

## Flora and Macrofauna of Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF), Kurukshetra, Haryana (India): A Survey

\*Ajay Kumar, Tarsem Kumar and Girish Chopra

Department of Zoology, Kurukshetra University, Kurukshetra-136119, India

\*e-mail - [ajayindorakuk@yahoo.com](mailto:ajayindorakuk@yahoo.com)

**Abstract:** The present study was carried out from February, 2011 to July, 2011 to record information about dominant flora and macrofauna of Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF), Haryana (India). Scan sampling method (Altman, 1974) was followed for identification of biodiversity in Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF). In Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF) 17 species of birds (*Acridotheres tritis*, *Corvus splendens*, *Dendrocitta vagabunda*, *Turdoides caudatus*, *Turdoides striatus*, *Phala crocorax niger*, *Phalacrocorax carbo*, *Ardeola grayii*, *Babulus ibis*, *Dendrocygna javanica*, *Anas clypeate*, *Haliaste indus*, *Pavo cristatus*, *Columba livia*, *Prisyaculla krameri*, *Haycyon smyrnesis*, *Saxicola torquata*), 10 species of mammals (*Rattus rattus*, *Boselaphus tragocamelus*, *Macaca mullatta*, *Funimbulus sp.*, *Felis sp.*, *Canas sp.*, *Antelope cervicapra*, *Canis aureus*, *Lepus nigericollus*, and *Velpes bengalensis*), 22 species of trees (*Acacia nilotica*, *A. Leucopholia*, *Albizza lebbek*, *Azadirachata indica*, *Bauhinia variegata*, *Butea monosperma*, *Cordea dichotoma*, *Crataeva nurvala*, *Dalbergia sissoo*, *Eukalyptus hybrid*, *Ficus bengalensis*, *Ficus glomerata*, *Focus religiosa*, *Ficus Rumphii*, *Morus alba*, *Parkinsonia aculeate*, *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora oleoides*, *Tamarise aphylla*, *Zizyphus mauritiana*), 2 species of shrubs (*Zizyphus nummularia*, *Capparis sepiaria*) and 7 species of herbs (*Brassica compestris*, *Oryza sativa*, *Triticum aestivum*, *Saccharum officinarum*, *Trifolium alexanderium*, *Chenopodium album*, *Cynodon dactylon*) were recorded.

[Ajay Kumar, Tarsem Kumar and Girish Chopra. **Flora and Macrofauna of Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF), Kurukshetra, Haryana (India): A Survey.** *J Am Sci* 2018;14(3):36-41]. ISSN 1545-1003 (print); ISSN 2375-7264 (online). <http://www.jofamericanscience.org>. 5. doi:[10.7537/marsjas140318.05](https://doi.org/10.7537/marsjas140318.05).

**Keywords:** Flora, Forest biodiversity, macrofauna, Sanctuary.

### 1. Introduction

Biodiversity is the most fascinating aspect of biology. It refers to the variety and differences among living organisms. It includes ecosystem development, soil maintenance, decomposition, self purification and climate regulation (Hosetti, 2002). Biodiversity plays an important environmental and developmental role which are very crucial to human survival but are not according to economic value (Khan, 1998). India is one of the 17 mega diversity nations in the world. It has a rich geographical diversity and biological heritage comprising nearly 8100 vertebrate species including 340 species of mammals, 1250 species of birds, 420 species of reptiles and 142 species of amphibians (Saharia, 1998; Narang, 2000). Biodiversity has been the subject of study of many researchers in different regions of Haryana, India (Whistler 1915, 1918; Yadav and Malyavar 1978, 1981; Gupta and Bajaj 1997; Kalsi, 1998; Bajaj, 2002; Tirshem, 2008; Garwa, 2008; Gupta and Kumar, 2009; Rai, 2011; Kumar, 2011; Kumar, 2011). However, scanty and unsystematic information is available on certain aspects of biodiversity in Haryana. Therefore, present research work was planned (from February, 2011 to July, 2011) to study the floral and

macrofaunal diversity of Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF) of district Kurukshetra (Haryana).

