3. The roles of termites (Insecta: Isoptera) in an ecosystem

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In natural ecosystems, plants utilize mineral nutrients in an inorganic form. In view of the fact that a considerable proportion of an ecosystem's nutrients is contained within living and dead plant material, it follows that new plant growth is ultimately dependent upon the rate at which mineralization occurs in soil. For many years, scientists have been studying aspects of the interactions between plants, soil and organisms. It has been assumed by many workers that nutrient mineralization is mainly a result of the activity of soil organisms, such as nematodes, earthworm, soil micro-arthropods and other insects.

On this aspects, social insects in general, and termites in particular, are extremely important in the soil because they are associate with the breakdown of organic material and consequently in the recycling of nutrients. For instance, Johnson and Whitford (1975) estimated that subterranean termites, *Gnathamitermes tubiformans* (Buckly), consumed at least 50% of the net primary production and fed up upon several kinds of plant material; wood, grasses, litter and herbs in a desert ecosystem, and this termites removed 14-20% of Nitrogen, Phosphorus and Sulfur from annual forbes and grasses. In other studies, Silva, Mackay and Whitford (1985) tested the hypothesis that termites and soil micro-arthropods are important in the organic matter loss, and they found that termites accounted for more than 51.5% of the organic matter loss after 1yr and there was no measurable effect of micro-arthropods in organic matter breakdown in the desert ecosystem. As a consequence termites, as those studied in a desert ecosystem, process a large fraction of net primary production and play a significant role in nutrient cycling in the ecosystem.

The role of termites in an ecosystem can be defined in terms of three essential features. The first feature is their ability to divert a proportion of the total energy flow through the ecosystem. It relates to

the diversity and dynamics of termite populations. It also involves various parameters, such as foraging activities, feeding preferences and rates of food consumption.

The second feature is their physical and chemical influence on the ecosystem. Termites often construct extensive and massive nest systems in response to food availability and other environmental factors. As a results, they have a profound effect on redistribution of soil particles, on physical and chemical properties of soils, and consequently on vegetation.

The third feature is their interaction with other organisms. It involves a variety of direct and indirect effects, such as predatory, symbiotic, and commensal relationships. Little is known of the effect of these activities on the habitat in which termites live. These interactions within the termite-soil-vegetation system are complex and are not fully understood.

The following shematic diagram shows the role of termites in nutrient cycling within an ecosystem. Organic matter from plant material which has been harvested is concentrated in the termite nests, and nutrients are returned to the ecosystem via corpses and predators, as well as by the eventual erosion of the nests.