

A Study on the chemical composition of compost produced by the local bodies of the Madras State during the Years 1960—1963

by

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Synopsis: The compost samples collected from the local bodies of the Madras State during the years 1960-'63 were analysed for total nitrogen and phosphoric acid contents. Based on the quality of compost as judged from the above two plant constituents certain conclusions have been drawn and the results of the findings are discussed in this paper.

Introduction: Compost manure, has, of late, assumed greater importance in Indian agriculture. Many notable advances have taken place in the field of composting ever since Hutchinson and Richards (1921) enunciated the scientific principles of composting. The Bangalore method of composting evolved by Acharya (1939) is adopted by the local bodies of the Madras State, with suitable modifications, for the preparation of compost manures. The urban compost scheme is in operation in the Madras State for the past six years and the local bodies, under this, are given incentive for compost production. To ensure good quality of compost, samples of compost are collected periodically from them and tested for their quality. Based on the quality of compost produced by the local bodies during the years 1960-'63 as judged from their total nitrogen and phosphoric acid contents, certain conclusions have been drawn. The results of the findings are presented in this paper.

Review of literature: Acharya (1949) reported that in the place of night-soil, septic and activated sludge, filterbed residues and raw sewage may with advantage be used as nitrogenous starters for composting dry refuse. Jeyasingh Bennett *et al* (1964) have reported a highly significant positive correlation between nitrogen and phosphorus in the compost produced by Municipalities and Panchayats of the Madras State during the years 1961-'62 and 1962-'63. Further, they have observed that the Municipal compost contained more phosphoric acid than the Panchayat compost. Ramanathan *et al* (1964) in their study on the composting of sea weeds showed that the composting of sea weeds washed in fresh water under pit system produced compost richer in nitrogen and phosphoric acid contents. Krishnamurthy *et al* (1965) reported a highly significant positive correlation between nitrogen and organic carbon on the one hand and between nitrogen and organic matter, and between organic carbon and organic matter on the other in the compost produced by Municipalities, Panchayats and

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Panchayat Unions. Krishnamurthi and Samboornaraman (1964) studied the chemical composition of compost produced by the local bodies of the Madras State during the years 1956-'60. They have reported that the quality of compost, as judged from their total nitrogen and phosphoric acid content, produced by the local-bodies did not vary from year to year and also there was no significant difference in the nitrogen content of compost, between Municipalities and Panchayats. But in respect of phosphoric acid content, Municipal compost just surpassed Panchayat compost. Taking both nitrogen and phosphoric acid contents of compost into consideration they observed that the compost produced in Tirunelveli district was consistently good followed by that of North Arcot. The present study has been undertaken with a view to finding out whether the quality of compost produced by the local-bodies has improved during the years 1960-'63, and also whether there is any significant difference in the composts produced by Municipalities and Panchayats in respect of total nitrogen and phosphoric acid contents.

Materials and methods: The Bangalore method of composting with suitable modification was adopted in the preparation of compost by local-bodies. Six months after composting, samples drawn from several points in a heap were mixed, and a composite sample representative of 3 or 4 heaps was prepared.

In the laboratory, the samples were treated with dilute acetic acid to prevent further decomposition and air-dried and passed through 1 mm. mesh sieve before taking them up for chemical analysis. Total nitrogen and phosphoric acid contents in the compost samples were determined by standard methods. The analytical data for the compost prepared during the three years, 1960-'63, have been utilised for the studies.

Results: The data obtained for total nitrogen and phosphoric acid contents of the compost are presented in Tables I and II, district-wise for Municipalities and Panchayats. The figures indicated against each district under Municipalities and Panchayats represent their average value in that district for a particular year. The statistical analysis of the data is presented in Table III. Eventhough the data obtained for total nitrogen and phosphoric acid contents were statistically analysed for finding out the performance of the various districts in producing good quality compost in relation to the above two constituents, (2) of Municipalities *vs.* Panchayats within districts, (3) Between Municipalities within districts, (4) Between Panchayats within districts, (5) Between years and (6) Between districts and years, only the statistical conclusions obtained for districts, Municipalities *vs.* Panchayats within districts and between years are discussed in this paper.