### 2. Materials and Methods

#### Study area

For present study Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF) were selected as study sites. Saraswati Plantation Wildlife Sanctuary (76° 27' -76° 33' E latitude and 29° 56'- 30° 01' N longitude) is located in two districts (Kurukshetra and Kaithal) of Haryana (India) covering an area of 11,003 acres. The climate of area is subtropical, semi arid type and contain alkali soil. Annual rain fall in the area is 516 mm and average temperature is 32.4°C (Dagar *et al.*, 2001). The vegetation of the Saraswati Plantation Wildlife Sanctuary is categorized as "Sub-group 5B tropical deciduous forest" (Champion and Seth, 1968) (Fig. 1). Bir Sonty Reserve Forest (30° 0' E latitude and 77° 1' N longitude) is located on Kurukshetra-Ladwa link road around 20 km. towards East of Kurukshetra and spread over an area of 474.50 acres. Bir Sonty Reserve Forest is an artificial forest and contains majority of the cultivated plants. The area has dark colored,

alluvial soil rich in organic matter and having high water retention capacity (Fig. 1).

Scan sampling method (Altman, 1974) was followed to study the floral and macrofaunal (avian and mammalian) diversity in Saraswati Plantation

Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF). Periodic fortnightly visits (February, 2011 to July, 2011), were conducted to locate flora and fauna of study sites. Thereafter, record of the floral and macrofaunal species was maintained.

