

## A study of the chemical composition of Compost produced by the local-bodies of the Madras State

by

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**Synopsis:** The compost samples collected from different local-bodies of the Madras State during the years 1956-1960 under the urban compost scheme were analysed for total Nitrogen and Phosphoric acid contents and conclusions have been drawn with regard to the performance by Municipalities and Panchayats in different districts in producing good quality compost.

**Introduction:** Eversince Hutchinson and Richards (1921) enunciated the scientific principles of converting waste material into rich organic manure, many notable advances have taken place in this field. Acharya (1939) developed the Bangalore method of composting which admirably suits Indian conditions for the disposal of Town refuse and Rural wastes.

Acharya (1940) laid down that there was a greater recovery of Carbon and Nitrogen in the hot fermentation method of composting than in the case of Aerobic system of composting. Acharya (1949) reported that in the place of night soil, septic and activated sludge, filter-bed residues and raw sewage may with advantage be used as nitrogenous starters for composting dry refuse. Rajagopala Ayyangar *et al* (1955) have reported that Pfeiffer's B. D. starter is in no way superior to the commonly used cattle dung in the manufacture of compost from farm waste. In the Madras State the urban compost scheme is in operation with the main objective of improving the quality of compost manure manufactured by the Municipalities and Town Panchayats. However, no attempt has so far been made to study the quality of the compost manure produced by the local bodies. Therefore, it is hoped that the present type of study which aims at assessing the quality of the compost manure produced by the Municipalities and Town Panchayats of this State from year to year, will plug the lacuna in the existing knowledge on compost.

**Materials and methods:** The Bangalore method of composting with suitable modifications was adopted in the preparation of compost by local bodies. Rectangular piles measuring 40' x 11' at the base were built up to a height of 3½' with alternate layers of rubbish and nightsoil, in beds of 9" and 3" thickness respectively. The piles were provided with adequate moisture. The rubbish were allowed to decompose for a period of six months, after which the compost was removed for field application. On an average, about 20 tons of compost was obtained from each compost heap. Compost samples drawn from several points in a heap were mixed, and a composite sample representative of 3 or 4 heaps was prepared.

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In the laboratory, the samples were treated with dilute acetic acid to prevent further decomposition and air-dried and passed through 1 m.m. mesh sieve before taking them up for chemical analysis. Total Nitrogen in the compost samples was determined by the Kjeldahl method (A. O. A. C. 1955) and total phosphoric acid by the A. O. A. C. (1955) method. The analytical data for the compost prepared during the four years 1956 to 1960 have been utilised for studies.

**Results:** The data obtained for the total Nitrogen and Phosphoric acid contents of the compost are presented in Table I district-wise for Municipalities and Town Panchayats.

TABLE I.

*Data on Nitrogen and Phosphoric acid contents of compost  
(Expressed as percentage on oven-dry basis).*

Sl. No.	Name of District	1956—'57		1957—'58		1958—'59		1959—'60	
		N.	P <sub>2</sub> O <sub>5</sub>	N.	P <sub>2</sub> O <sub>5</sub>	N.	P <sub>2</sub> O <sub>5</sub>	N.	P <sub>2</sub> O <sub>5</sub>
MUNICIPALITIES									
1.	Coimbatore	0.80	0.91	1.34	2.00	1.16	1.76	0.92	1.44
2.	Nilgiris	0.68	1.36	0.85	0.99	0.97	1.12	1.40	1.53
3.	Madurai	0.73	1.51	0.98	1.59	0.69	1.68	0.74	1.52
4.	Tirunelveli	1.23	2.53	1.60	2.04	0.92	1.51	0.88	1.44
5.	Ramnad	1.32	2.31	1.02	1.62	0.86	1.55	0.91	1.59
6.	Salem	Nil*	—	0.61	1.29	0.48	0.96	0.65	1.29
7.	Thanjavur	0.82	1.72	0.97	2.04	0.65	1.74	0.77	1.78
8.	Tiruchirapalli	1.38	2.42	0.97	1.89	0.88	1.36	1.07	1.52
9.	South Arcot	0.65	1.41	0.78	1.50	0.93	1.53	0.77	1.11
10.	North Arcot	0.96	1.73	1.18	2.35	0.89	1.42	0.84	1.69
11.	Chengleput	1.49	2.70	0.53	1.10	0.85	1.40	1.25	2.24
PANCHAYATS									
1.	Coimbatore	1.00	1.97	1.00	2.07	0.97	1.59	0.65	1.12
2.	Nilgiris	Nil*	—	1.06	0.82	1.07	0.97	1.13	1.06
3.	Madurai	0.81	1.37	0.78	1.53	0.82	1.50	0.75	1.42
4.	Tirunelveli	1.70	2.71	0.85	1.50	0.78	1.46	0.81	1.58
5.	Ramnad	0.66	0.97	0.68	1.44	0.68	1.41	0.76	1.23
6.	Salem	0.60	0.68	0.56	1.32	0.60	0.86	0.52	1.03
7.	Thanjavur	0.64	0.99	0.85	1.52	0.70	1.19	0.72	1.43
8.	Tiruchirapalli	0.82	1.34	0.90	1.30	0.90	1.62	0.75	1.31
9.	South Arcot	0.89	1.83	1.10	1.64	1.07	2.08	0.98	1.50
10.	North Arcot	1.24	2.07	1.00	1.50	0.92	1.39	0.92	1.47
11.	Chengleput	Nil*	—	0.93	1.62	1.38	2.01	1.05	2.05

\* Compost samples were not received for the year 1956—'57 from the Municipalities in Salem district and from the Panchayats in Nilgiris and Chengleput districts.

