

Coir Pith - Its Use in Poultry Farm

H.P. Maheswarappa, R. Dhanapal, C.C. Biddappa and George V. Thomas

Division of Crop Production

Central Plantation Crops Research Institute, Kasargod

Introduction

Coir pith, the by-product of coir industry, was hitherto considered as a waste material. Of late, technology has been developed for composting it to be used as an organic manure and soil ameliorant. The coconut husk finds its noble use due to its fibrous nature and resilience. After extracting the coir, the waste material *viz.*, the pith consisting of dust and bits of fibres of lesser length are considered waste and dumped on the road side in mounds and in increasing proportions every year. The tannins that ooze from the dump yards during monsoon are considered to create environmental problems. Attempts were made by the Central Coir Board (India) to find better ways and means of utilization of this waste material. The abundant availability of coir pith in the southern states, the problems associated with its disposal, the associated environmental pollution problems and the physico-chemical characteristics of the material attracted the attention of agriculturists and technologists in finding productive use of this material.

The current boom in the fertilizer prices, farm energy requirements and growing preference for organically cultivated farm produce has necessitated the development of appropriate technology to recycle this waste in agriculture.

Coir pith and its composition

The word coir is derived from 'kayar' in Malayalam. Coir fibre is extracted from coconut husk the mesocarp of the coconut fruit. The pith material forming non fibrous tissues of the husk is generally referred to as coir pith or coco-peat (Bhowmic and

Debnath, 1985), which accounts for about 70 per cent of the total weight of the husk of 30 per cent fibre 12 per cent is considered as bristle fibre and 18 per cent as mattress fibre. During retting, the fibrous mesocarp which is an assembly of individual fibres with cork like parenchymatous cells containing the cementing materials undergoes decomposition. The coir pith obtained from mechanical processing of unretted husk is richer in nutrients. It is also assessed that in India 7.5 million tonnes of coir pith is produced annually (Kamaraj, 1994). Coir pith consists mainly of lignocellulosic material free from any admixed heavy metals. Detailed analysis of coir pith is given in *Table 1*.

In the present study, an attempt was made to use coir pith as a bedding material in homestead poultry farm and analysis was made for coir pith

enriched with poultry droppings for its composition with respect to manurial value.

A trial was conducted at CPCRI in the coconut based mixed farming unit having poultry in deep litter system (with 100 broiler birds per batch). Sundried and sieved coir pith is used as bedding material for broiler birds and removed after 55 days. Then, it was heaped for 25 days and samples were collected from the heap for chemical analysis. In each batch 6 samples were taken and samples from 4 batches were analysed for chemical characters by adopting standard procedures (Jackson, 1973). Lignin and cellulose contents were determined by following the procedure given by AOAC (AOAC, 1975). Microbial population was enumerated by dilution plating technique (Pramer and Schmidt, 1964) using nutrient agar for bacteria,

Table 1. Comparative chemical composition of coir pith enriched with poultry droppings and raw coir pith

Character	Coir pith enriched with poultry droppings	Coir pith (after 80 days)	Raw coir pith
Lignin	12.2	33.6	34.8
Cellulose	15.0	27.9	28.6
Total Nitrogen (%)	1.85	0.31	0.28
Total P (%)	2.04	0.01	0.01
Total K (%)	1.87	0.68	0.78
Total Mg (%)	0.53	0.31	0.36
Total Ca (%)	0.86	0.75	0.78
Total Mn (ppm)	265.0	105.0	110.0
Total Fe (ppm)	1576.1	1380.0	1390.0
Total Zn (ppm)	285.9	110.0	120.0
Total Cu (ppm)	125.9	60.3	66.3
pH	7.40	6.0	5.9
Organic carbon (%)	18.60	25.0	26.0
C:N Ratio	10:1	81:1	93:1

Kuster's agar for actinomycetous, potato dextrose agar for fungi and Pikovskaya agar for phosphate solubilisers.

