International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2026): 5.29
IJABR 2026; SP-10(1): 365-368
www.biochemjournal.com
Received: 19-10-2025
Accepted: 23-11-2025

SV Deshmukh
Assistant Professor, Department of Soil Science and Agriculture Chemistry, College of Agriculture, Dapoli, Maharashtra, India

YR Govekar
Associate Professor (Plant Pathology), Regional Fruit Research Station, Vegurla, Maharashtra, India

US Kudtarkar
Assistant Professor, Department of Agronomy, College of Agriculture, Dapoli, Maharashtra, India

Corresponding Author:
SV Deshmukh
Assistant Professor, Department of Soil Science and Agriculture Chemistry, College of Agriculture, Dapoli, Maharashtra, India

Compost from cashew leaf litter and cashew apple waste

SV Deshmukh, YR Govekar and US Kudtarkar

DOI: https://www.doi.org/10.33545/26174693.2026.v10.i1Se.6952

Abstract
A field experiment was carried out to study the composting of cashew apple waste and leaf litter. Cashew apple was undertaken in the Regional Fruit Research Station, Vengurla during 2020 to 2023. All the tanks were initially added with basic feed mixture (cashew leaf litter, cashew apple, and cow dung in 1:10:1 ratios on weight basis. Along with the basic feed mixture, different substrates were added according to the treatments. The experiment was carried out in a Completely Randomized Design with three replications with three tanks per replication. Nutrient status of substrates and that of matured compost was recorded initially and after compost maturity. In addition, pH was also recorded before and after composting, pH ranged from 4.5 in cashew leaf waste to 7.4 in cow dung respectively. Organic carbon content varied from 23% in cashew apple waste to 41% in cashew leaf litter. C:N ratio was found between 61.19 cashew leaf litter to 22.62 in cashew apple waste. The biochemical constituents *viz*, cellulose, phenol, tannin and lignin were highest in cashew leaf litter (45.9, 1.62, 0.62 and 13.4 mg/100 g respectively) as compared to cashew apple. The compost obtained from T_6 (T_1+Rock Phosphate 400 g) on maturity (120 days), recorded a pH of 6.18, OC (31.90%), C:N ratio (15.33), N (1.90%), P (1.69%), K (1.91%), which was highest among other treatments. Based on results composting could be established as a eco-friendly and ecologically sound method for manure from cashew leaf litter and cashew apple waste.

Keywords: Cashew apple waste, leaf litter and microorganisms

Introduction
Sindhudurg and Ratnagiri districts were considered to include the maximum area and production of cashew in Maharashtra state. Cashew is an important plantation crop in sindhudurg and Ratnagiri district. Due to its high dietary value and increasing affordability by the consumers, demand for cashews many farmers in the sector are planting cashews. The present production of cashew is less which requires adopting new technology for improving productivity. In Cashew plantations a grown- up cashew tree produces huge cashew biomass waste per year (biomass waste - cashew leaf litter, pruning's, waste cashew apples, etc.). Disposal of waste has become one of the major complications for farmers. Natural decomposition of cashew biomass it will occur nearly 9 month due to the presence of many complex molecules like poly saccharides, Polyphenols, Amino compounds, lignin, etc. There is a chance of catching fire due to long time exposure to waste in the natural decomposition. Composting, a controlled process for stabilization of organic matter, can turn organic waste into a valuable soil amendment. Compost can return nutrients and organic matter to the soil, a proven practice for soil health enhancement. It can improve crop growth and provide environmental benefits by improving soil tilth and the soil's capacity to absorb and hold water and plant nutrients. A properly managed composting process can destroy weed seeds, plant pathogens, and human pathogens. Compost analysis helps assure buyers of bulk compost they are receiving good value for their money.

