



A study on the ecology of Nilgai (*Boselaphus tragocamelus* Pallas) and its status as an unconventional pest of agriculture in and around Beer-Sonty reserve forest, Haryana, India

Girish Chopra and Deepak Rai*

Department of Zoology, Kurukshetra University, Kurukshetra -136119 (Haryana), INDIA

* Department of Zoology, Dayanand College, Hisar - 125001(Haryana), INDIA

*Corresponding author. E-mail : drbkuk@gmail.com

Abstract: Periodic fortnightly visits from June, 2007 to May, 2008 in Beer-Sonty reserve forest and surrounding agricultural fields indicated incidences of damage to various crops and many herbs, shrubs and trees by Nilgai. The opinion survey of the 208 inhabitants including 166 farmers/farm labourers and 42 forest officials/forest labourers in and around Beer-Sonty reserve forest also revealed that 74.52% of the contacted persons reported significant damage by Nilgai to agricultural crops and herbs. As far as the distribution of Nilgai is concerned, 94.72% interviewees reported random distribution while 5.28% interviewees reported non-random distribution. One year fortnightly survey revealed minimum of one to a maximum of four Nilgai sightings/visit with a minimum of one individual to a maximum of 11 individuals per sighting. Most of the times, males were sighted singly or in mixed herds, whereas, herds comprising 2-11 individuals in different sightings included female(s) with calves or mixed herds. Opinion survey has also indicated herds comprising 1-10, 10-20 and more than 20 individuals by 60.10%, 30.77% and 9.13% interviewees. During regular periodic visits of the study area and surrounding fields, farmers were found using various means such as fencing, fire, night-light, sound efforts and effigy models to check the activity of Nilgai in their agricultural fields

Keywords: Agricultural crops, Antelope, Herbs, Unconventional pest.

INTRODUCTION

India has a rich biological heritage comprising nearly 89,451 species which includes 390 species of mammals (Kumar and Khanna, 2006). Among mammals, ungulates are the important component of biodiversity as they not only form the major prey base for large mammalian predators but also are considered as indicators of habitat quality, protection and management levels. Development in agriculture, industry as well as increased urbanization has greatly affected the populations of these ecological dislocates (Chauhan and Sawarkar, 1989; Singh, 1995 and Prater, 1998). Consequently, ungulates are surviving in fragmented habitats, often as small populations, and occasionally become locally overabundant due to realization of wildlife values and timely conservation efforts adopted by man particularly in protected areas, reserve forests and surrounding habitats (Singh, 1995 and Hoseti, 2002). Those that have been successful in adjusting to the man-altered habitats have thrived and, in many places, such species have become serious pests of agricultural crops and are competing for resource utilization with domestic stock (Chauhan and Sawarkar, 1989; Chauhan and Singh, 1990; Singh, 1995; Khan, 1998; Prater, 1998; Wilson, 1998; Hoseti, 2002).

The state of Haryana, with only 1666 sq. kms. (3.8%) area under forest cover (department of census, Haryana, 1997-

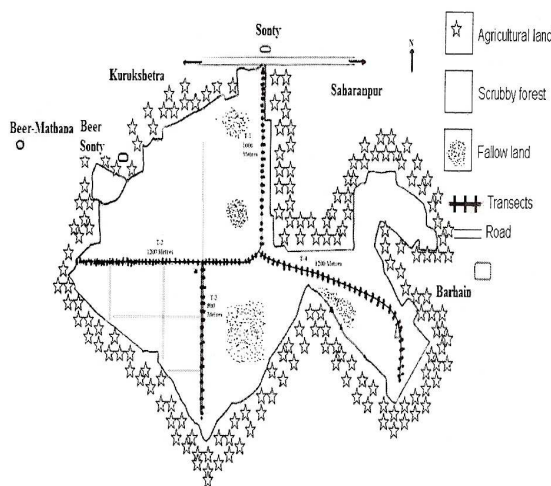
1998) and very few wildlife protected areas harbour many mammalian species such as nilgai, deer, wild boar, rhesus monkey, five striped palm squirrel, porcupine and many other rodent species which regularly invade the cultivated areas and feed on agricultural crops and herbs. Therefore, the present survey was planned in district Kurukshetra to acquire relevant information about certain aspects of ecology and behaviour of Nilgai and the management practices being adopted by inhabitants to minimize damage to agricultural crops and herbs by this species.

