

## Some Physiochemical Properties of the Casts of Earthworm, *Metaphire posthuma* from Clay Loam Soil

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The beneficial effect of earthworm casts in increasing soil fertility is well documented by Darwin (1881). Earthworm casts consist of excreted masses of soil, mixed with residues of comminuted and digested organic material. Some authors have contributed on various properties of earthworm cast. However, no study has been carried out on the physiochemical properties of casts of earthworm *Metaphire posthuma* (Vaillant) from clay-loam soil.

### Materials and methods

Casts of *M. posthuma* were collected by means of their shape and size from an orchard in the district of North 24 Parganas, West Bengal, at regular monthly interval from May 2012 to April 2013. Before collection, all casts cleared off from the selected area of sampling site and after a day fresh casts were collected, which kept frozen until analyzed and at the same time, adjacent soil samples were (10-20 cm profile) collected. Standard procedure as described by Basak (2002) were adopted for determination of various parameters.

### Results

Tables 1, 2 show different physiochemical parameters of earthworm cast and the surrounding soil. Distinct seasonal variation of different parameters recorded in the cast as

well as in surrounding soil. Casts usually have a higher or nearly same pH, more kjeldahl and available nitrogen, available phosphorus, available potassium, electrical conductivity, organic carbon and C: N ratio than surrounding soil (Table 1, 2).

### Discussion

Seasonal variation in activities of earthworm occurs mainly due to the changes in soil temperature, moisture and organic carbon; leads to the seasonal changes in composition of casts. Casts have higher or nearly same pH compared to that in the adjacent soil samples. Probable explanation is that soils neutralized by secretions from the intestine and/or from calciferous glands and by ammonia that excreted. This is consistent with findings of Darwin (1881), Verma & Chauhan (1979) and Reddy (1983). Organic carbon content was higher in worm cast than in the adjacent soil, this finding, however, is in agreement with Gupta & Sakal (1967) and Reddy (1983). This occurs as earthworms ingested food material that enriched with carbon. Available and total nitrogen content of casts is higher than that of surrounding soil. Dash & Patra (1977) also made similar observation in grassland at Orissa while studied a mixed population of *Lampito mauritii* and an

Table 1. Showing various physiochemical characteristics of the cast of *Metaphire posthuma*.

Month	pH	EC (dSm <sup>-1</sup> )	OC (%)	Avail. N <sub>2</sub> (Kgha <sup>-1</sup> )	Avail. P <sub>2</sub> O <sub>5</sub> (Kgha <sup>-1</sup> )	Avail. K <sub>2</sub> O (Kgha <sup>-1</sup> )	Total N <sub>2</sub> (%)	C:N
May'12	7.4	0.56	3.4	610	215	1200	0.48	7.08
June'12	7.2	0.48	3.72	595	185	1005	0.53	7.01
July'12	7.6	0.48	3.9	522	125	905	0.48	8.12
Aug'12	7.1	0.56	2.86	485	225	678	0.32	8.93
Sept'12	7.1	0.65	3	560	185	739	0.38	7.89
Oct'12	7.2	0.82	3.2	530	135	735	0.42	7.61
Nov'12	7.4	0.55	2.5	660	290	850	0.31	8.06
Dec'12	7.4	0.79	2.7	610	305	690	0.36	7.5
Jan'13	6.6	0.56	3.2	405	125	650	0.42	7.61
Feb'13	6.9	0.72	2.9	485	210	670	0.55	5.27
March'13	6.9	0.3	3.9	590	222	585	0.52	7.5
April'13	6.9	0.64	3.5	565	175	755	0.45	7.77

**Table 2. Showing various physiochemical parameters studied in the surrounding soil.**

Month	Surrounding Soil							C:N
	pH	EC (dSm1)	OC (%)	Avail. N2 (Kg ha-1)	Avail. P2O5 (Kg ha-1)	Avail. K2O (Kg ha-1)	Total N2 (%)	
May'12	6.7	0.39	1.8	335	111	340	0.36	5.0
June'12	6.5	0.22	1.2	345	114	175	0.32	3.75
July'12	6.4	0.29	1.7	260	95	400	0.43	3.95
Aug'12	6.8	0.15	1.8	305	105	395	0.28	6.42
Sept'12	6.9	0.2	1.54	230	45	427	0.37	4.16
Oct'12	6.9	0.28	1.71	205	90	495	0.42	4.07
Nov'12	6.6	0.36	1.4	225	75	565	0.4	3.5
Dec'12	6.6	0.3	1.5	355	86	505	0.45	3.33
Jan'13	6.6	0.2	1.2	305	70	480	0.2	6.00
Feb'13	6.9	0.2	1.2	285	70	470	0.25	4.8
March'13	6.4	0.3	1.5	290	82	505	0.23	6.52
April'13	6.5	0.3	1.72	345	95	225	0.35	4.91

unidentified ocerodrilid. Increase nitrogen content in cast might be due to the nitrogenous excretory product and enzymatic digestion of organic material in the gut of earthworm.

The C : N ratio of casts generally higher compared to soil. It was also the observation by Lee (1967) and Kale & Krishnamoorthy (1981). Present study pointed out that casts have higher concentrations of available phosphorus and potassium than underlying soil. Gupta & Sakal (1967) also recorded similar result. The increased availability of phosphorus and potassium in earthworm casts is not only due to enhanced microbial and enzymatic activity but might depends on the type of food, they intake. Higher electrical conductivity in the cast than neighbouring soil confirms the previous observation of Joshi & Kelkar (1952). This denotes an increase in the level of soluble salts. The elevated level of nutrients in the cast indicates that the nutrients, which locked up in the organic matter, mobilized into plant-available forms in the cast during passage of this plant material through the gut of the worms.

From present study, it can be concluded that earthworm activities in the soil cause change in the physiochemical properties of the soil and increase soil fertility. The nature of change depends on the type of the soil, presence or absence of litter and the species of earthworm involved in the process.

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#### Drug Sniffer Flies

Fruit flies could help in fighting crime against illegal drugs and explosives. Their smell receptors and bio-chemical sense of smell could help in contraband detection. Their attraction to the smell of wine is due to their love for fermenting fruit. They sniff it out more accurately than metal oxide sensors.