Materials and Methods
Cashew leaf litter available in cashew garden is collected before the Pre. Monsoon season during harvest of the crop. Cashew apple waste after extraction of juice was used for preparation of compost. It is heaped in a cement chamber constructed specially for the compost. Size of the Chamber was 2 m in length, 1 m in width and 1 m in height. Out of which 1 m height is equally divided into 6 layers of 15 cm each. At the base layer 5 Kg

cashew leaf litter is spread evenly and to that cow dung slurry was sprinkled. The 15 litter cow dung slurry was prepared by mixing 10 kg of cow dung with 5 litter water. This 15 litter cow dung slurry was equally sprinkled on all the six layers. The second layer was filled with 50 kg cashew apple waste and cow dung slurry was sprinkled. The same set of these two layers is repeated thrice. At the same time the decomposition media was also spread in equal quantity in all the six layers. The seven different media were used in seven pits as per treatments. All the seven treatments were replicated thrice. In total one pit contains the total weight of 15 kg cashew leaf litter, 150 kg cashew apple waste and 15 kg cow dung slurry. Top of the material was covered with coconut leaves. After 45 days first turning of the biomass was done for uniform decomposition. After that turning was done weekly. In every turning water was sprinkled to wet the biomass. The compost was removed after complete decomposition. The period required for decomposition was differ as per the treatments from 118 to 146 days accordingly.

Results and Discussion

Initial material was analysed for the parameters which are TC, N, P, K. The results are presented in Table 1.

Total carbon content of the material is important in deciding the ultimate quality ofcompost. Carbon provides both energy and serve as the basic building blocks of the microbial cells. (about 50% of the microbial cellmass). The substrates recorded carbon content of 27.4 to 43 per cent. The high carbon containing material proves its suitability for better decomposition by the living organism provided other substrates are available.

The manurial value of compost is dependent on the content of N, P, K. Based on the substrate the elemental composition will vary in the matured compost. N content in the substrate, registered a value between 0.67 to 1.82per cent. The maximum value obtained for cashew apple waste 1.82 per cent followed by cow dung slurry 0.96 per cent. With respect to P content, the value ranged from 0.31 to 0.35 per cent. The maximum value of P content was obtained for cow dung slurry 0.35per cent.

Table 1: Initial Nutrient analysis

Material		N (%)	P (%)	K (%)	TC (%)	C:N Ratio
1	Cashew apple waste	1.82	0.31	0.98	43	23.62
2	Cashew Leaf litter	0.67	0.17	0.75	41	61.19
3	Cow dung	0.96	0.35	1.21	27.4	28.54

Nutrient analysis of compost

Similar to the initial analysis on nutrient status of the substrate the matured compostobtained from the seven treatments was analysed for the parameters which are TC, N, P, K. The results are presented in Table 2.The values for Total carbon in different compost treatments ranged between 23.42 and 28.57 percent. It was highest for the T_6treatment (28.57%). This is at par with T_4, T_5 and T_7 rest of other treatments. The lowest value of total carbon was recorded for the treatment T_1 (23.42%). In all the compost materials the carbon status showed a significant reduction as compared to the initial level. However the data among the treatments is statistically non - significant. The values for C:N ratio in different compost treatments ranged between 14.64 to 20.17. It was highest for the treatment T_1 (20.17). The lowest value of C:N ratio was recorded for the treatment T_7 (14.64).

Results on the major nutrient content are given in Table 3. Among the major nutrients nitrogen is very critical in the composting process since its content in the composted material is directly related to the source. The N content of the composted material ranged from 1.17 to 1.93 per cent. The compost obtained from T_7contains more amount of N (1.93%) as compared to other treatments and the data is statistically significant. The data given in Table 3. Revealed that the compost from T_6 (1.69%) was superior in terms of P and general range was from 0.91 to 1.69 per cent. The amount of K contained in the matured compost was higher than the initial status with T_6 registering the highest value of 1.92 per cent which is at par with T_2, T_3 and T_7 rest of other treatments and T_4 the lowest 1.59 per cent. However the data is statistically significant.