Discussion: From the statistical analysis presented in Table III, it will be seen that Kanyakumari compost is richer in nitrogen than that made in Chingleput, North Arcot, Tirunelveli, Coimbatore, Tiruchirapalli, Madurai, South Arcot, Ramnad, Thanjavur, and Salem districts. But the compost produced by the Kanyakumari district is on a par with that of the Nilgiris district. The compost

produced in Chingleput is richer in nitrogen than that produced in Tirunelveli, Coimbatore and Tiruchirppalli which are all on a par. But the compost of Chingleput is on a par with that of North Arcot. The compost produced in Chingleput, North Arcot, Tirunelveli, Coimbatore and Tiruchirapalli are richer in nitrogen than those produced in Madurai, South Arcot, Ramnad, Thanjavur, and Salem. The compost of Madurai, which is on a par with those of South Arcot and Ramnad, contains higher nitrogen than Thanjavur and Salem. Salem compost is the poorest though not poorer than those of Ramnad, and Thanjavur. Krishnamurthy and Samboorna Raman (1964) also observed that the Salem compost was the poorest though not poorer than those of Thanjavur and Ramnad. Therefore, the districts of Salem, Thanjavur and Ramnad have to improve their quality of compost to a greater extent. But Tirunelveli and North Arcot compost have gone down in quality during the years under study.

The high nitrogen content of compost of Kanyakumari and Nilgiris districts may be chiefly attributable to the special care bestowed in the utilisation of proper materials for composting, 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. The comparatively inferior quality of the compost prepared in Salem, Thanjavur and Ramnad districts may be either due to the inferior quality of the materials used for composting or due to loss of important plant nutrients from night soil before collection.

TABLE I

Average values of Nitrogen and Phosphoric Acid contents of compost produced by Municipalities during the years 1960-'63.

No. Sl.	Name of District	1960-'61		1961-'62		1962-'63	
		N	P ₂ O ₅	N	P ₂ O ₅	N	P ₂ O ₅
1.	Coimbatore	0.62	1.36	1.25	2.08	0.95	1.84
2.	Salem	0.59	1.86	0.86	1.23	0.67	1.25
3.	Madurai	0.54	1.16	0.84	1.53	1.03	1.75
4.	Ramnad	0.61	1.02	0.71	1.19	0.84	1.59
5.	Tirunelveli	1.15	2.75	1.10	2.04	1.36	2.48
6.	Kanyakumari	1.13	1.27	1.28	2.25	1.10	1.78
7.	Tiruchirapalli	0.91	0.82	0.89	1.31	0.92	1.51
8.	Thanjavur	0.80	1.97	0.72	1.52	0.83	1.46
9.	North Arcot	1.01	2.17	0.97	1.97	0.98	1.44
10.	South Arcot	Nil	Nil	0.87	1.34	0.69	1.02
11.	Chingleput	Nil	Nil	0.83	1.82	0.80	1.51
12.	Nilgiris	1.98	3.55	1.07	1.13	1.19	1.40

It is also seen that the nitrogen content of compost has significantly increased from year to year during 1960-'63 both under Municipalities and Panchayats. This was not the case during the years 1956-'60. The significant

progress made by the local-bodies in improving the nitrogen content of compost manure from year to year during the years, 1960-'63 may be attributable to the sustained interest evinced by the analytical staff of the compost scheme in improving the quality of compost, and also to the advice rendered by the Field Manure Officers and State Compost Development Officer in making good compost, based on the analytical reports.

During the years under study, in the districts of Coimbatore, Madurai, Tirunelveli and Thanjavur, Municipal compost has been found to be superior to Panchayat compost, while in the case of other districts, they are on a par. The high nitrogen content of Municipal compost in the districts of Coimbatore, Madurai, Tirunelveli and Thanjavur may be attributed to the proper proportion between night soil and refuse material. It is possible to conserve the nitrogen in night soil to a greater degree by having more of carbonaceous material for composting (Shrikhande, 1946).

TABLE II

Average values of Nitrogen and Phosphoric Acid contents of compost produced by Panchayats during 1960-'63.

