11]	20	2.03	21
T3	2.05	20b	2.58	15	4.15'	21	1.93	21
T4	2.18	19b	2.75	16	4.50'	21	1.95	21
TS	2.15	20'	2.80	17	4.25'	22	2.13	22
S.E. (±)	0.18	4.7	0.18	0.5	0.13	0.8	0.16	0.6

Means followed by the same letter are not significantly different at 5% according to DMRT
* Treatment not imposed

The response obtained with manure compost was different from that of litter. Indeed, as in the first trial, the treatment consisting of manure compost plus recommended fertilisers gave heads of significantly lower yields than those receiving none or partial fertiliser suppplementation. However, these results were not confirmed in the second trial as yields were not affected significantly by those same treatments. Nonetheless, highest yields (2.13 kg/rn") and largest mean diameter (22 cm) of heads were obtained when manure was used in combination with two-thirds of amounts of fertilisers actually recommended.

4.4.2 Cabbage -- Central Experiment Station, Reduit

The response of cabbage at Reduit to both composts (Table 5) indicates that total fresh yields were significantly reduced in absence of mineral fertiliser supplementation in the first trials only. Head yields on the other hand were not affected significantly in any trial. Indications also point to the possibility of substituting compost for farmyard manure since similar responses were noted when either was used in combination with full complement of fertilisers.

Table 5: Total yield (TY) in kg/Jn² and mean head yield (HY) in kg/rn² of cabbage grown on poultry compost, Central Experiment Station, Reduit, (1996-98)

Treatment	Litter				Manure			
	1st trial		2nd trial		1st trial		2nd rial	
	TY (kg/m^2)	HY (kg/m^2)	TY (kg/m^2)	HY (kg/m^2)	TY (kg/m^2)	HY (kg/m^2)	TY (kg/m^2)	HY (kg/m^2)
T1	5.66''	3.04	9.12	6.61	8.55"	5.18	9.83	7.60
T2	**6.22p**	**3.53**	9.92	**7.23**	7.99'	4.74	8.65	5.92
T3	5.01°	2.79	8.60	6.38	6.32°	3.62	9.05	6.89
T4	**5.25°**	2.87	9.56	7 02	7.41'	3.60	9.51	7.22
TS	5.71 ab	2.95	9.86	7.15	7.69'	4.69	9.26	6.83
S.E. (±)	0.24	0.20	0.51	0.80	0.49	0.49	0.80	0.59

It could also be deduced that when poultry litter was used at 50 t/ha highest yields were obtained when fertilisers were applied at recommended rates. However, when manure was used in place of litter yields were maximised when fertiliser application was reduced to two thirds of recommended rates, which underscores a potential saving of 30 kg N, 40 kg P2Os and 50 kg K_2O per hectare.

Table 6: Total yield (TY) in kg/m^2 and mean head yield (HY) in kg/m^2 of cauliflower grown on poultry compost, Central Experiment Station, Reduit, (1996-98)

Treatment	Litter				Manure			
	1st trial		2nd trial		1st trial		2nd trial	
	(kg/m^2)	(kg/m^2)	(kg/m^2)	(kg/m^2)	(kg/m^2)	(kg/m^2)	(kg/m^2)	(kg/m^2)
T1	–	–	2.97	0.33	2.75'	0.69'	3.99	1.09'
T2	3.17	0.84	2.24	0.27	3.59'	0.99''	3.97	1.09'
T3	4.11	0.93	2.41	0.29	2.16c	0.71'	2.82	0.58'
T4	4.04	1.02	3.15	0.24	3.24^{30}	0.87'''	3.59	0.96'
T5	3.69	1.25	2.13	0.19	3. 5au	1.16'	3.59	1.07'
S.E. (±)	0.39	0.22	0.178	0.07	0.22	0.09	0.29	0.08

4.3 Cauliflower -- Central Experiment Station, Reduit

With litter composts in both trials treatments imposed did not significantly affect total yield and head yield at 5% significance level (refer table 6). Curd formation in the second trial was poor possibly due high temperatures that prevailed during august-september 98. In the first trial maximum curd yield (1.25kg/m^2) was obtained when fertiliser level was reduced by one-third recommended level. However with manure , differences in total weight between treatments were statistically different in both trials. Significant differences in head yields between treatments were noted in the second trial only. Treatments receiving no fertiliser supplement gave significantly lowest yields. this indicates that supplementation with inorganic fertilisers is necessary. Treatments receiving manure plus full dose of fertilisers produced cauliflowers with highest total yield (3.78 kg/m^2) and highest head or curd yields (1.04 kg/m^2). It is to be noted that when the fertiliser level was reduced to two-third yields statistically similar to the control were obtained. The total yield was 3.37 kg/m^2 and the head yield was 1.12 kg/m^2.