The Treatment T_7 shows significantly increased in the microbial population such as Bacteria and Actinomyctes as compared to control. The bacterial population increased due to the combine effect of SSP, Urea and rock phosphate which activates bacterial population. The addition of *Pleurotus sajor-caju* along with combine effect of nutrients increased fungal population. The Actinomyctes always dominate and actively involved during compost formation in presence of higher amounts of nutrients which shows their importance.

Maturity period of compost

Maturity of compost is an important factor which decides its suitability for application to the soil. Compost is considered matured when energy and nutrient containing material have been combined into stable mass. The time required to obtain matured compost is vested with many factors and may range from a couple of weeks to more than one year. The result obtained on maturity period of composting is furnished in Table 4. Significant difference was noticed with respect to the treatments on maturity period. In general average maturity Period varied from 118 to 146 days. Fastest maturity was attained in the treatment T_6 (118 days) where different plant residues, organic manures and microbes were included. Treatment T_1 took the maximum time to attain maturity of 146 days.

Table 2: Total carbon and C:N ratio of compost

Treatments		Total carbon (%)				C:N ratio			
		2020-21	2021-22	2022-23	Pooled mean	2020-21	2021-22	2022-23	Pooled mean
T_1	Cashew apple waste + Leaf litter + Cow dung slurry	22.20	24.20	23.87	23.42	18.69	20.96	20.85	20.17
T_2	T_1+*Pleurotus sajor-caju*400 g	22.63	26.96	25.94	25.18	21.27	17.07	16.50	18.28
T_3	T_1 +*Tricoderma harzianum*400 g	21.00	27.67	27.33	25.33	23.44	16.10	15.66	18.40
T_4	T_1+ Single super phosphate 400 g	22.23	29.57	28.57	26.79	21.69	15.94	15.33	17.65
T_5	T_1+ Urea 2%	22.87	30.53	29.87	27.76	15.36	15.69	14.93	15.33
T_6	T_1+Rock Phosphate 400 g	21.57	32.23	31.90	28.57	17.64	15.64	15.33	16.20
T_7	T_1+ *Pleurotus sajor-caju*100 g +*Tricoderma harzianum*100 g + SSP 100 g + Urea 2% + Rock Phosphate 100 g	24.20	28.53	27.87	26.87	18.87	12.65	12.40	14.64
SEm ±		0.72	3.04	2.97	0.95	-	-	-	-
C.D (P=0.05)		NS	NS	NS	2.94	-	-	-	-

Table 3: Major nutrient content of compost

Treatments		N (%)				P (%)				K (%)			
		2020-21	2021-22	2022-23	Pooled mean	2020-21	2021-22	2022-23	Pooled mean	2020-21	2021-22	2022-23	Pooled mean
T_1	Cashew apple waste + Leaf litter + Cow dung slurry	1.20	1.16	1.31	1.22	1.19	0.76	0.77	0.91	1.46	1.86	1.85	1.72
T_2	T_1+*Pleurotus sajor-caju*400 g	1.11	1.74	1.26	1.37	1.84	0.72	0.71	1.09	1.47	1.94	1.92	1.78
T_3	T_1 +*Tricoderma harzianum*400 g	0.91	1.75	2.04	1.57	1.34	0.82	0.84	1.00	1.47	1.93	1.94	1.78
T_4	T_1+ Single super phosphate 400 g	1.18	1.92	1.93	1.68	1.72	1.58	1.57	1.62	1.23	1.78	1.76	1.59
T_5	T_1+ Urea 2%	1.49	2.00	2.21	1.90	1.41	1.05	1.04	1.17	1.30	1.88	1.90	1.69
T_6	T_1+Rock Phosphate 400 g	1.23	2.08	1.90	1.74	1.36	1.84	1.86	1.69	1.39	2.17	2.16	1.91
T_7	T_1+ *Pleurotus sajor-caju*100 g +*Tricoderma harzianum*100 g + SSP 100 g + Urea 2% + Rock Phosphate 100 g	1.28	2.26	2.12	1.89	1.46	1.75	1.76	1.66	1.58	1.95	1.97	1.83
SEm ±		0.13	0.20	0.20	0.13	0.09	0.25	0.24	0.17	0.13	0.22	0.23	0.04
C.D (P=0.05)		NS	0.62	0.63	0.41	0.30	0.78	0.76	0.55	NS	NS	NS	0.14

