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EXTERNAL CHARACTERISTICS AND DENSITY OF THE CRESTED PORCUPINE BURROWS IN EMBANKMENTS AND SOME OTHER NON-CROP AREAS

Muzaffar Khan, Haji M. Aslam, M.A. Beg & Akbar A.Khan
Department of Zoology & Fisheries, University of Agriculture, Faisalabad

This study was conducted to gather information about some external features and density of porcupine burrows located in the embankments and other non-crop areas of central Punjab. An average hectare of the embankments of drainage canals, irrigation canals, and some miscellaneous tracts of raised lands in the cultivations of central Punjab harboured 0.68, 1.25 and 7.14 procupine burrows, respectively. The burrow systems located in the miscellaneous habitats appeared to be more complex as these possessed a larger and greater number of entrances.

INTRODUCTION

The Indian crested porcupine (Hystrix indica) has long been recognised as a pest of forest trees. It has also a reputation of plundering the agricultural crops as well as causing breaches in embankments of water channels because of its habit of digging burrows in embankments (Chaudhry and Ahmad, 1975; Ahmad and Chaudhry, 1977; Greaves and Khan, 1978).

Kayani *et al.* (1990) estimated that an average hectare of the forest plantation of central Punjab harboured about 20 porcupines. Besides the forest plantations, earthen embankments and uncultivated uplands seem to have increased the burrowing niche of this animal in the cultivations of the Punjab. The present paper documents information about some external features and density of porcupine burrows located in the embankments and other non-crop areas of central Punjab.

MATERIALS AND METHODS

In all 62 ha. of embankments of drainage canals, 28 ha. of irrigation canals, 56 ha. of other types of embankments and non-crop areas (Table 1) were sampled in central Punjab from October 1987 to July 1988. Only those portions of the embankments of drainage and irrigation canals which averaged 2m or more in height and relatively less disturbed, were sampled. Other sites, namely, the flood protection and railway track embankments, earthmounds, sandy scrubs, and graveyards were also sampled. The area of each of the sampling sites was estimated through pacing while their height or elevation was assessed visually. The criteria for identifying the porcupine burrows and their parameters that were measured were the same as used by Kayani *et al.* (1990).

Elevated tracts of land especially in the form of earthen embankments were common in the study

area. Besides the embankments occasional elevated sandy tracts of scrubs were also there amidst the croplands. At the same places, old mounds of scraped earth served as excellent denning sites for the porcupines. The graveyards being mostly located on well-drained sites, were also the favoured denning sites. All these uplands become vegetated, in due course of time, with an admixture of plants characteristic of the tropical thorn forest (e.g. *Prosopis specigera, Salvadora oleoides, Capparis decidua*) and riparian jungle (*Accacia arabica, Dalbergia sissoo, Saccharum munja, Alhaji camelorum*). Plants of *Zizyphus, Calotropis procera, Heliotropium, Peganum hermala, Cynodon dactylon* and *Eleusin indica* are also common. On mesic sites at the foot of the canal embankments, *Saccharum bengalense, Cyperus rotundus* and *Typha* may be present.

RESULTS AND DISCUSSION

Table 1 shows that a survey of 146 ha. of embankments and other uplands in central Punjab revealed the presence of 117 active burrows of porcupines. Thus the average per hectare burrow density was 0.80 which is 16 times higher than recorded by Kayani *et al.* (1990) for the forest plantations. The miscellaneous habitats which included flood protection and railway track embankments, earthmounds, sandy scrubs and graveyards, were found heavily infested (7.14 burrows per ha.) as compared to the embankments of drainage (0.68 burrow per ha.) and irrigation (1.25 burrows per ha.) canals. The area of all the miscellaneous habitats excepting that of the earthmounds was small and hence the density estimates for them were not reliable. The earthmounds which occupied 50 ha. of flat surface were heavily infested with porcupines.

The burrow systems of the miscellaneous habitats had significantly larger number of entrances in them than those of the embankments of drainage ($t = 14.578$; d.f. = 311; $p < 0.001$) and irrigation ($t = 13.380$; d.f. = 302; $p < 0.001$) canals (Table 2). The burrow systems of the embankments of drainage canals and irrigation canals were not significantly different ($p > 0.10$) with respect to the number of their entrances.

The heights of the burrow entrances of the embankments of irrigation canals ($t = 10.441$; d.f. = 115; $p < 0.001$) and miscellaneous habitats ($t = 8.544$; d.f. = 309; $p<0.001$) averaged more than that of the drainage canals. However, the entrances of the burrow systems of irrigation canals and miscellaneous habitats were not different ($p > 0.10$) in this respect.

