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NOTES

RELEASE OF NITROGEN, PHOSPHORUS AND POTASSIUM FROM THE DECOMPOSING LEAF LITTER OF A TROPICAL NATURAL FOREST

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Decomposition of organic matter involves three major aspects: the microbial system, the release of energy and release of nutrients. The release of nutrients, especially nitrogen, phosphorus and potassium, is important to the stability of the ecosystem as a whole (Pomeroy 1970, Lisanework & Michelson 1994). As information on nutrient release during decomposition process is lacking from the Varanasi region, a study was conducted within the Chandra Prabha Sanctuary (24° 52'-24° 58' N, 83° 3' - 83° 12' E) in Varanasi forest division.

Litter samples were collected from twenty 1 × 1 m quadrats, mixed together and placed inside 50 nylon net bags (30 × 25 cm, 1 mm^2 mesh size). Each bag contained 50 g air dried litter sample. A trench (4 × 4 × 10 cm) was made in the Botanical Garden of Banaras Hindu University and filled with forest soil. All the nylon bags were placed on the surface of the soil in the trench. At the beginning of each month from June 1976 to June 1977, three bags were picked up randomly and dried at 80 °C for 48 h for chemical analysis. Nitrogen content was estimated by the micro-Kjeldahl's method, total phosphorus was analysed by the wet ashing technique and potassium by flame photometric method (Allen 1989).

The concentration of nitrogen increased from 1.28% (June 1976) to 2.15% (May 1977). Despite this increase in the concentration of the element, its absolute amount was found to decline continuously (Table 1).

The increase in concentration of nitrogen may be attributed to the release of carbon during decomposition and retention of the element in the microbial tissues. The increase of nitrogen in decaying litter has been reported in forest ecosystems (Sinha & Dayal 1981, Muller & Sundman 1988).

Like nitrogen the concentration of phosphorus also increased continuously from 0.065% (June 1976) to 0.119% (May 1977). The absolute amount of phosphorus declined continuously along with the loss of dry weight of decomposing litter. The probable reason for the increase in concentration of phosphorus in decomposing litter is that the microbial population infesting the litter immobilised this element. This increase may be accounted for by the same reason as given for the behaviour of nitrogen. The concentration of potassium decreased substantially with heavy rainfall and fluctuated till the summer season within a range of 0.400 to 0.435%. The decreasing concentration of potassium in decomposing litter may be ascribed to the subsceptibility of the element to leaching. The sharp decrease in the absolute amount of potassium in the decomposing litter was a combined effect of decreasing concentration and increasing weight loss.

The annual release of nitrogen was found to be 72.23% out of which 51.94, 13.11 and 7.18% were released in the rainy, winter and summer seasons respectively. From the 67.39% annual release of phosphorus, 32.25, 26.53 and 8.61% were released in the rainy,

winter and summer seasons respectively. The corresponding figures for the 83.01% annual release of potassium were 60.97, 15.71 and 6.33%. The present findings are in accordance with the results of workers such as Staaf and Berg (1982), Thomas and Asakawa (1993) and Cornejo *et al.* (1994).

Table 1. Concentrations and absolute amounts of nitrogen, phosphorus and potassium during litter decomposition

Month	Nitrogen		Phosphorus		Potassium	
	Concentration (%)	Absolute amount (g)	Concentration (%)	Absolute amount (g)	Concentration (%)	Absolute amount (g)
1976						
June	1.280 ± 0.104	0.640 ± 0.000	0.650 ± 0.005	0.0325 ± 0.0000	0.420 ± 0.005	0.210 ± 0.000
July	1.280 ± 0.070	0.600 ± 0.007	0.630 ± 0.006	0.0298 ± 0.0004	0.400 ± 0.000	0.189 ± 0.002
August	1.300 ± 0.131	0.426 ± 0.014	0.080 ± 0.005	0.0263 ± 0.0003	0.417 ± 0.015	0.184 ± 0.002
September	1.500 ± 0.050	0.320 ± 0.009	0.105 ± 0.005	0.0240 ± 0.0012	0.400 ± 0.008	0.178 ± 0.005
October	1.580 ± 0.076	0.310 ± 0.029	0.113 ± 0.008	0.0221 ± 0.0007	0.423 ± 0.003	0.082 ± 0.002
November	1.700 ± 0.050	0.307 ± 0.009	0.120 ± 0.005	0.0217 ± 0.0022	0.433 ± 0.003	0.078 ± 0.008
December	1.750 ± 0.050	0.276 ± 0.009	0.117 ± 0.650	0.0184 ± 0.0007	0.435 ± 0.005	0.068 ± 0.210
1977						
January	1.800 ± 0.076	0.271 ± 0.006	0.117 ± 0.010	0.0176 ± 0.0006	0.430 ± 0.005	0.065 ± 0.002
February	1.950 ± 0.050	0.224 ± 0.006	0.117 ± 0.008	0.0134 ± 0.0004	0.432 ± 0.003	0.040 ± 0.001
March	1.930 ± 0.028	0.214 ± 0.014	0.115 ± 0.013	0.0127 ± 0.0008	0.427 ± 0.003	0.047 ± 0.003
April	2.060 ± 0.057	0.215 ± 0.007	0.120 ± 0.003	0.0125 ± 0.0004	0.433 ± 0.008	0.045 ± 0.002
May	2.100 ± 0.000	0.187 ± 0.021	0.118 ± 0.003	0.0105 ± 0.0012	0.432 ± 0.015	0.038 ± 0.001
June	2.150 ± 0.028	0.180 ± 0.013	0.119 ± 0.008	0.0106 ± 0.0007	0.432 ± 0.015	0.036 ± 0.003

Values given ± are standard deviations.

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