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EXTERNAL CHARACTERISTICS AND DENSITY OF THE CRESTED PORCUPINE BURROWS IN FOREST PLANTATIONS

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Five forest plantations, all located in the central Punjab, were sampled for knowing the abundance of burrows of the Indian crested porcupine (Hystrix indica). It was estimated that an average block of 100 ha of the plantations harboured 5 porcupine burrows. The burrow entrances were generally located about 89 ± 24.41 cm above ground level. An average burrow had 4.4 ± 1.59 entrances in it, which measured 43.0 ± 8.32 cm high and 47.5 ± 21.45 cm wide. It was concluded that the plantation- cropland complex of central Punjab had a favourable effect on the population density of the porcupines in the region.

INTRODUCTION

The Indian crested porcupine (Hystrix indica) occurs over most of Pakistan where it affects, among other habitats, the moist temperate deciduous forests in the Himalayas, the steppes of Baluchistan, and the sand hills in deserts of Thal and Thar (Taber et al., 1967; Roberts,1977). Before the massive development of canal irrigation at the turn of the present century, the porcupine inhabited the tropical thorn forest of the central Punjab. However, introduction of agriculture and plantation of forests substantially raised the carrying capacity and consequently porcupines became abundant throughout the region (Taber et al. , 1967). From the forest plantations, where they debark and girdle trees, and destroy nursery plants, the porcupines launch nightly attack on nearby croplands to depredate on maize, potato, sweet potato, sugarcane and a variety of other crops. This paper presents information about the external characteristics of porcupine burrows and their density in some forest plantations of central Punjab.

METHODS

From January 1988 to August 1989, five forest plantations, all located in central Punjab, were sampled for porcupine burrows. From these plantations, which collectively covered 7233 ha of canal irrigated land amidst the croplands, 2201 ha were randomly chosen and sampled for porcupine burrows (Table 1). The portions of the plantations surveyed were divided into 10 m wide strips and each strip was then simultaneously checked by two workers for porcupine burrows.

The burrows were assigned to porcupines on the basis of presence of squills and the characteristic for marks of the soil present at the burrow entrances. Porcupine faeces present in the immediate vicinity of the burrows were also helpful in this respect. Information about the elevation of the burrow entrances from the ground level, soil type, distance from reliable water supply, and distance to croplands was also recorded. Number of entrances per burrow system and the height and width of each entrance were also noted. Details of the forest plantations that were surveyed for the present study are given in Table 1. In these plantations Dalbergia sisso, Eucalyptus spp. ,Salmalia malabarica, Morus alba and Acacia modesta were the common trees. In the understorey plants, bushes of Prosopis specigera, Prosopis juliflora, Capparis decidua, Acacia modesta, and Salvadora oleoides were common. At some places clumps of Saccharum munja, Cynodon dactylon and Desmostachia bipinnata were also present.

Species composition and relative abundance of trees and understorey plants varied from plantation to plantation and often between different parts of the same plantation. All the plantations were canal irrigated and were located in close proximity to the croplands. Some of the plantations were also provided with tube–well water for irrigation. The plantation soils were generally kept thin by the forest staff who occassionally also attempted to eliminate the porcupines by filling their burrows with water and killing them on being flushed out.

RESULTS AND DISCUSSION

Burrow Density: About 2201 ha of forest plantation located in the districts of Faisalabad, Jhang, Toba Tek Singh, and Sheikhupura were sampled for porcupine burrows (Table 1). The estimates of the density of the burrows in each of these plantations are given in Table2.

Mochiwala forest plantation : There was an average of five porcupine burrows per 100 ha of the Mochiwala forest plantation. Eighty percent of these burrows were located over 37 ha (17% of the total area sampled) which had understorey of Salvadora oleoides, Capparis decidua and Saccharum munja.

Lalian forest plantation: An average block of 100 ha of the plantation had 11 porcupine burrow systems in it. Most of the plantations had sparse understorey vegetation which comprised mainly Prosopis spp. and Saccharum munja. The plantation floor in certain parts was not even and such portions tended to have large number of burrows.

Chakku forest plantation: This forest plantation was heavily infested with porcupines; the average burrow density was 68 per 100 ha. Most of the plantations had fairly thick growth of understorey vegetation comprising Prosopis specigera, Tamarix articulata and scattered clumps of Saccharum munja. This plantation was located near a couple of drainage canals whose raised embankments were heavily infested with porcupine burrows.

Kamalia forest plantation: An average block of 100 ha of this plantation had four burrows of porcupine in it. The entire plantation had generally sparse understorey in which Prosopis juliflora was dominant

Paini Tanran forest plantation: This forest plantation supported mature stands of Dalbergia sisso and Salmalia malabarica. The understorey vegetation in this plantation comprised young Acacia modesta and clumps of Saccharum munja. On average there was only one burrow per 100 ha of this plantation. Thus, Chakku plantation was the most heavily infested of all the five plantations. This plantation was also the smallest in size. The present data show that the degree of infestation was generally inversely related to the size of the plantation. Portions of the plantation having dense understorey vegetation and raised ground tended to have large number of porcupine burrows.

The porcupine burrow entrances were generally located on somewhat elevated lands. The mean elevation of the burrow entrances in the plantation of the present study was 89 ± 24.41 cm (range:0-183 cm) (Table 2). This protected the burrows from being flooded with rain or irrigation water.

