

## Short Communication

### Influence of Aridity on Burrowing and Other Behavioural Traits of *Nesokia indica* Gray

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The short-tailed mole-rat, *Nesokia indica* Gray, an oriental rodent, is fairly well distributed in Punjab, Haryana, Delhi, parts of Uttar Pradesh and Himachal Pradesh, registering a pest status in various crops of mesic and sub-mesic zones of northern India (Barnett and Prakash, 1975; Jain and Tripathi, 1988a). It has been, however, recorded from irrigated fields in Sri Ganganagar, a district of Rajasthan (Prakash *et al.*, 1971). Interestingly, it prefers to live in those habitats having soft soil crust with high moisture content and good vegetal cover (Ramesh, 1992). Recently, its presence was noticed in the rangelands and afforestation sites of true arid ecosystems where it damaged 4.4 to 10% forest plantations (Jain and Tripathi, 1988b). Since *Nesokia indica* is considered a mesic species, its immigration and spread in arid areas, its adaptation and survival in the new environs have been studied. The changes in burrowing and other behavioural traits in *Nesokia indica*, infesting 2 to 10-year-old arid zone afforestation sites of Nagaur and Bikaner districts of western Rajasthan, on a 25 ha afforested range area, Panwari (near Kuchaman city), district Nagaur, and at Udayramsar, near Bikaner were recorded. These ranges had 2 to 10-year-old plantations of *Prosopis cineraria*, *P. juliflora*, *Acacia tortilis*, *Parkinsonia aculeata* and certain seedlings of *Acacia nilotica*. The Panwari range is located in vast sandy plains, surrounded by Aravali hills and is close to large salt fields, whereas, the Udayramsar range is located in sandy plains, surrounded by undulating sand dunes. Both these locations had infestation of *Nesokia indica*, as evidenced by the presence of mole hills.

Important behavioural manifestations of *N. indica*, viz., burrowing behaviour/pattern, dietary

habits and neophobia, etc., were recorded at the above sites and compared with those of mole rats inhabiting mesic zones (Ramesh, 1992).

(i) *Burrowing pattern* : In Rajasthan desert, a typical burrow system of mole rat measured 21 m in length and 17 m in width. The mole hills were also quite large as compared to those found in the burrows in Delhi (Ramesh, 1986). This may be due to deeper burrows in the arid ecosystem (85 to 150 cm) resulting in greater deposition of soil at burrow openings. As *N. indica* prefers soil with high moisture regime and soft soil crust, the depth of burrows in Delhi and U.P. rarely reaches 56 cm (Ramesh, 1992). On the contrary, in the arid zone, these requirements are met with only in very deep burrows (85 to 150 cm). Evidently, deeper burrows help in avoiding high soil surface temperatures during acute summers - a major threat to survival for a mesic species.

The burrows were mainly dug close to the plants/trees where comparatively more moisture is expected. The burrow structure indicated presence of blind ends (Fig. 1), which could probably be the future extension points towards the roots of the new host trees. Such blind ends were, however, absent in the irrigated fields in Delhi (Ramesh, 1992). A further comparison of burrow system of this mole rat, occurring in mesic zone and in arid zone (Table 1) revealed, that the distance between the two burrow openings was more in forest plantations of arid zone than in the irrigated crop fields of Delhi. The number of burrow openings (1- 4) in each burrow system was also lower in the former case. This seems to be an adaptation against predators, as the