MATERIALS AND METHODS

Study area: The Beer-Sonty reserve forest (Fig. 1) is located in tehsil Ladwa (77°05'E longitude and 29°98'N latitude) of district Kurukshetra (Haryana) at an altitude ranging from 255-262 m above m.s.l. This reserve forest is on Kurukshetra-Saharanpur link road around 20 km East of Kurukshetra University campus. Its total area is 474.50 acres. Beer Sonty forest was declared as reserve forest in October, 1946. The main fauna of this reserve forest includes Avian and Mammalian species. The latter includes nilgai (*Boselaphus tragocamelus*), wild boar (*Sus scrofa*), cat (*Felis* sp.), Rhesus monkey (*Macaca mulatta*), five striped palm squirrel (*Funambulus pennanti*) and various others rodents species. The main flora of the area includes *Acacia nilotica* (Kikar), *Albizia*

Table 1. Positivity of opinion survey of farmers/farm labourers/forest officials/forest labourers regarding Nilgai damage to agriculture and methods of its management in and around Beer-Sonty reserve forest.

Parameters of Opinion survey	Opinion of interviewees Number (%)			
Damage	Herbs and Agricultural Crops 155 (74.52)	Herbs and agricultural Crops + Shrubs + Trees 32 (15.38)	Shrubs 11 (5.29)	Trees 10 (4.81)
Methods of control	Fencing 21 (10.10)	Killing 0 (0.00)	Others Manual 82 (39.42)	Fencing + others 105 (50.48)

**Fig. 1.** Showing the area and location of Beer-Sonty reserve forest in district Kurukshetra, Haryana (India).

lebbek (Siris), *Butea monosperma* (Dhak/Palاس), *Eucalyptus sp.* (Safeda), *Prosopis Juliflora* (Mesquite), *Dalbergia sissoo* (Roxb.), *Ziziphus mauritiana* (Ber) and *Bamboos sp.* (Bansh) and different types of herbs and shrubs. As per classification by Champion and Seth (1968), the vegetation of this area falls under "Sub group 5B Northern Tropical Dry Deciduous Forests".

Survey : Periodic fortnightly visits were made in the study area from June, 2007 to May, 2008 to record relevant information about the Nilgai problem, its nature of distribution, population status, group size and richness, activity schedule, breeding and calving periods, its status as a pest of agriculture as well as traditional methods of its management being adopted by local inhabitants. Simultaneously, an opinion survey of the 208 inhabitants (166 farmers/farm labourers of the 4 surrounding villages namely Beer-Sonty, Sonty, Beer-Mathana and Barhain and 42 forest officials/forest labourers) living in and around the reserve forest area was carried out through questionnaire to obtain necessary information about the Nilgai. The data was later on statistically analysed.

Table 2. Positivity of the response of the interviewees regarding some ecological aspects of Nilgai (*Boselaphus trsgocamelus*) in and around Beer-Sonty reserve forest.