a) Chemical composition

From this study it was proved that sun dried, sieved coir pith can be safely used as bedding material for deep litter poultry farms. The coir pith gets enriched with nutrients due to the receipt of poultry droppings. In the initial 150 kg of dried, sieved coir pith was used as bedding material. After 80 days period, due to enrichment with poultry droppings, the by-product obtained was 225 kg, thereby there was addition of 75 kg of droppings from 100 poultry birds in 55 days period. The data presented in *Table 1* revealed that, lignin and cellulose contents reduced from 34.8 per cent and 28.6 per cent to 12.2 and 15.0 per cent respectively in 80 days whereas same did not get reduced in the raw coir pith studied under identical condition. The average N content increased to 1.85 per cent, P content to 2.04 per cent and K content to 1.87 per cent as a result of poultry dropping enrichment. The organic carbon content of the coir pith enriched with poultry droppings decreased from the initial value of 26.0 per cent to 18.60 per cent. Decrease in the organic carbon in coir pith enriched with poultry droppings was mainly attributed to increase in microbial activity as evident from increase in microbial population (*Table 2*). The C:N ratio of the coir pith enriched with poultry droppings came down to 10:1

from the initial value of 93:1, whereas coir pith maintained in identical condition had C:N Ratio of 81:1. There was increase in the secondary nutrient content like Ca and Mg along with increase in the micro-nutrient content of the litter. The pH of the coir pith enriched poultry droppings increased to 7.4 from 5.9, which might be due to addition of poultry dropping which is having higher pH. However, there was no major change in the composition of chemical content in the raw coir pith after 80 days maintained at identical condition.

b) Microbial population

Microbial population is given in the *Table 2*. It is revealed from the data that the population of bacteria, actinomycetes, fungi and phosphate solubilisers were higher in coir pith enriched with poultry droppings compared to raw coir pith and coir pith kept without any treatment for 80 days. Thus it indicates that, the coir pith enriched with poultry droppings had higher microbial activity resulting in the faster decomposition of lignocellulosic coir pith into coir pith manure which is suitable for substituting the chemical fertiliser as a source of nutrients and soil amendment.

From this study it can be concluded that, sun dried, sieved coir pith can be safely used as a bedding material in homestead poultry farm. The coir pith enriched with poultry droppings was richer in major, secondary and micro

nutrient contents. The manure had lower lignin and cellulose content, had lower C:N ratio and higher microbial activity rendering it as most acceptable organic manure for coconut and allied crops.

References

- AOAC, 1975, *Official Methods of Analysis of the AOAC*. 12th Edn. (1975) p. 138.
- Bhowmic, B. B. and Debnath C. R., 1985, Coir fibre, Part II. Potentiality of coir fibre products *Indian Coco. J.*, 16(3) : 7-10.
- Jackson M. L., 1973, *Soil Chemical Analysis*, Prentice Hall of India Pvt. Ltd., New Delhi.
- Kamaraj, C. M. 1994, Exportable coir products in Tamil Nadu *The Coconut Wealth*, 1 (6) : 6-8.
- Pramer, D. and Schmidt, E. L., 1964, *Experimental Soil Microbiology*. Burgers' Pub, Minneapolis, Minnesota, USA.

Coco Shell Charcoal as Blacksmith Fuel

A company engaged in traditional ornamental blacksmithing based in England is looking into the possibility of using coconut shell charcoal substitute for coal based coke as fuel for blacksmith's forges. Spokesman from the company said that he had seen coconut shell charcoal in use in blacksmith shops in Sri Lanka and it is fairly dense and does not continue to burn out of control when the air is blast off. He further said that these characteristics are desirable for their applications and added that charcoal is a renewable resource and much less polluting than coal. He said that the coal obtainable in UK is high in mineral ash and sulphur and hence unpleasant to use and a source of pollution. Present consumption is 10 tonnes of coke per year. In view of this the company is interested to obtain specific information about the product and a sample for trial. Interested parties can contact Mr. Richard Quinnell at requinnell@aol.com.

Table 2. Microbial population in coir pith in relation to enrichment with poultry droppings

Material	Population (Colony forming units g ⁻¹ material)			
	Bacteria	Actinomycetes	Fungi	Phosphate solubiliser
Raw coir pith	6.0x10 ⁵	16.8x10 ⁴	23.6x10 ⁴	1.8x10 ⁴
Coir pith (After 80 days)	5.2x10 ⁵	14.6x10 ⁴	20.1x10 ⁴	1.2x10 ⁴
Coir pith enriched with poultry droppings	9.2x10 ⁵	4x10 ⁷	9.0x10 ⁵	2.0x10 ⁵