The entrances of the burrow systems located in the embankments of irrigation canals ($t = 4.332$; d.f. = 115; $p < 0.001$) and miscellaneous habitats ($t = 5.848$; d.f. = 309; $p < 0.001$) were wider than of those located in the embankments of drainage canals. The widths of the entrances of the irrigation canals and miscellaneous habitat burrows were not different ($p>0.05$). Thus, the burrow systems of miscellaneous habitats had more and larger entrances than those of the drainage and irri-

Table 1. Estimates of burrow density of the Indian crested porcupine in different types of raised lands located in central Punjab

Habitat type	Location	Av.distance (m) from croplands	Av. height (m) from ground level	Area (ha) sampled	No. porcupine burrows	Per hectare burrow density
A. Embankments of Drainage Canals						
1 Chakku Drainage plantation, Jaranwala Tehsil, Faisalabad.	Near Chakku forest	40	2.5	36	22	0.61
2. Lalian Drainage	Near Lalian, Chiniot Tehsil, Lalian, Chiniot	15	2.3	23	9	0.40
3. Sikandarpur Drainage, Faisalabad.	Near Shahkot, Jaranwala Tehsil,	10	2.5	3	11	3.66
	Total/Av.	18	2.4	62	42	0.68
B. Embankments of Irrigation Canals						
1. Jhang Branch	Aminpur-Thekriwala Sector, Faisalabad Tehsil, Faisalabad	8	2.5	5	16	3.20
2. Tributary of Jhang Branch	Near Lalian Forest plantation, Chiniot Tehsil, Jhang	12	2.5	1	3	3.00
3. Tributary of Jhang Branch	Near Chak 27/J.B., Faisalabad Tehsil, Faisalabad.	6	2.1	4	10	2.50
4. Gogera Branch	Salooni Jhal–Tarkhani Banglow, Sammundri Tehsil, Faisalabad.	10	2.5	12	4	0.33
5. Tributary of Gogera Branch	Near Chak 216/G.B., Jaranwala Tehsil, Faisalabad.	2	3.0	6	2	0.33
	Total/Av.	6	2.5	28	35	1.25
C. Miscellaneous Habitats						
1. Protective flood embankments	Aminpur–Chiniot Embankment, Chiniot Tehsil, Jhang	700	1.8	2	9	4.50
2. Earthmounds in croplands	Chak 52 G.B., Near Tarkhani Bunglow, Sammundri Tehsil, Faisalabad.	5	1.5	50	15	3.33
3. Sandy tracts (a)	Village Nasrana, Chiniot Tehsil, Jhang	20	2.6	1	15	15.00
(b)	Chak 345 J.B., Gojra Tehsil, Toba Tek Singh	30	1.5	0.5	3	6.00
4. Abandoned railway line embankment	Chak 109 G.B., Jaranwala Tehsil, Faisalabad	2	1.2	1	2	2.00
5. Graveyard	Village Nasrana, Chiniot Tehsil, Jhang	30	0.3	1	5	5.00
	Total/Av.	131	1.5	56	40	7.14

Table 2. **Number of entrances associated with an average burrow of the Indian crested porcupine and their measurements**

Upland	No. of burrows (No. of entrances)	No. of entrances per burrow $\bar{X}$ ± SD (Range)	Entrance height (cm) $\bar{X}$ ± SD (Range)	Entrance width (cm) $\bar{X}$ ± SD (Range)
Embankments of drainage canals	42 (92)	2.2 ± 1.3 (1–6)	43 ± 6.5 (15–91)	53 ± 6.4 (15– 91)
Embankments of irrigation canals	35 (85)	2.4 ± 1.2 (1–6)	53 ± 7.0 (23–90)	58 ± 8.8 (25–105)
Miscellaneous habitats	40 (219)	5.5 ± 2.0 (1–6)	54 ± 11.6 (23–90)	60 ± 10.7 (25– 90)
Total/Av.	117 (396)	3.4 ± 1.5 (1–6)	51 ± 9.4 (15–91)	58 ± 9.3 (15–91)

gation canals. The burrow systems of the latter two habitats were different from each other only with respect to the size of their entrances which on average were larger in case of the irrigation canals. As compared to the burrow systems of forest plantations (see Kayani *et al.*, 1990), the burrows of the embankments of drainage and irrigation canals had fewer entrances, whereas those of the miscellaneous habitats had both larger and more numerous entrances in them (Kayani *et al.*, 1990).

Among various factors that may favour the porcupine in increasing its carrying capacity in central Punjab, old and unattended embankments standout prominently. The huge earthmounds of the Harrapa ruins (Sahiwal district), which are heavily infested with porcupines, bear a testimony to this fact.

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