Parameters of opinion survey	Opinion of interviewees Number (%)		
Nilgai problem	No 18 (8.65)	Yes 190 (91.35)	
Distribution	Random 197 (94.72)	Non-random 11 (5.28)	
Group richness	In groups 187 (89.90)	In groups and Solitary 21 (10.10)	
Population (at present)	More 148 (71.15)	Medium 51 (24.52)	Less 9 (4.33)
Population (5-10 years earlier)	More 46 (22.12)	Medium 59 (28.36)	Less 103 (49.52)
Number in group	1-10 125 (60.10)	10-20 64 (30.77)	20-above 19 (9.13)
Highly active period	6:00 AM-11:00 AM 53 (25.48)	11:00 AM-3:00 PM 0 (0.00)	3:00 PM- Onward 155 (74.52)
Habitat used (when not active)	Scrubby forest 166 (79.80)	Agricultural fields 21 (10.10)	Plantation sites 21 (10.10)

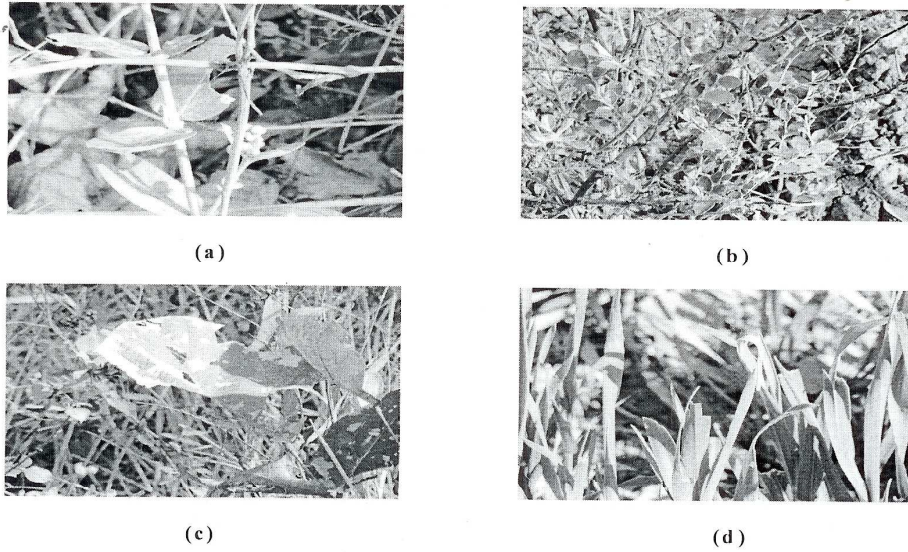


Plate 1. Evidences of damage to (a) Oak tree, *Calotropis procera*, (b) Beri, *Ziziphus nummularia*, (c) Dhak, *Butea monosperma* and (d) Wheat, *Triticum aestivum* by Nilgai in and around Beer-Sonty reserve forest.