4.4.4 Lettuce -- Wooton Experiment Station, Curepipc.

Table 7: Yield (Y) in kg/rn^2 and mean **diameter (MD) in** cm **of lettuce gro,vn on poultry compost,** Wooton Experiment Station,Curepipe, (1997-98)

Treatment	Litter		Manure	
	Y(kglm-)	MD (cm)	Y(kg/m-)	MD (cm)
Tl	2.925	21	2.88	17
T2	2.875	21	3.35	19
T3	2.80	21	3.225	19
T4	3.075	21	3.125	18
TS	2.90	21	3.30	19
S.E. (±)	0.17	0.72	0.23	0.50

Statistical analysis of data for both litter and manure composts revealed no significant differences in fresh weight and diameter of lettuces between treatments imposed (Table 7). Addition of fertiliser did not significantly reduced fresh yield and diameter of lettuces.

4.4.5 Cabbage -- Wooton Experiment Station, Curepipe.

Statistical analysis of data for both litter and manure composts revealed no significant differences in fresh total weight and fresh head weight of cabbages between treatments imposed. Table 8 shows that for both litter and manure total yield and head yield were maximum when the fertiliser level was reduced to two-third.

Table 8: Total yield (TY) in kg/m^2 and mean head yield (HY) in kg/m^2 of cabbage grown on poultry compost, Wooton Experiment Station, Curepipe, (1997-98)

Treatments	**Litter**		**Manure**	
	TY (kg/m^2	HY (kg/m^2	TY (kg/m^2	HY (kg/m^2
Tl	6.21	4.14	4.33	0.74
T2	6.48	4.29	4.39	0.80
T3	6.031	4.00	4.36	0 81
T4	5.62	4.05	4.23	0.77
T5	6.77	4.44	4.54	0.77
S.E. (±)	0.36	0.19	0.25	0.21

Table 9: Total yield (TY) in kg/m! and mean head yield (HY) in kg/rn^2 of cauliflower gr'own on poultry compost, Wooton Experfrncnt Station, Curepipc, (1997-98)

rcatrnent	**Liner**		**Manure**	
	TY (kg/m^2)	IIY (kg/m^2)	TY (kg/m^2)	HY (kg/m^2)
l	3.08:1	0.79'	l.09	0.34
2	3. \ Ja	0.80'	2.13	0.51
3	.J9c	0.39°	l.91	0.45
4	2.69^{11}b	0.72'	l.14	0.34
5	2.57°	0.71'	l.34	0.50
.E. (±)	0.13	0.07	0.28	0.08

-t.-t.6 Cauliflower -- Wooton Experiment Station, Curepipe.

Table 9 shows that with litter total yields and head yields for treatment recerving no fertiliser supplement were significantly lowest indicating that inorganic fertilisers should be added. Total yields were significantly higher when the recommended level of fertilisers are applied. However, the head yield for treatment receiving one-third the recommended fertiliser level was comparable to treament receiving full dose of fertiliser. Poultry litter can replace farmyard manure and the level of inorganic fertilisers can be reduced by two-third the amount usually recommended. In the case of poultry manure statistical analysis revealed no significant differences between treatment means for both parameters. Cauliflower growth at Wooton ES was poor probably due to low soil pH (average 4.5) and lack of water during critical growth stage. The high coefficient of variation (averaging 30 %) indicates the unreliability of the data for detecting differences between treatments.

5 CONCLUSION

The pile method for composting agricultural wastes is effective for quick composting of poultry manure and litter. Because of its inherently low C:N ratio, manure would nonetheless necessitate the inclusion of carbon-rich materials to reduce composting time relative to litter. The ensuing composts are a viable substitute for increasingly-scarce farmyard manure and can contribute significantly by virtue of their slightly alkalinity towards improving the quality of the highly-acidic, leached soils found in the uplands of Mauritius.

In trials carried out at Reduit it was found that, composted manure is better than compost made from litter and substitutes more effectively for mineral fertilisers. Actually, when applied in cabbage at 50 tonnes in combination with two-thirds the amount of fertiliser recommended i.e. 60 kg N, 80 kg P_2O_5 and 100 kg K_2O per hectare, savings to the tune of 30 kg N, 40 kg P_2O_5 and 50 kg K_2O can be realised per hectare. In lettuce, when the fertiliser level is reduced to two-third, the corresponding savings would stand at 45kg N, 25kg P_2O_5 and 30 kg K_2O per hectare and in cauliflower. 28 kg N, 38 kg P_2O_5 and 50 kg K_2O per hectare. At Wooton ES, it was found that when either litter or manure is applied in cabbage the fertiliser level can be reduced by one-third. In the case of lettuce addition of mineral fertilisers did not significantly improve yield. When litter compost is applied at 50 t/ha in cauliflower 56 kg N, 76 kg P_2O_5 and 100 kg K_2O can be saved.