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"The importance of termites in rangelands"

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The Importance of Termites in Rangelands[1]

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Termites can be both beneficial and destructive to rangelands. In some instances they are thought to be important in nutrient cycling and soil formation, whereas in other situations they are regarded as major factors in rangeland deterioration and soil erosion (Bodine and Darrel, 1975). Ohiagu and Wood (1979) made observations on the foraging behaviour and harvesting rates of Trinervitermes geminatus (Wasmann). In addition, they have made some assessment of grass-eating termites in pastures in northern Nigeria. In general, studies on damage to pasture and competition with herbivores are lacking.

The importance of termites in nutrient cycling and soil formation has been reviewed by Wood and Sands (1978). In East Africa, recent studies on the effects of termite activities on soil properties include, among others, those by Pomeroy (1983), Wielmaker (1984) and Okwakol (1987).

The aim of this paper is to highlight various aspects in which termites are important in rangelands.

Effects on Soil

Termites play a significant role in the soil and plant systems, more particularly in the physical and chemical alteration of soils and availability of nutrients. Consequently, they form an important component of rangeland ecosystems.

The effect of termites on the physical nature of soil is mostly exerted as a result of their burrowing activities. This is mainly because, their size being larger than the soil pores, they tend to force their way through the soil. Some build elaborate subterranean galleries and chambers where they spend most of their time while others construct epigenous structures. Notable among these are the large mounds of Macrotermitinae that form a conspicuous feature of many landscapes in Uganda. In addition, these insects modify soil profiles by removing soil from various depths and bringing it to the surface in the form of runaways, sheeting's and mounds.

Changes in soil texture appear to be due to selection and sorting of certain particles by worker termites resulting in altered structure and particle size distribution.

The part played by termites in furthering soil erosion has been discussed by Harris (1949) and Bagine (1984). In his consideration of this subject, Harris suggested that erosion arises from the bringing to the surface of soil with reduced organic matter, and foraging termites depriving the surface of humus and removing plant cover.

As decomposers, termites play a critical role in contributing to the total energy flow in a rangeland. They carry out two distinct processes in decomposition: comminution, which is the reduction in size of organic particles, and catabolism which is the biochemical breakdown of complex organic particles. In their study of grass production and decomposition in southern Guinea Savanna, of Nigeria, Ohiagu and Wood (1979) observed that 46.8 percent of the annual grass production was channelled by decomposers.

A number of termite species have been recorded as chemically affecting the soil by concentrating nutrients. Among them may be species of Macrotermes (Pomeroy, 1983), Odontotermes (Bagine, 1984) and Cubitermes (Okwakol, 1987). In most cases higher nutrient concentrations in mound soil than in adjacent soil were noted. Unfortunately, these nutrients remain unavailable to plants until the mounds are either destroyed by man or are eroded.

Arshad (1981) observed that the growth of grass in most grasslands is enhanced by the higher nutrient content of mound soil. He also showed that dry matter yield was much higher in the area around mounds constructed by Macrotermes michelseni than adjacent areas in a semi-arid range ecosystem in Kenya (Arshad, 1982). He attributed such development to high nutrient content due to the mound-building activities of termites.

Consumption of Forage Grasses

Wood and Sands (1978) have recognised three types of foraging behaviour from the point of view of damage to pasture:

a)The termites climb up standing grass which is cut down into small pieces and then carried to the nest.

b)Dead grass lying on the soil surface is carried back to the nest.

c)The termites construct runaways and sheets of soil over dead grass lying on the surface or short grass tussocks.

These authors observed that the first type of feeding behaviour removes grass that may otherwise be eaten by cattle, while the second and third type of behaviour may kill off grass seeds which would otherwise germinate following rains, create potential erosion hazards by baring the soil surface, and destroy valuable pasture plants.

In Africa, the most abundant and widely distributed grass-eating termites are various species of Hodotermes, Microhodotermes and Trinervitermes together with certain Macrotemitinae, such as Macrotermes and Odontotermes spp. (Wood and Sands, 1978). Investigating the impact of Trinervitermes geminaturs on rangeland in Nigeria, Ohiagu (1979) noted that these termites harvest standing grass tussocks which are cut into pieces and carried back to the nest. He estimated a total consumption of about 81 kg/ha/annum, which compared with a total estimated consumption by cattle of 1404 kg/ha/annum, and did not appear to be economically significant. However, more quantification of consumption of grass by termites of different genera and species is necessary in order to fully understand their significance. According to Lapage (1979) competition with domestic stock for standing grass may result from drought or overgrazing.

Reduction of Productive Land

As well as causing depletion of forage that would otherwise be available for grazing animals, pasturelands may deteriorate due to the presence of termite mounds. The ground surface covered by the mounds varies depending on the species. In other words, the larger the mounds constructed the more the space occupied. Okwakol (1976) estimated the ground surface covered by the small Cubitermes mounds in a grazing area in Uganda as being 1.9 percent of the total land. Large mounds constructed by Macrotermes no doubt cover a much larger area. Grass does not normally grow on live mounds. This, therefore, means that the presence of these mounds leads to reduced grass cover in the area and consequently to reduced amounts of feed available for grazing animals

Conclusion

The importance of termites in a rangeland ecosystem is mostly manifested in their influence on nutrient cycling and soil formation, as well as range destruction and soil erosion. Consequently, in order to discern whether or not it is necessary to control these insects in rangelands, more quantitative data is required, particularly regarding competition with herbivores.

Note

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