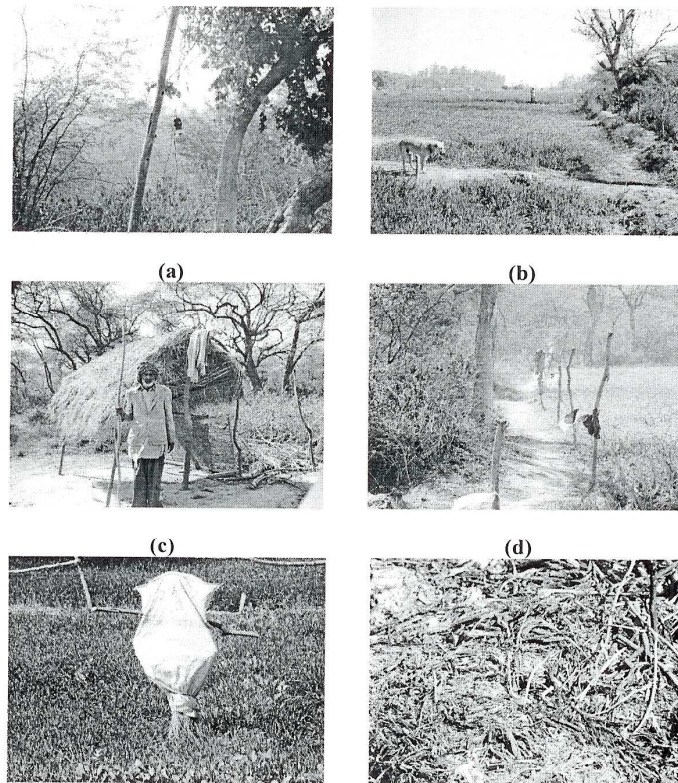


Plate 2. Various means of management adopted by local inhabitants surrounding Beer-Sonty reserve forest to prevent crop raiding by Nilgai; (a) Night light, (b) Use of pet dogs on boundary of agricultural fields, (c) Day and night watchmen, (d) Fencing with amalgamation of polythene bags, (f) Effigy models, (g) Fire signs.

RESULTS AND DISCUSSION

Due to change in land use practices by man, Nilgai (*Boselaphus tragocamelus*) has been frequently reported in agricultural habitats in different districts of Haryana and elsewhere (Schultz and Chauhan, 1986; Chauhan and Sawarkar, 1989; Chauhan and Singh, 1990 and Singh, 1995). In the present study, periodic fortnightly visits to the study area and surrounding agricultural fields from June, 2007 to May, 2008 revealed incidences of damage to crops such as mustard (*Brassica campestris*), rice (*Oryza sativa*), wheat (*Triticum aestivum*), sugarcane (*Saccharum officinarum*), jawar (*Sorghum sp.*), fodder grass (*Trifolium alexandrinum*) and many herbs, shrubs and trees which includes (Oak) *Calotropis procera*, (Beri) *Ziziphus nummularia* and (Dhak) *Butea monosperma* (Plate 1) by Nilgai (*Boselaphus tragocamelus* Pallas). Opinion survey of the 208 local inhabitants of the 4 villages surrounding Beer-Sonty reserve forest has also revealed that 155 (74.52%) interviewees reported damage to agricultural crops and herbs and 32 (15.38%) interviewees reported damage to agricultural crops and other flora (Table 1). As far as number of sightings/visit and group size of Nilgai is concerned, the survey revealed minimum of one to a maximum of four sightings of Nilgai per visit with a minimum of one individual to a maximum of 11 individuals per sighting (Fig. 2). Most of the times, males were sighted singly or in mixed herds, whereas, herds comprising 2 to 11 individuals in different sightings included female(s) with calves or mixed herds. These individuals were found randomly moving in the scrubby forest area as well as adjacent agricultural fields. Earlier also, Blandford (1888-91), Brander (1923), Fall (1972) and Singh (1995) have reported frequent solitary male sightings, occasional multiple male sightings (up to 12 individuals) and mixed herd sightings (10-17 individuals). Also, Schaller (1967) has mentioned sighting of mixed

loose herd of 50 nilgai individuals. An opinion survey of 208 farmers/farm labourers/forest officials/forest labourers also revealed that 91.35% interviewees complained about Nilgai problem in the agricultural fields. As far as the distribution of Nilgai is concerned, 94.72% interviewees reported random distribution while 5.28% interviewees reported non-random distribution. The opinion survey also revealed that 187 (89.90%) contacted persons reported Nilgai sightings in groups, whereas, 21 (10.10%) interviewees reported solitary as well as group sightings of the Nilgai individuals. Of these, 125 (60.10%) interviewees reported 1-10 individuals per sighting, 64 (30.77%) interviewees reported 10-20 individuals in different sights and 19 (9.13%) contacted persons reported 20 and more individuals in different sightings in the study area (Table 2).