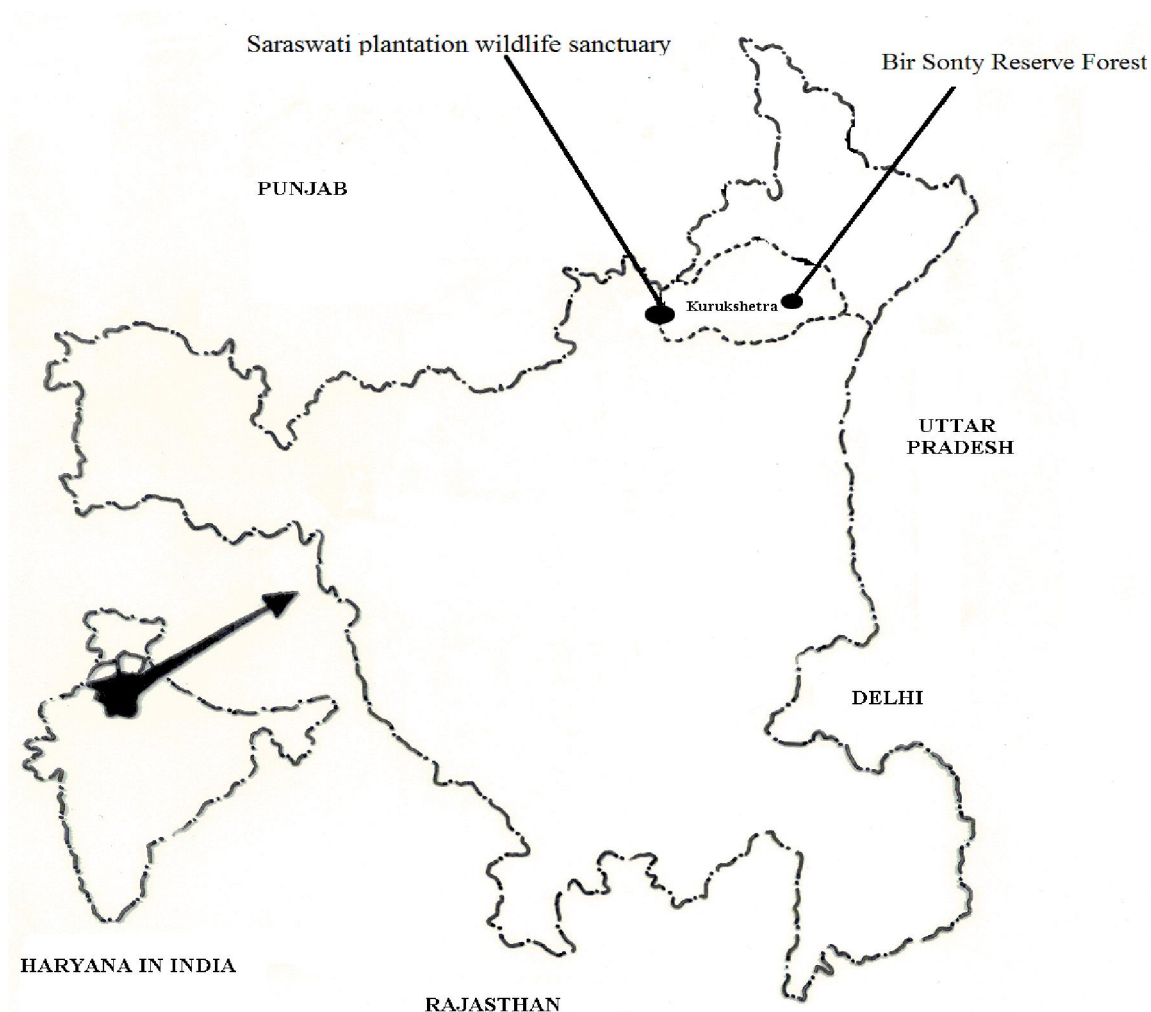


Fig. 1 Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF), Haryana (India).

### 3. Results

A detailed study was conducted to record the existence of variety of macrofauna (birds and mammals) and flora (trees, herbs, shrubs, grasses, climbers and sedges) in Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF) from February, 2011 to July, 2011. In Saraswati Plantation Wildlife Sanctuary (SPWS), 17 species of birds (*Acridotheres tritis*, *Corvus splendens*, *Dendrocitta vagabunda*, *Turdoides caudatus*, *Turdoides striatus*, *Phala crocorax niger*, *Phalacrocorax carbo*, *Ardeola grayii*, *Babulus ibis*, *Dendrocygna javanice*, *Anas clypeate*, *Haliaster indus*, *Pavo cristatus*, *Columba livia*, *Prisyaculla krameri*, *Haycyon smyrnesis*, *Saxicola torquata*) and

10 species of mammals (*Rattus rattus*, *Boselophus tragocamulus*, *Macaca mullatta*, *Funimbulus sp.*, *Felis sp.*, *Canas sp.*, *Antilope cervicapra*, *Canis aureus*, *Lepus nigricollus* and *Velpes bengalensis*) were recorded during the study period. As far as plant species are also concerned, existence of 22 species of trees namely, *Acasia nilotica*, *A. Leucopholia*, *Albizza lebbek*, *Azadirachata indica*, *Bauhinia variegata*, *Butea monosperma*, *Cordea dichtoma*, *Crataeva nurvala*, *Dalbergia sissoo*, *Eukalyptus hybrid*, *Ficus bengalensis*, *Ficus glomerata*, *Focus religiosa*, *Ficus Rumphii*, *Morus alba*, *Parkinsonia aculeate*, *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora oleoides*, *Tamarise aphylla*, *Zizyphus mauritiana*; 14 species of herbs and shrubs namely, *Adhatoda vasica*, *Argemone*

*maxicana*, *Brassica campestris*, *Capparis sepiaria*, *Capparis desidua*, *Carissa opaca*, *Calotropis procera*, *Chenopodium album*, *Kochia indica*, *Solanum nigrum*, *Trifolium alexandarium*, *Triticum aestivum*, *Oryza sativa*, *Zizyphus mauritiana* and 9 species of grasses, climber and sedges namely, *Cuscuta reflexa*,

*Desmostachya bipinnata*, *Cyprus rotundus*, *Cenchrus ciliaris*, *Dichanthium annuatum*, *Sporobolus marginatus*, *Saccharum spontaneum*, *Typha elephantia* and *Vetiveria zizanoides* were identified in the Saraswati Plantation Wildlife Sanctuary (tables 1 and 2).