The statistical analysis of the data is presented in Table II.

TABLE II.

(a) *Nitrogen content (Analysis of variance,*

Sl. No.	Source	D. F.	S. S.	M. S.	F.
1.	Municipality vs. Panchayats	... 1	0.1290	0.1290	1.68 N. S.
2.	Between Districts	... 10	1.9524	0.1952	2.55*
3.	Between Years	... 3	0.1057	0.0352	—
4.	Municipality vs. Panchayats x districts	... 10	0.5554	0.0555	—
5.	Municipality vs. Panchayats x years	... 3	0.1374	0.0458	—
6.	District x years	... 30	2.3088	0.0770	1.01 N. S.
7.	Municipality vs. Panchayats x Districts x year (Error)	... 30	2.2987	0.0766	—
Total		... 87	7.4874	—	

N. S. : Not significant.

\* Significant at P=0.05 level.

*Comparison of Districts.*

Sl. No.	Districts	Mean N. content	S. E. of mean	C. D. (P=0.05)
1.	Coimbatore	... 0.98		
2.	Nilgiris	... 0.90		
3.	Madurai	... 0.79		
4.	Tirunelveli	... 1.10		
5.	Ramnad	... 0.86		
6.	Salem	... 0.50	0.098	0.283
7.	Thanjavur	... 0.77		
8.	Tiruchirapalli	... 0.96		
9.	South Arcot	... 0.99		
10.	North Arcot	... 0.99		
11.	Chengleput	... 0.94		

Conclusion :—

4, 10, 1, 8, 11, 9, 2, 5, 3, 7, 6.

(b) *Phosphoric acid content (Analysis of variance)*

Sl. No.	Source	D. F.	S. S.	M. S.	F.
1.	Municipality vs. Panchayats	1	0.8641	0.8641	4.33
2.	Between Districts	10	6.4404	0.6440	3.23
3.	Between years	3	0.1907	0.0636	—
4.	Municipality vs. Panchayats x Districts	10	1.9747	0.1975	—
5.	Municipality vs. Panchayats x years	3	0.5103	0.1701	—
6.	District x years	30	5.6545	0.1885	—
7.	Municipality vs. Panchayats x Districts x years	30	5.9872	0.1996	—
Total		87	21.6219	—	—

\* Significant at  $P=0.05$  level.\*\* do.  $P=0.01$  level.**Summary of Results :**i. *Comparison of Municipalities and Panchayats.*

Sl. No.	Locality	Mean $P_2O_5$ Content	S. E. of mean	C. D. ( $P=0.05$ )
1.	Municipality	1.60	0.067	0.193
2.	Panchayats	1.40		

*Conclusion:* Municipality, Panchayats.iii. *Comparison of Districts*

Sl. No.	District	Mean $P_2O_5$ content	S. E. of mean	C. D. ( $P=0.05$ )
1.	Coimbatore	1.65		
2.	Nilgiris	0.98		
3.	Madurai	1.52		
4.	Tirunelveli	1.85		
5.	Ramnad	1.52		
6.	Salem	0.93	0.158	0.456
7.	Thanjavur	1.55		
8.	Tiruchirapalli	1.60		
9.	South Arcot	1.58		
10.	North Arcot	1.70		
11.	Chengleput	1.64		

*Conclusion:* 4, 10, 11, 1, 8, 9, 7, 5, 3, 2, 6.

**Discussion:** The rapidity of decomposition of the raw materials used for composting is dependent upon their nature, their C/N ratio, moisture content and the nitrogenous starter used for composting (Acharya *et al* 1945; and Rajagopala Iyengar *et al* 1955. Even if one of the above conditions for composting is neglected, the quality of compost manure will be affected to a great extent. From the statistical analysis presented in Table II, it will be clear that Tirunelveli Compost is richer in Nitrogen than that made in Madurai, Thanjavur, and Salem Municipalities and Panchayats. The other districts except Salem are on a par. The Salem compost is the poorest though not poorer than that of Thanjavur.

The high nitrogen content of Tirunelveli Compost may be chiefly attributable to the special care bestowed in the utilisation of proper materials for composing, collection of night soil with minimum loss of plant nutrients, and also the better care with which composting has been done, when compared with composts from other districts.

It is also seen that the nitrogen percentage of compost both in the case of Municipalities and Panchayats does not appreciably change from year to year, nor between Municipalities and Panchayats. But in respect of phosphoric acid contents, Municipal compost just surpasses Panchayat compost. This can be attributed to the presence of a greater number of slaughter houses, and meat-stalls in the vicinity of Municipalities, the wastes of which might have found entry into the Municipal compost heaps in large quantities. Also, the compost from Nilgiris and Salem districts are definitely poorer in Phosphoric acid content than that from the other districts which are all on a par.

Both Nitrogen and Phosphoric acid contents considered together, Tirunelveli compost is consistently good followed by North Arcot.

**Summary:** Nitrogen content of Tirunelveli Compost is higher than that of the compost made in Madurai, Thanjavur and Salem Municipalities and Panchayats. In respect of the Nitrogen content of compost, there is no marked difference between Municipalities and Panchayats, while in the case of Phosphoric acid content, Municipal compost just surpasses Panchayat compost. Further, the Nitrogen content of compost does not appreciably change from year to year. Both Nitrogen and Phosphoric acid contents considered together, Tirunelveli compost is consistently good followed by North Arcot.

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