Table 4: Maturity period of compost (Days)

Treatments		2020-21	2021-22	2022-23	Average days
T_1	Cashew apple waste + Leaf litter + Cow dung slurry	148	138	151	146
T_2	T_1+*Pleurotus sajor-caju*400 g	140	125	147	137
T_3	T_1 +*Tricoderma harzianum*400 g	138	135	141	138
T_4	T_1+ Single super phosphate 400 g	128	138	135	134
T_5	T_1+ Urea 2%	120	118	128	122
T_6	T_1+Rock Phosphate 400 g	118	116	120	118
T_7	T_1+ *Pleurotus sajor-caju*100 g +*Tricoderma harzianum*100 g + SSP 100 g + Urea 2% + Rock Phosphate 100 g	128	119	124	124

Microbial population of compost

The Treatment T_7 shows significantly increased in the microbial population such as Bacteria and Actinomyctes as compared to control. The bacterial population increased due to the combine effect of SSP, Urea and rock phosphate which activates bacterial population. The addition of *Pleurotus sajor-caju* along with combine effect of nutrients increased fungal population. The Actinomyctes always dominate and actively involved during compost formation in presence of higher amounts of nutrients which shows their importance.

Table 5: Microbial population of compost

Treatments		Bacteria 10^6 cfu/g				Actinomycetes10^5 cfu/g				Fungi 10^4 cfu/g			
		2020-21	2021-22	2022-23	Pooled mean	2020-21	2021-22	2022-23	Pooled mean	2020-21	2021-22	2022-23	Pooled mean
T_1	Cashew apple waste + Leaf litter + Cow dung slurry	92.00	94.00	92.00	92.67	31.00	33.00	28.00	30.67	20.00	17.00	15.00	17.33
T_2	T_1+*Pleurotus sajor-caju*400 g	96.00	99.00	80.00	91.67	25.00	28.00	27.00	26.67	32.00	33.00	28.00	26.00
T_3	T_1 +*Tricoderma harzianum*400 g	110.00	108.00	102.00	106.67	38.00	40.00	31.00	36.33	29.00	27.00	22.00	31.00
T_4	T_1+ Single super phosphate 400 g	116.00	111.00	97.00	108.00	39.00	41.00	38.00	39.33	17.00	13.00	12.00	14.00
T_5	T_1+ Urea 2%	122.00	118.00	132.00	124.00	30.00	35.00	41.00	35.33	10.00	8.00	10.00	9.33
T_6	T_1+Rock Phosphate 400 g	127.00	130.00	132.00	129.67	43.00	45.00	39.00	42.33	19.00	10.00	15.00	14.67
T_7	T_1+ *Pleurotus sajor-caju*100 g +*Tricoderma harzianum*100 g + SSP100 g + Urea 2% + Rock Phosphate 100 g	125.00	131.00	135.00	130.33	46.00	47.00	48.00	47.00	22.00	19.00	23.00	21.33
SEm ±		7.31	11.14	6.45	3.98	4.36	3.88	2.44	1.83	1.85	1.75	3.79	1.37
C.D (P=0.05)		22.54	NS	19.89	12.26	13.45	11.97	7.51	5.64	5.70	5.38	11.68	4.24