Fortnightly visits to the study area revealed that the Nilgai individuals rested during mid-day period in the scrubby forest areas but were frequently sighted in the adjacent agricultural fields for feeding and drinking purposes afternoon onwards. They were also found active in the morning period in the scrubby forest as well as adjacent agricultural fields. Opinion survey of the local inhabitants also revealed that 155 (74.52%) contacted persons reported afternoon period (3:00 PM onwards) to be the highly active period of Nilgai while 53 (25.48%) reported their activity in the morning period (6:00 AM-11:00AM) also. Of the 208 interviewees, 166 (79.80%) reported Nilgai individuals in the scrubby forest (when not active), 21 (10.10%) in agricultural fields, and 21 (10.10%) in plantation sight during non-active periods (Table 2). Most of the interviewees reported nilgai invaded their agricultural fields after dusk. Opinion survey of the 208 local inhabitants was also conducted to record information regarding calving and breeding period of Nilgai in the study area. The information revealed that 82

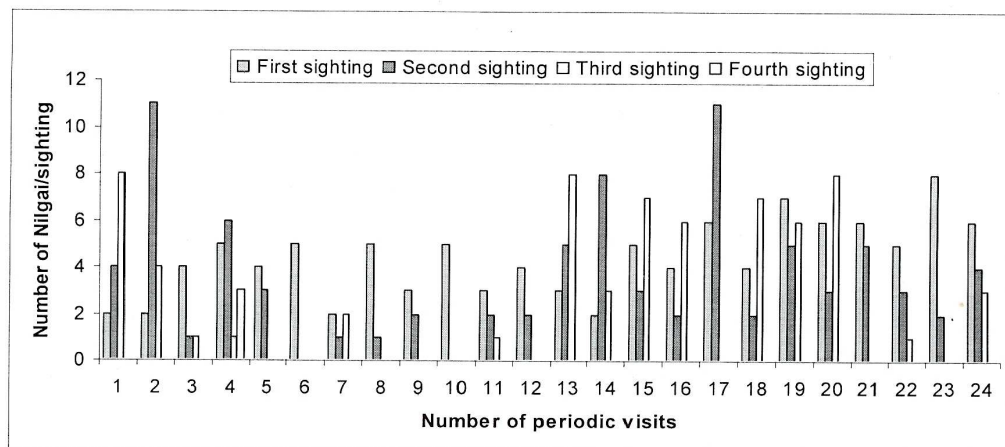


Fig. 2. Number of sightings per visit and group size of Nilgai in Beer-Sonty reserve forest and surrounding agricultural fields.

Table 3. Response of the interviewees regarding reproductive behaviour of Nilgai (*Boselaphus tragocamelus*) in and around Beer-Sonty reserve forest.

Parameters of opinion survey	Opinion of interviewees			
	Number (%)			
Breeding period	Jan-April	May-August	Sep-December	Can't say
	82 (39.42)	32 (15.38)	51 (24.52)	43 (20.68)
Calving period	Jan-April	May-August	Sep-December	Can't say
	41 (19.72)	82 (39.42)	21 (10.10)	64 (30.76)

(39.42%), 32 (15.38%) and 51 (24.52%) interviewees reported breeding period of Nilgai to be extended from January-April, May-August and September-December whereas 43 (20.68%) interviewees did not give any concrete reply to this survey. As far as calving period is concerned, 41 (19.72%), 82 (39.42%) and 21 (10.10%) reported calving period of Nilgai to be extended from January-April, May-August and September-December whereas 64 (30.76%) did not give any satisfactory response (Table 3).

During regular periodic visits of the study area and surrounding fields, farmers were found using various means such as fencing, fire, night-light, sound efforts and effigy models to check the activity of Nilgai in their agricultural fields (Plate 2). Opinion survey of the local inhabitants has also revealed that 105 (50.48%) interviewees used fencing and other traditional strategies like fencing and manual methods like fire, night-light, sound efforts, watchmen, pet dogs and effigy models singly or in amalgamation to check their entry into the agricultural fields, 21 (10.10%) interviewees used only fencing. Not even a single individual reported killing of Nilgai (Table 1). Singh (1995) has also reported use of barked-wire fencing, electric fencing, brush wood fencing, use of dummies and night watchmen by inhabitants to protect their agricultural crops from Nilgai in Southern Haryana.

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