

## ABSTRACT

The aim of this research was to study the biology of two advanced species of termites, Nasutitermes nigriceps (Haldeman) and Nasutitermes costalis (Holmgren). Previous studies of the biological properties of both species of termite were not done. In order to achieve this aim, a two stage process of extracting termites from their arboreal nest was designed. The proportion of termites retrieved from the extraction process was 94.6%.

Both N. nigriceps and N. costalis occurred in Trinidad and Jamaica, however, the distribution of their colonies were inversely related. Nasutitermes nigriceps dominated in Jamaica while N. costalis was more common in Trinidad. The populations of N. costalis were restricted to areas with a mean annual rainfall exceeding 1270 mm.

In Jamaica the density of N. nigriceps in the mangroves of Port Royal was 2 nests per 30 m<sup>2</sup>. This was significantly higher than the mangroves of Hellshire and the N.W. Coast which had 0.5 and 1 nest per 30 m<sup>2</sup>, respectively. The mangroves of Port Royal supported  $7 \times 10^3$  termites per m<sup>2</sup>. The biomass of termites in Port Mangroves was 3.05 gm<sup>-2</sup>. There was a vertical zonation of

termite colonies in the mangroves; the highest frequency of nests was found in the mid-region of the mangroves. Nests of N. nigriceps were preferentially constructed on red mangroves.

Colonies of N. nigriceps and N. costalis had two and three types of nymphs respectively. Both colonies had two types of workers and one type of soldiers. The presoldiers of N. nigriceps had narrow heads with long nasus or wider heads with short nasus.

The colonies of N. nigriceps from Jamaica were consistently monogynous and monandrous. However, N. costalis colonies were either monogynous or polygynous. Polygyny was usually associated with polyandry. The number of multiple queens varied with geographic location. In Jamaica, the number of multiple queens ranged from 2 - 6, while in Trinidad the range was from 8 - 28. Polygyny appeared to be a normal phenomenon in colonies inhabiting fragile nests. Intraspecific variation in the number of queens per colony arised from the method of replacement of reproductives.

Colonies of N. nigriceps and N. costalis consisted of parent nests and calies. The ratio of parent nests to calies in N. nigriceps was 1:1. In colonies of N.

costalis the ratio of parent nests to calies ranged from 1:2 to 1:5. The proportion of castes was asymmetrically distributed in colonies of N. costalis from both Trinidad and Jamaica: parent nests housed a higher proportion of nymphs while calies supported a higher proportion of the sterile castes. However, a similar proportion of castes was found in parent nests and calies of N. nigriceps. The proportion of sterile castes required for alate production in colonies of N. nigriceps from Port Royal was workers 82.3% and soldiers 17.7%. This was similar in other regions of Jamaica but was lower than that of N. costalis from Trinidad and Jamaica.

The sex ratio of colonies of N. costalis was 1:1. This was observed only in older colonies of N. nigriceps. Colonies of N. nigriceps less than 130 cm in perimeter exhibited a 2:3 ratio in favour of females. The presence of only female workers in trails and the high proportion of this group in the brood chambers of N. nigriceps suggested the existence of sex polyethism.

The development of colonies of N. nigriceps may be divided into three stages: immature, mature and senescent. The energy of immature colonies of N. nigriceps was invested in the expansion of the colony to accommodate the increasing colony produced during the

mature stage. Alates were only produced during the mature stage of nest development. Alates of N. nigriceps were produced between October and March and swarming occurred in December and March only. The frequency of senescent nests in the mangroves was low: this indicated that colonies rarely attain this level of nest development.