References

1. Aira M, Domínguez J. Microbial and nutrient stabilization of two animal manures after the transit through the gut of the earthworm Eisenia foetida. Journal of Hazardous Materials. 2009;161:1234-1238.
2. Aira M, Monroy F, Domínguez J. Eisenia foetida (Oligochaeta: Lumbricidae) modifies the structure and physiological capabilities of microbial communities improving carbon mineralization during vermicomposting of pig manure. Microbial Ecology. 2007;54:662-671.
3. Ansari AA, Ismail SA. Vermitechnology in organic solid waste management. Journal of Soil Biology and Ecology. 2001;21:16-20.
4. Ansari AA. Organic waste: reduce, recycle and management through vermitech. In: Urban planning and environment—strategies and challenges. Advance Research Series. India; 2007.
5. Ansari AA. Vermitech: an innovation in organic solid waste management. Journal of Sustainable Development and Environmental Protection. 2011;1(1):107-113.
6. Anastasi A, Varese GC, Filipello Marchisio V. Isolation and identification of fungal communities in compost and vermicompost. Mycologia. 2005;97:33-44.
7. Ansari AA. Worm powered environmental biotechnology in organic waste management. International Journal of Science. 2011;6(1):25-30.

8. Atiyeh RM, Subler S, Edwards CA, Bachman G, Metzger JD, Shuster W. Effects of vermicomposts and compost on plant growth in horticultural container media and soil. Pedobiologia. 2000;44:579-590.
9. Raja KP, Ramalingam R. Utilization of cashew leaf litter and sugar mill waste pressmud for the culture of a compost earthworm *Eudrillus eugineae* (Kinberg). The Bioscan. 2007;2(1):37-40.
10. Pushpalatha PB. Morphophysiological analysis of growth and yield in cashew (*Anacardium occidentale* L.). PhD thesis. Thrissur: Kerala Agricultural University; 2000.
11. Panse VG, Sukhatme PV. Statistical methods for agricultural workers. 4th ed. New Delhi: Indian Council of Agricultural Research; 1985. p. 347.
12. Nair N. Enrichment of coir pith compost through organic amendments. MSc (Ag) thesis. Thrissur: Kerala Agricultural University; 1997. p. 89.
13. Kumar DP, Hegde M. Recycling of plant nutrients through cashew leaf litter. The Cashew. 1999;12(2):2-8.
14. Kutty NMC. Development pattern, storage behaviour and variability in processing characters of cashew apple. Thrissur: Kerala Agricultural University; 2000.
15. Mandal RC. Cashew production and processing technology. Tamil Nadu: Agro Botanica; 1997.
16. Piper CS. Soil and plant analysis. Bombay: Hens Publishers; 1966. p. 368.
17. Richards NK. Cashew tree nutrition related to biomass accumulation, nutrient composition and nutrient cycling in sandy red earths of Northern Territory, Australia. Scientia Horticulturae. 1992;52(1-2):125-142.
18. Smith VC, Bradford MA. Litter quality impacts on grassland decomposition are differently dependent on soil fauna across time. Applied Soil Ecology. 2003;24:197-203.
19. Sobhana A, Mathew J, Mini C, Pushpalatha PB. Technologies for cashew apple utilization on commercial scale. Souvenir, National Conference on Cashew; 2013; 20-21.
20. Sushama PK, Smitha John K, Gopinathan R. Chemistry of composting. Thrissur: Kerala Agricultural University; 2010. p. 78.
21. Tian G, Kang BT, Brussaard L. Biological effects of plant residues with contrasting chemical compositions under humid tropical conditions: decomposition and nutrient release. Soil Biology and Biochemistry. 1992;24:1051-1060.
22. Usha KE. Integrated nutrient management in cashew in relation to yield and quality. PhD thesis. Thrissur: Kerala Agricultural University; 2001.
23. Walkley A, Black IA. An examination of the Degtjareff method for determining soil organic matter and a proposed modification of the chromic acid titration method. Soil Science. 1934;37:29-37.
24. Zibilske LM. Composting of organic waste. In: Sylvia DM, Fuhrmann JJ, Hartel PG, Zuberer DA, editors. Principles and applications of soil microbiology. Upper Saddle River (NJ): Prentice Hall; 1999. p. 482-497.