No. Sl.	Name of Panchayat	1960-'61		1961-'62		1962-'63	
		N	P ₂ O ₅	N	P ₂ O ₅	N	P ₂ O ₅
1.	Coimbatore	0.85	1.53	0.95	1.23	0.19	1.37
2.	Salem	0.50	1.20	0.65	0.91	0.73	1.21
3.	Madurai	0.59	1.06	0.74	1.11	0.84	1.31
4.	Ramnad	0.56	1.25	0.63	1.43	0.90	1.60
5.	Tirunelveli	0.74	1.12	0.98	1.42	0.81	1.13
6.	Kanyakumari *	Nil	Nil	Nil	Nil	Nil	Nil
7.	Tiruchirapalli	0.81	1.18	1.03	1.44	0.87	1.39
8.	Thanjavur	0.89	1.52	0.64	0.89	0.69	1.20
9.	North Arcot	0.45	1.06	0.93	1.62	1.05	1.53
10.	South Arcot	0.66	1.47	0.72	1.53	0.81	1.40
11.	Chingleput	0.30	1.08	0.94	1.40	1.03	1.29
12.	Nilgiris	0.95	1.42	1.33	1.65	1.12	1.32

* Compost samples were not received from Panchayats.

In respect of phosphoric acid content compost produced in Kanyakumari district contains higher phosphoric acid content than those produced in other districts. The composts produced in Chingleput and North Arcot districts are on a par in respect of phosphoric acid content, and they closely follow Kanyakumari district. The Salem compost is poor though not poorer than those of Madurai, Tiruchirapalli and South Arcot and the remaining districts are on a par. The high phosphoric acid content in the compost of Kanyakumari district may be attributed to fish wastes that find place in larger quantities in the compost heaps, when compared to other districts. Further, as fish constitute

one of the major items of food of the people of that area, the night soil voided in that area is bound to be rich in phosphoric acid; since Acharya (1949) has also reported, that the composition of night soil varies with the food habit of the people.

In respect of years also, the phosphoric acid content of compost has registered a significant increase from year to year, and the reason advanced under nitrogen holds good for this also.

In Coimbatore, Madurai, Tirunelveli, Thanjavur and Chingleput districts, Municipal compost has recorded more phosphoric acid content than Panchayat compost. In South Arcot district alone, the reverse effect is noticed (i. e., Panchayats have recorded more phosphoric acid in their compost than Municipalities). In the case of other districts, the Municipalities and Panchayats are on a par. During the years under study, only in the districts of Coimbatore, Madurai, Tirunelveli, Thanjavur and Chingleput, Municipal compost has surpassed Panchayat compost in respect of phosphoric acid content, while composts produced in other districts excepting South Arcot, are on a par. The high phosphoric acid content of Municipal compost in these districts may be chiefly attributable to the greater availability of wastes of slaughter houses and meat stalls, which might have found their way into compost heaps in larger quantities.

Taking both nitrogen and phosphoric acid contents of compost into consideration, the compost produced in Kanyakumari district has been found to be consistently good in all the three years.

TABLE III

*Results of statistical analysis**I. Total Nitrogen**Analysis of variance.*

S. No.	Source	D. F.	S. S.	M. S.	"F"
1.	Districts	11	106.2156	9.6559	25.50 **
2.	Municipalities vs Panchayats within districts	11	30.8661	2.8060	7.41 **
3.	Between Municipalities within districts	49	267.9643	5.4687	14.44 **
4.	Between Panchayats within districts	146	284.7158	1.9501	5.15 **
5.	Between years	2	20.9977	10.4988	27.72 **
6.	Districts x years	22	120.1194	5.4600	14.42 **
7.	Residual	456	172.7086	0.3787	—
	Total	697	1003.5875		

** Significant at P=0.01 level.

Summary of Results

I (i) *Comparison of Districts.*

S. No.	Districts	Mean nitrogen content (transformed)	S. E. of Mean	C. D. (P=0.05)
1.	Coimbatore	5.45	0.097	0.190
2.	Madurai	5.07	0.092	0.180
3.	Tirunelveli	5.49	0.101	0.206
4.	Ramnad	4.87	0.101	0.214
5.	Salem	4.67	0.093	0.182
6.	Thanjavur	4.87	0.100	0.204
7.	Trichy	5.36	0.211	0.413
8.	Kanyakumari	6.34	0.101	0.200
9.	North Arcot	5.63	0.131	0.257
10.	South Arcot	4.98	0.111	0.220
11.	Chingleput	5.81	0.131	0.257
12.	Nilgiris	6.29	0.150	0.300