**Table 1 Macrofauna (avian and mammalian species) of Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF), Kurukshetra, Haryana (India).**

| Category | Sr. no. | Avian species            |                                |                |      |      |
|----------|---------|--------------------------|--------------------------------|----------------|------|------|
|          |         | Local name               | Scientific name                | Order          | SPWS | BSRF |
| Birds    | 1       | Common Myna              | <i>Acridotheres tritis</i>     | Passeriformes  | +    | +    |
|          | 2       | Common crow              | <i>Corvus splendens</i>        | Passeriformes  | +    | +    |
|          | 3       | Indian treepie           | <i>Dendrocitta vagabunda</i>   | Passeriformes  | +    | +    |
|          | 4       | Common babbler           | <i>Turdoides caudatus</i>      | Passeriformes  | +    | +    |
|          | 5       | Jungle babbler           | <i>Turdoides striatus</i>      | Passeriformes  | +    | +    |
|          | 6       | Little cormorant         | <i>Phala crocorax niger</i>    | Plecaniformes  | +    | -    |
|          | 7       | Great cormorant          | <i>Phalacrocorax carbo</i>     | Plecaniformes  | +    | +    |
|          | 8       | Indian pond heron        | <i>Ardeola grayii</i>          | Plecaniformes  | +    | +    |
|          | 9       | Cattle egret             | <i>Babulus ibis</i>            | Plecaniformes  | +    | -    |
|          | 10      | Lesser whistlingduck     | <i>Dendrocygna javanic</i>     | Anseriformes   | +    | +    |
|          | 11      | Northern shoveller       | <i>Anas clypeate</i>           | Anseriformes   | +    | +    |
|          | 12      | Brahmini kite            | <i>Haliaster Indus</i>         | Falconiformes  | +    | +    |
|          | 13      | Indian pea fowl          | <i>Pavo cristatus</i>          | Galliformes    | +    | +    |
|          | 14      | Blue rock pigeon         | <i>Columba livia</i>           | Culumbiformes  | +    | +    |
|          | 15      | Rose ringed parakeet     | <i>Pristaculla krameri</i>     | Psittaciformes | +    | +    |
|          | 16      | White bristledkingfisher | <i>Haycyon smyrnesis</i>       | Coraciformes   | +    | +    |
|          | 17      | Common stone chite       | <i>Saxicola torquata</i>       | Passeriformes  | +    | +    |
| Mammals  | 1       | Rat                      | <i>Rattus rattus</i>           | Rodentia       | +    | +    |
|          | 2       | Nilgai                   | <i>Boselophus tragocamulus</i> | Artiodactyla   | +    | +    |
|          | 3       | Rhesus monkey            | <i>Macaca mulatta</i>          | Primates       | +    | +    |
|          | 4       | Gilhari                  | <i>Fumublus sp</i>             | Rodentia       | +    | +    |
|          | 5       | Cat                      | <i>Felis sp.</i>               | Carnivora      | +    | +    |
|          | 6       | Dog                      | <i>Canis sp.</i>               | Carnivora      | +    | +    |
|          | 7       | Black buck               | <i>Antilope cervicapra</i>     | Artiodactyla   | +    | -    |
|          | 8       | The jackle               | <i>Canis aureus</i>            | Carnivora      | +    | -    |
|          | 9       | The Indian hare          | <i>Lepus nigrecollus</i>       | Lagomophorma   | +    | +    |
|          | 10      | Fox                      | <i>Velpes bengalensis</i>      | Carnivora      | +    | -    |

Similarly, in Bir Sonty Reserve Forest (BSRF) 15 bird species (*Acridotheres tritis*, *Corvus splendens*, *Dendrocitta vagabunda*, *Turdoides caudatus*, *Turdoides striatus*, *Phalacrocorax carbo*, *Ardeola grayii*, *Dendrocygna javanice*, *Anas clypeate*, *Haliaster indus*, *Pavo cristatus*, *Columba livia*, *Prisyaculla krameri*, *Haycyon smyrnesis*, *Saxicola torquata*) and 7 species of mammals namely, *Rattus rattus*, *Boselophus tragocamulus*, *Macaca mullatta*, *Funimbulus sp.*, *Felis sp.*, *Canas sp.*, *Lepus nigericollus* were recorded. Flora of this forest also included 21 species of trees namely, *Acasia nilotica*, *A. Leucopholia*, *Albizza lebbek*, *Azadirachata indica*, *Bauhinia variegata*, *Butea monosperma*, *Cordea dichtoma*, *Crataeva nurvala*, *Dalbergia sissou*, *Eukalyptus hybrid*, *Ficus glomerata*, *Focus religiosa*,

