

**ECOLOGY OF SAMBAR DEER (*Cervus unicolor unicolor*-Kerr
1792) IN RELATION TO HABITAT REQUIREMENTS AND
PREDATOR PRESSURE BY THE LEOPARD (*Panthera pardus
kotiya*-Meyer 1974) AT THE HORTON PLAINS NATIONAL
PARK OF SRI LANKA**

BY

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ABSTRACT

Horton Plains National Park harbours the largest population of sambar deer (*Cervus unicolor unicolor*) in Sri Lanka. Its only predator, the leopard (*Panthera pardus kotiya*) is also available in the National Park. The impact of the sambar deer on habitats is inevitable. Therefore, a study was conducted from 1997-2001 on the ecology of sambar deer and the prey predator relationship at Horton Plains National Park. The study on sambar deer included aspects on population density, group size and composition, sex ratio, breeding schedule, activity pattern, habitat use, and impacts on habitat, food habits and food availability. The study on leopard was mainly on food habits, population estimation, identification of core areas and prey predator relationship.

The sambar population was estimated using direct and indirect methods. The defecation rate of sambar used as an indirect method was determined by a study carried out at the National Zoological Garden Dehiwala using four-penned sambar. The mean daily defecation rate of sambar was 21 pellet groups. The estimated sambar population was 2102.5 ± 845 . Crude density was $66.5/ \text{km}^2$ and the ecological density was $223.5/ \text{km}^2$ and each of them by the indirect method was 3154 ± 1096 , $98.9/ \text{km}^2$, $350/ \text{km}^2$ respectively. The sambar population increased in years 1997, 1998, 1999 and 2000 than in year 1991.

The average group size of sambar was 6.5. Male and female group sizes were 1.35 ± 0.7 (n= 646) and 3.14 ± 2.7 (n= 2746). The average mixed group size was 9.7 ± 7.5 (n= 2754). The sambar deer at Horton Plains seemed to be gregarious. Permanent associations were not observed.

Group sizes varied and large groups were seen on feeding grounds when the food was abundant from April onwards. During rut group size became larger again. These periods lie within March-May and September-November. Although mixed groups were seen throughout the year, mixed group peaks during May and September were due to rutting. Fawns were seen throughout the year but fawning peaks occurred in May-July and September-October. The highest peak was in May. During the corresponding period of conceptions, most males had polished antlers. However males with polished antlers were encountered throughout the year. Though there are fawning and breeding peaks they are seen all the year at Horton Plains National Park.

The sex ratio (male: female) of the sambar at Horton Plains National Park was 1:4.

Analysis of food habits of sambar indicated that males fed more on less nutritious foods than females. There was a significant difference in diet of male and female sambar deer ($P < 0.05$). The amount of *Pennisetum* in diet of fawn was also significantly higher ($P < 0.05$) compared to that of adult sambar deer. This tendency was found only in higher quality foods when the sexes were taken into consideration. When the ages were taken



into consideration the proportion of both the higher quality foods and also other food items varied significantly. There was a monthly variation in diet of sambar deer showing a preference depending on availability during dry and wet periods. During the wet periods they fed more on *Pennisetum* sp while during the dry period they fed on palatable species like *Andropogon* spp.

There was a positive correlation between chemical composition of food plants and faeces indicating dungs as an indicator of dietary quality. Protein contents of the dominant forage species varied between the dry and the wet seasons. The major food plants contained 19.6%-60% protein, which were within the range of requirements.

GSN (Grazing Susceptibility Number) was used as an indicator of the grazing effects of the sambar in the grassland. SDR (Summed Dominance Ratio) was used to calculate the GSN. Even for preferred foods low GSN values were obtained during flowering seasons and during the dry periods due to their un-palatability. Positive SIN (Stand Index Number) values indicate damages caused by the deer.

About 88% of forest seedlings survived (N=1499) within forest enclosures and 73% of the seedlings survived (N=1488) in the open area.

Bark damages were distinct on plants like *Cinnamomum ovalifolium*, *Neolitsea fucata*, *Calophyllum walkeri*, *Eurya japonica*, *Eleocarpus subvillosus*, *Syzygium revolutum* and *Hedyotis lawsoniae* all of which had high IVI (Importance Value Indices). Trees with average gbh 28 cm and average height 7 m were more prone to damage by deer. Only 5% of a total of 921 trees were dead due to bark damage. Damages caused by bark stripping were negligible.

Seedling growth in the enclosures was significantly better than control ($P < 0.05$).

The major prey item in the leopard scat was sambar (77.3%). Of this, 39% comprised of juvenile or fawn sambar. The other prey included species such as *Lepus nigricolis* (5.9%), *Mus* species (6.29%), *Rattus* species (3.1%), *Trachypithecus vetulus* (2.1%), *Ratufa macroura* (3.4%), *Sus scrofa* (1.2%) and *Loris tardigradus* (0.62%).

The population of leopard at Horton Plains was estimated at 14.22 ± 5.23 .

The model that closely resembled the prey-predator cycle was 'stable limit cycle model'.