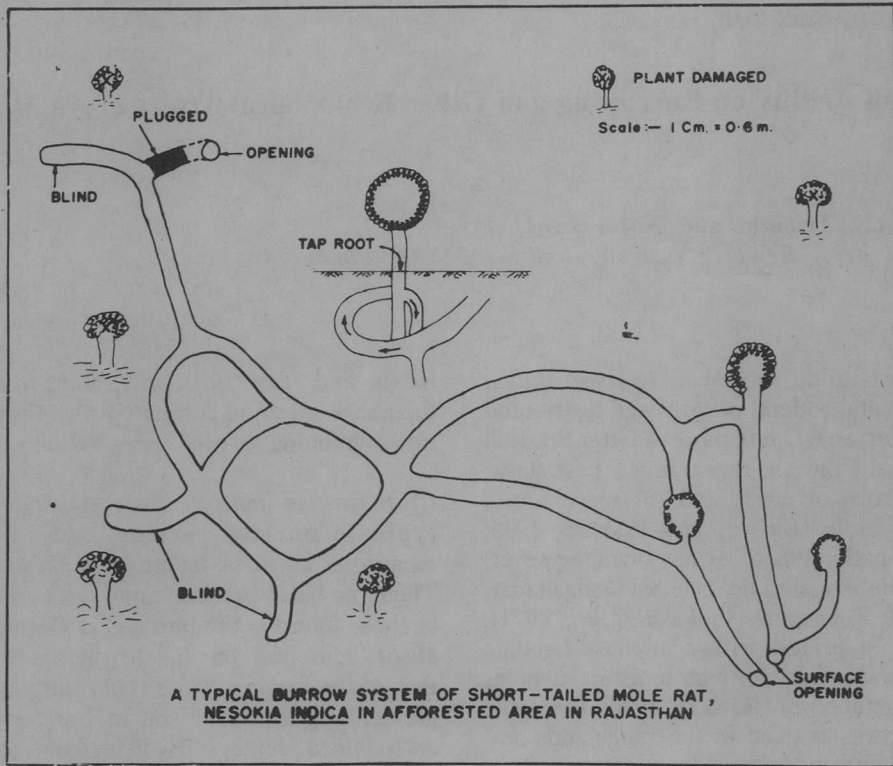


Fig 1 A typical burrow system of short-tailed mole rate, *Nesokia indica* in afforested area in Rajasthan

vegetal cover in such habitats is almost nil, atleast during acute summers, and burrow openings are easily visible. The burrow openings are also kept

tightly plugged by sand and the bark of the roots to avoid attack by natural predators and the flow of hot air into the burrows.

Table 1. A comparison of burrowing pattern of *Nesokia indica* Gray in arid afforestation sites and semi-arid crop fields

Characteristics	Observations	
	Arid zone afforestation site*	Semi-arid crop fields**
No. of openings per burrow system	1-4	1-19
Distance between two openings of a burrow system (cm)	30-1710	41-572
Length of the tunnel (cm)	3432-5542	17-3443
Depth of the burrow (cm)	85-150	9-56
Diameter of burrows (cm)	3.75-12.5	3.5-11.5

\* Present study, mean of 10 burrow systems.

\*\* Ramesh (1986, 1992).

(ii) *Dietary habits* : Since there is an acute shortage of food and water in arid ecosystems, especially in summers (March-June), *N. indica* seem to have modified its dietary habits and has been found to feed mainly on the roots of exotic plants like *A. tortilis* and *P. juliflora*. The endemic *P. cineraria*, *Capparis decidua* and *Ziziphus nummularia* were not at all attacked by these mole rats. Its damage to the exotic tree species was easily identifiable from those of other desert rodents on the basis of presence of peculiar tooth marks. Moreover, the damage by *N. indica* is mainly of slicing type, whereas, other rodents were responsible for debarking. The burrows of the mole rats were preferably made underneath the exotic tree species. Not a single burrow system of this rat was traced leading to the root zone of endemic plants. It depends for feeding on available food resources at such depths, i.e., only on the roots of the trees of exotic plants, because these trees have large number of main (7-12) and subsidiary roots (42-52) as compared to 4 main roots and 13 subsidiary roots of endemic *P. cineraria* (Muthana *et al.*, 1984). Such root spread of exotic trees makes it easier for mole rats to feed on them for longer durations in the arid conditions. However, in mesic and sub-mesic zones, this species has been reported to feed on a variety of crops (Peshwani *et al.*, 1975 and Chopra and Parshad, 1983). Reports are not available about its damage to tree plantations in the mesic zones.

(iii) *Neophobia* : Another notable change observed in this species in xeric environment was the development of strong neophobia. *N. indica* was observed to avoid all sorts of poison baits, traps and even aluminium phosphide fumigation tablets, kept inside the burrow openings, by making a new plug inside. Whenever the plug at a burrow opening was removed, the same was replugged by this species within around three minutes. In the xeric environment, this species rarely ventures out of the burrows, except for defecation and other intraspecific social interactions in the cool night hours. Although the

species is nocturnal, its underground root slicing activity could be heard easily even during day time. The strong neophobic behavioural trait has made it possible for this rodent to adjust to hostile arid environment and to establish its sizeable populations in the afforested lands.

The climatic (high temperature and low humidity) and edaphic (loose sandy soil) factors, coupled with food and water requirement of this species, seem to have probably induced changes in its burrowing and dietary behaviour.

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