*Ficus Rumphii*, *Morus alba*, *Parkinsonia aculeate*, *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora oleoides*, *Tamarise aphylla*, *Zizyphus mauritiana*; 14 species of herbs and shrubs namely, *Adhatoda vasica*, *Argemone maxicana*, *Brassica campestris*, *Capparis sepiaria*, *Carissa opaca*, *Calotropis procera*, *Chenopodium album*, *Saccharum officinarum*, *Solanum tuberosum*, *Kochia indica*, *Solanum nigrum*, *Trifolium alexandarium*, *Triticum aestivum*, *Oryza sativa*, *Zizyphus mauritiana* and 9 species of grasses, climbers and sedges namely, *Cuscuta reflexa*, *Desmostachya bipinnata*, *Cyprus rotundus*, *Cenchrus ciliaris*, *Dichanthium annuatum*, *Sporobolus marginatus*, *Saccharum spontaneum*, *Typha elephantia*, *Vetiveria zizanoides* in Bir Sonty Reserve Forest.

**Table 2 Dominant flora of Saraswati Plantation Wildlife Sanctuary (SPWS) and Bir Sonty Reserve Forest (BSRF), Kurukshetra, Haryana (India).**

| Category                  | S. No | Plant species |                               |                |      |      |
|---------------------------|-------|---------------|-------------------------------|----------------|------|------|
|                           |       | Local name    | Scientific name               | Order          | SPWS | BSRF |
| Tree                      | 1     | Kikar         | <i>Acasia nilotica</i>        | Fabales        | +    | +    |
|                           | 2     | Nimber        | <i>A. Leucopholia</i>         | Fabales        | +    | +    |
|                           | 3     | Siris         | <i>Albizza lebbek</i>         | Fabales        | +    | +    |
|                           | 4     | Neem          | <i>Azadirachata indica</i>    | Spindales      | +    | +    |
|                           | 5     | Kachnar       | <i>Bauhinia variegata</i>     | Fabales        | +    | +    |
|                           | 6     | Dhak          | <i>Butea monosperma</i>       | Fabales        | +    | +    |
|                           | 7     | Lasura        | <i>Cordea dichtoma</i>        | Unplaced       | +    | +    |
|                           | 8     | Barna         | <i>Crataeva nurvala</i>       | Brassicales    | +    | +    |
|                           | 9     | Shisham       | <i>Dalbergia sissoo</i>       | Fabales        | +    | +    |
|                           | 10    | Safeda        | <i>Bukalyptus hybrid</i>      | Fabales        | +    | +    |
|                           | 11    | Barh          | <i>Ficus bengalensis</i>      | Rosales        | +    | -    |
|                           | 12    | Gular         | <i>Ficus glomerata</i>        | Rosales        | +    | +    |
|                           | 13    | Peepal        | <i>Ficus religiosa</i>        | Rosales        | +    | +    |
|                           | 14    | Pilkhan       | <i>Ficus rumphi</i>           | Urticales      | +    | +    |
|                           | 15    | Tut           | <i>Morus alba</i>             | Rosales        | +    | +    |
|                           | 16    | Parkinsonia   | <i>Parkinsonia aculeata</i>   | Fabales        | +    | +    |
|                           | 17    | Jand          | <i>Prosopis cineraria</i>     | Fabales        | +    | +    |
|                           | 18    | Walayti jand  | <i>Prosopis juliflora</i>     | Fabales        | +    | +    |
|                           | 19    | Jaal          | <i>Salvadora oleoides</i>     | Brassicales    | +    | +    |
|                           | 20    | Jamun         | <i>Syzygium cumini</i>        | Myrtales       | +    | +    |
|                           | 21    | Frash         | <i>Tamarise cumini</i>        | Myrtales       | +    | +    |
|                           | 22    | Beri          | <i>Ziziphus mauritina</i>     | Rosales        | +    | +    |
| Herbs, and Shrubs         | 1     | Bansa         | <i>Adhatoda vasica</i>        | Lamiales       | +    | +    |
|                           | 2     | Kandai        | <i>Aegemone maxicana</i>      | Ranunculales   | +    | +    |
|                           | 3     | Sarso         | <i>Brassica indica</i>        | Brassicales    | +    | +    |
|                           | 4     | Hins          | <i>Capparis sepiaria</i>      | Brassicales    | +    | +    |
|                           | 5     | Kair          | <i>Capparis desidua</i>       | Brassicales    | +    | +    |
|                           | 6     | Karaunda      | <i>Carissa opaca</i>          | Gentianales    | +    | +    |
|                           | 7     | Ak            | <i>Calotropis procera</i>     | Gentianales    | +    | +    |
|                           | 8     | Bathua        | <i>Chenopodium album</i>      | Caryophyllales | +    | +    |
|                           | 9     | Bui           | <i>Kochia indica</i>          | Poales         | +    | +    |
|                           | 10    | Mahua         | <i>Solanum nigrum</i>         | Solanales      | +    | +    |
|                           | 11    | Bersin        | <i>T. alexandarium</i>        | Fabales        | +    | +    |
|                           | 12    | Wheat         | <i>Triticum aestivum</i>      | Poales         | +    | +    |
|                           | 13    | Paddy         | <i>Oryza sativa</i>           | Poales         | +    | +    |
|                           | 14    | Malha         | <i>Ziziphus mauritina</i>     | Rosales        | +    | +    |
| Grasses, Climbers, Sedges | 1     | Akash bel     | <i>Cuscuta reflexa</i>        | Sonales        | +    | +    |
|                           | 2     | Della         | <i>Cyprus rotundus</i>        | Poales         | +    | +    |
|                           | 3     | Anjan         | <i>Cenchrus ciliaris</i>      | Poales         | +    | +    |
|                           | 4     | Dab           | <i>Desmostachya bipinnata</i> | Poales         | +    | +    |
|                           | 5     | Sarkanda      | <i>Dichanthium annuatum</i>   | Poales         | +    | +    |
|                           | 6     | Chirhia grass | <i>Sporobolus marginats</i>   | Poales         | +    | +    |
|                           | 7     | Kans          | <i>Saccharum spontaneum</i>   | Poales         | +    | +    |
|                           | 8     | Patera        | <i>Typha elephantia</i>       | Typhales       | +    | +    |
|                           | 9     | Panni/Kans    | <i>Vetiveria zizinoideis</i>  | Cyperales      | +    | +    |