Measurements of Burrow Entrances

The number of entrances associated with a single burrow system varied from 1 to 16. The mean number of entrances per burrow system in Kamalia (6.0 ± 2.43) and Lalian (4.9 ±1.99) forest plantations was about twice as many as those of the burrow entrances in other plantations (Table 2). The height of the burrow entrances in the combined samples of the five plantations ranged from 15 to 91 cm (mean: 43.0 ±8.32 cm). The entrances in Kamalia (45.6 ± 14.44 cm), Lalian (40.3 ± 15.96 cm) and Chakku (39.6 ± 11.94 cm) plantations on average were larger than those of other plantations. The maximum mean width of the entrances

Table 1. Some information about the forest plantations that were sampled for the burrows of the Indian porcupine

Location of forest plantation	Total area of plantation (ha)	Area sampled (ha)	Major crops in vicinity	Comments
Mochiwala (178 J.B., Jhang Tehsil, Jhang)	816	222	Wheat, sugarcane, brassica	Understorey vegetation sparse
Lalian (Chak Bahadur, Chiniot Tehsil, Jhang)	462	220	Wheat, sugarcane, maize, Trifolium	Well kept plantation with thin understorey
Chakku Rakh, Jaranwala Tehsil, Faisalabad	162	12	Wheat, sugarcane, fodder	Dense understorey vegetation
Kamalia Tehsil, Toba Tek Singh	4498	1416	Wheat, sugarcane, fodder, cotton	Understorey vegetation sparse
Paini Tanran (Shariqpur Tehsil,Sheikhupura)	1295	331	Wheat, sugarcane, maize	Poorly maintained understorey

Table 2. External characteristics of the Indian porcupine burrow systems in the plantations of central Punjab

Forest plantation	Burrow entrance elevation (cm) X ± S.D. (range)	Entrances per burrow system X ± S. D. (range)	Height of entrances (cm) X ± S.D. (range)	Width of entrances (cm) X + S.D. (range)
1. Mochiwala	77.0 ± 31.24 (30 –122)	2.9 ± 1.97 (1–7)	33.4 ± 17.64 (8–76)	44.6 ± 8.91 (15–91)
2. Lalian	48.6 ± 43.58 (0–122)	4.9 ± 1.99 (1–14)	40.3 ± 15.96 (15–91)	56.1 ±16.8 (20–91)
3. Chakku	63.1 ± 19.17 (31–91)	2.4 ± 1.06 (1– 4)	39.6 ± 11.94 (23–69)	51.9 ± 11. 77 (33–79)
4. Kamalia	115.0 ± 30.69 (61–183)	5.0 ± 2.43 (1–16)	45.6 ± 14.44 (20–79)	43.9 ± 44.12 (25–94)
5. Paini Tanran	70.0 ± 16.80 (46–91)	1.3 ± 0.50 (1–2)	26.6 ± 6.99 (23–38)	52.5 ± 10.60 (36–61)
Average	89.0 ± 24.41 (0–183)	4.44 ± 1.59 (1–16)	43.0 ± 8.32 (15–91)	47.5 ± 21.45 (15–94)

was recorded for Lalian burrow systems (mean: 56.1 ± 16.8 cm). The width of the burrow entrances of Paini Tanran (mean: 52.5 ± 10.60 cm) and Chakku (mean: 51.9 ± 11.77 cm) system too averaged higher than those of Mochiwala (mean: 44.6 ± 8.91 cm) and Kamalia (43.9 ± 44.12 cm) burrow systems.

If the number of entrances is used as an index of a burrow complexity, the burrow system of Kamalia and Lalian plantations would be the most complex ones, while those of Mochiwala and Chakku plantations less complex, and those of Paini Tanran the least complex. The same conclusion would be arrived at if increasing height of the burrow entrances was taken as an index of complexity. However, the width of the entrances did not reveal a pattern similar to those mentioned above.

These data showed that plantations with denser understorey vegetation and raised lands were favoured by the porcupine for burrowing. These two factors may be taken to indicate that the area was less disturbed and better protected from flooding. But the observation that the density of the burrows was generally inversely related to the size of the plantation is hard to interpret. As for Chakku plantation, it may be pointed out that an exceptionally high burrow density in that plantation was possibly a result of spillover from the nearby heavily infested embankments of drainage canals. Porcupines living on such narrow and unproductive embankment, which ran through the croplands, must have depended for feed largely on the croplands. The same idea may be extended to smaller plantations. Porcupines concentrated in smaller plantations possibly drew most of their nutriments from the croplands, whereas in large plantations the size of the cropland over which the porcupines (constrained by the size of their home range) could forage, would not increase in proportion to the increase in size of the plantations. The croplands being more productive than the plantations but being not available ad libitum, would have greater impact on the carrying capacity of the porcupine in a plantation-cropland complex.

As many as 10 porcupines have been reported from a single burrow system (Roberts, 1977). (Arshad 1987) estimated an average of four porcupines per burrow. Using the latter estimate, on average 100 ha block of the forest plantation in the central Punjab, harboured roughly 20 porcupines. The estimate of 272 animals/100 ha for Chakku forest plantation would be too high as compared to that of Lalian (44/100 ha), Mochiwala (20/100 ha) Plantations. It may be pointed out here that the burrows of Kamalia and Lalian plantations, being possibly more complex than those of the other plantations, might have harboured greater number of porcupines than the estimates given above.

The forest plantation in the present study area provided not only cover and food to the porcupines but also proximity to croplands which were much richer in food resources than the plantations themselves. Thus the plantation-cropland complex must have an important role in sustaining high population densities of porcupines in central Punjab.

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