Conclusions: 8, 12, 11, 9, 3, 1, 7, 2, 10, 4, 6, 5

(ii) *Comparison of Municipalities vs Panchayats within districts.*

S. No.	Districts	Mean P ₂ O ₅ content (transformed)		S. E. of Mean	C. D. (P=0.05)	Conclusions
		Municipalities	Panchayats			
1.	Coimbatore	5.70	5.30	0.13	0.26	M, P
2.	Madurai	5.27	4.92	0.13	0.26	M, P
3.	Tirunelveli	6.38	5.20	0.13	0.26	M, P
4.	Ramnad	4.92	4.76	0.15	0.30	M, P
5.	Salem	4.79	4.65	0.25	0.50	M, P
6.	Thanjavur	4.99	4.70	0.12	0.24	M, P
7.	Trichy	5.46	5.33	0.18	0.36	M, P
8.	Kanyakumari	Nil	Nil	Nil	Nil	—
9.	North Arcot	5.45	5.66	0.16	0.32	P, M
10.	South Arcot	4.94	5.00	0.25	0.50	P, M
11.	Chingleput	5.53	5.55	0.19	0.38	P, M
12.	Nilgiris	6.31	6.28	0.24	0.48	M, P

Note: M = Municipality
P = Panchayat

(ii) *Comparison of Municipalities vs Panchayats within Districts.*

S. No.	Districts	Mean Nitrogen content (transformed)		S. E. of Mean	C. D. (P=0.05)	Conclusions
		Municipalities	Panchayats			
1.	Coimbatore	7.53	6.49	0.15	0.30	M, P
2.	Madurai	6.92	6.10	0.15	0.29	M, P
3.	Thirunelveli	8.50	6.16	0.16	0.31	M, P
4.	Ramnad	6.56	6.66	0.15	0.29	$\overline{P, M}$
5.	Salem	6.45	6.03	0.28	0.56	$\overline{M, P}$
6.	Thanjavur	7.20	5.86	0.14	0.27	M, P
7.	Trichy	6.70	6.51	0.21	0.41	$\overline{M, P}$
8.	Kanyakumari	Nil	Nil	Nil	Nil	—
9.	North Arcot	7.24	6.96	0.19	0.36	$\overline{M, P}$
10.	South Arcot	5.88	6.96	0.27	0.54	P, M
11.	Chingleput	7.88	6.55	0.21	0.40	M, P
12.	Nilgiris	6.88	6.71	0.27	0.51	$\overline{M, P}$

Note: M = Municipalities
P = Panchayats

II *Phosphoric Acid*
Analysis of variance

S. No.	Source	D. F.	S. S.	M. S.	"F"
1.	Districts	11	81.5401	7.4127	15.58**
2.	Municipalities vs Panchayats within Districts	11	267.5450	24.3222	51.13**
3.	Between Municipalities within districts				
4.	Between Panchayats within districts	146	777.7535	5.3271	11.20**
5.	Between years				
6.	District x years	22	570.8553	25.9479	54.55**
7.	Residual	456	216.9363	0.4757	—
		697	2415.8220		

** Significant at P = 0.01 level.

Summary of Results.

(i) Comparison of Districts.

S. No.	Districts	Mean P_2O_5 content (transformed)	S. E. of Mean	C. D. (P = 0.05)
1.	Coimbatore	6.89	0.11	0.22
2.	Madurai	6.45	0.10	0.21
3.	Tirunelveli	6.74	0.11	0.22
4.	Ramnad	6.59	0.12	0.22
5.	Salem	6.09	0.10	0.20
6.	Thanjavur	6.64	0.12	0.22
7.	Trichy	6.56	0.26	0.51
8.	Kanyakumari	8.57	0.11	0.22
9.	North Arcot	7.13	0.15	0.30
10.	South Arcot	6.59	0.13	0.26
11.	Chingleput	7.18	0.16	0.31
12.	Nilgiris	6.78	0.17	0.33

Conclusions: 8, 11, 9, 1, 12, 3, 6, 4, 10, 7, 2, 5

Summary: The compost samples collected from the local bodies of the Madras State during the years 1960-'63 were analysed for total nitrogen and phosphoric acid contents. From the quality of compost, as judged by the above two constituents, it has been found that the local bodies of Kanyakumari district produced compost of higher nitrogen and phosphoric acid contents than the rest. Salem compost was the poorest though not poorer than those of Thanjavur and Ramnad in respect of nitrogen content, and those of Madurai, Tiruchirapalli and South Arcot in respect of phosphoric acid content.

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