#### 4. Discussion

India is one of the 17 mega diversity nations in the world having 10 biogeographical zones. It has a rich geographical diversity and biological heritage

comprising nearly 8100 vertebrate species including 340 species of mammals, 1250 species of birds, 420 species of reptiles and 142 species of amphibians (Saharia, 1998; Narang, 2000). India occupies only

2.4% of the world's land area but its contribution to the world's biodiversity is approximately 8% of the total number of species (Khoshoo, 1996), which is estimated to be 1.75 million (As per Global Biodiversity Assessment of UNEP of 1995, described number of species so far is 1.75 million). The species recorded includes flowering plants (angiosperms), mammals, fish, birds, reptiles, and amphibians, constitute 17.3% of the total whereas nearly 60% of India's bio-wealth is contributed by fungi and insects (Khoshoo, 1996). Such a distribution is similar to that found in the tropics and the subtropics. Based on the available data, India ranks tenth in the world and fourth in Asia in plant diversity, and ranks tenth in the number of endemic species of higher vertebrates in the world. Yadav and Malyavar (1978, 1981), Gupta and Bajaj (1997), Kalsi, (1998), Bajaj (2002), Tirshem (2008), Garwa (2008) and Gupta and Kumar (2009) have reported 203 species of birds in whole of Haryana, 23 wetland birds at Brahmansarovar (Kurukshetra), 161 species from Kalesar wildlife sanctuary (Yamunanagar), 202 species of birds from four bird sanctuaries, 80 wetland bird species from Northern Haryana, 87 species from Kurukshetra and 110 species of birds in and around Kurukshetra respectively.

Rai (2010) have reported different avian species (*Anas poecilorhyncha*, *Acridotheres tristis*, *Bubulcus ibis*, *Centropus sinensis*, *Columba livia*, *Corvus splendens*, *Dinopium savanense*, *Egretta garzetta*, *Himantopus himantopus*, *Meropus orientalis*, *Passer domesticus*, *Pristiculla krameri*, *Phalacrocorax niger*, *Pycnonotus cafer*, *Primia gracilis*, *Streptopelia senegalensis*, *Sturnus contra*, *Turdoides caudatus*, *Upupa epopus*), mammalian species (*Boselaphus tragocamelus*, *Sus scrofa*, *Felis sp.*, *Macaca mulatta*, *Funambulus pennanti*) and dominant flora of both study sites includes *Acacia nilotica*, *Albizia lebbek*, *Butea monosperma*, *Eucalyptus sp.*, *Dalbergia sissoo*, *Prosopis juliflora*, *Morus alba*, *Ficus bengalensis*, *Ficus glomerata*, *Syzygium cumini* and many species of herbs and shrubs in Saraswati Plantation Wildlife Sanctuary and Bir Sonty Reserve Forest. In present study, in Saraswati Plantation Wildlife Sanctuary (SPWS), 17 species of birds (*Acridotheres tristis*, *Corvus splendens*, *Dendrocitta vagabunda*, *Turdoides caudatus*, *Turdoides striatus*, *Phalacrocorax niger*, *Phalacrocorax carbo*, *Ardeola grayii*, *Bubulcus ibis*, *Dendrocycyna javanica*, *Anas clypeate*, *Haliastur Indus*, *Pavo cristatus*, *Columba livia*, *Prisyaculla krameri*, *Haycyon smyrnensis*, *Saxicola torquata*), 7 species of mammals (*Rattus rattus*, *Boselaphus tragocamelus*, *Macaca mullatta*, *Funimbulus sp.*, *Felis sp.*, *Canas sp.*, *Lepus nigericollus*), 21 species of trees (*Acacia nilotica*, *A. Leucopholia*, *Albizia lebbek*, *Azadirachata indica*, *Bauhinia variegata*, *Butea monosperma*,

*Cordea dichtoma*, *Crataeva nurvala*, *Dalbergia sissoo*, *Eucalyptus hybrid*, *Ficus glomerata*, *Ficus religiosa*, *Ficus Rumphii*, *Morus alba*, *Parkinsonia aculeate*, *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora oleoides*, *Tamarise aphylla*, *Zizyphus mauritiana*), 2 species of shrubs (*Zizyphus nummularia*, *Capparis sepiaria*) and 7 species of herbs (*Brassica compestris*, *Oryza sativa*, *Triticum aestivum*, *Saccharum officinarum*, *Trifolium alexanderium*, *Chenopodium album*, *Cynodon dactylon*) were recorded. Similarly in Bir Sonty reserve forest 15 species of birds (*Acridotheres tristis*, *Corvus splendens*, *Dendrocitta vagabunda*, *Turdoides caudatus*, *Turdoides striatus*, *Phalacrocorax carbo*, *Ardeola grayii*, *Dendrocycyna javanica*, *Anas clypeate*, *HaliasturIndus*, *Pavo cristatus*, *Columba livia*, *Prisyaculla krameri*, *Haycyon smyrnensis*, *Saxicola torquata*), 10 species of mammals (*Rattus rattus*, *Boselaphus tragocamelus*, *Macaca mullatta*, *Funimbulus sp.*, *Felis sp.*, *Canas sp.*, *Antelope cervicapra*, *Canis aureus*, *Lepus nigericollus*), 22 species of trees (*Acacia nilotica*, *A. Leucopholia*, *Albizia lebbek*, *Azadirachata indica*, *Bauhinia variegata*, *Butea monosperma*, *Cordea dichtoma*, *Crataeva nurvala*, *Dalbergia sissoo*, *Eucalyptus hybrid*, *Ficus bengalensis*, *Ficus glomerata*, *Ficus religiosa*, *Ficus Rumphii*, *Morus alba*, *Parkinsonia aculeate*, *Prosopis cineraria*, *Prosopis juliflora*, *Salvadora oleoides*, *Tamarise aphylla*, *Zizyphus mauritiana*), 2 species of shrubs (*Zizyphus nummularia*, *Capparis sepiaria*) and 7 species of herbs (*Brassica compestris*, *Oryza sativa*, *Triticum aestivum*, *Saccharum officinarum*, *Trifolium alexanderium*, *Chenopodium album*, *Cynodon dactylon*) were recorded.

#### Correspondence to:

Ajay kumar  
Department of Zoology, Kurukshetra University,  
Kurukshetra-136119, (Haryana) India  
Telephone: 01282-320043  
Cellular phone: +91-9813077684  
E-mail: [ajayindorakuk@yahoo.com](mailto:ajayindorakuk@yahoo.com)

#### References

1. Altman, J. (1974): Observation study of behavior: sampling methods. *Behaviour*. 49:227-265.
2. Bajaj, M. (2002): Studies on the Avian Fauna of Bird Sanctuaries, Ph.D. Thesis, Department of Zoology, Kurukshetra University Kurukshetra, Haryana (India).
3. Garwa, R. (2008): Study on Avian biodiversity of District Kurukshetra Suburbs, Haryana, India, M.Phil. Dissertation, Kurukshetra University, Kurukshetra.

4. Gupta, R. C. and Kumar, S. (2009): Determination of avian bio diversity in Morni hills in district Panchkula, Haryana, *J. Adv. Zool.*, 30 (1): 44-53.
5. Gupta, R. C. and Bajaj, M. (1997): Preliminary investigations into migratory wetland birds of Brahma Sarovar at Kurukshetra, *Jeevanti*, 15: 29-41.
6. Hosetti, V.J. (2002): Distribution of birds in relation to vegetation in the Calicut University Campus Kerala. *J. Zoos' Print*, 18 (9):1187-1192.
7. Kalsi, R. S. (1998): Birds of Kalesar Wild Life Sanctuary, Haryana (India), *Forktail*, 13: 29-32.
8. Khan, C. (1998): Bird community Structure in Ranthambore National Park. *Tiger paper*, 32 (2): 16-24.
9. Khoshoo, T.N. (1996): 'Biodiversity in the Indian Himalayas: conservation and utilization'. In *Banking on Biodiversity*, edited by Sheggi P Kathmandu: International Centre for Integrated Mountain Development, 12 (3):1-19.
10. Kumar, A. (2011): Study on ecology and behavior of Rhesus monkey (*Macaca mulatta*). M.Phil. Dissertation, Kurukshetra University Kurukshetra, Haryana (India).
11. Kumar, T. (2011): Study on ecology and behavior of Peacock (*Pavo cristatus*). Ph.D. thesis, Kurukshetra University Kurukshetra, Haryana (India).
12. Narang, M. L. (2000): Wildlife, In, Verma, L. R. (Eds.) *Nature Resource and Development in Himalaya*, Malhotra Publishing House, New Delhi.
13. Rai, D. (2010): Study on ecological and behavior of Nilgai (*Boselophus tragocamelus*), Ph.D. thesis, Kurukshetra University Kurukshetra, Haryana (India).
14. Saharia, V. B. (2002): *Wildlife in India*, Natraj Publishers, Dehradun.
15. Tirshem, (2008): Study of Wetland Avifauna of Seven Districts of Haryana, Ph.D Thesis, Kurukshetra University, Kurukshetra.
16. Whistler, H. (1918): Notes on the birds of Ambala District, Punjab Part II, *J. Bombay Nat. Hist. Soc.*, 26(1): 665-681.
17. Whistler, H. (1915): Some birds in Hisar District, Punjab, *J. Bombay Nat. Hist. Soc.*, 24(1): 190.
18. Yadav, J. S. and Malyavar, R. P. (1978): The birds of Haryana, A classified list, *Journal of Haryana studies (Kurukshetra)*, 10(1): 37-51.
19. Yadav, J.S. and Maleyaware, R.P. (1981): The birds of Haryana, A few more spotting, *Pavo* 19: 51-55.

3/17/2018