CHAPTER 1

ROLE OF JUNGLE BABBLER (*Turdoides striatus*) IN AGRO ECOSYSTEMS

INTRODUCTION ~

The increasing pressure on the natural habitat due to urbanization, industrialization as well as large scale agricultural practices have either forced several animals to adapt to the change in the habitat or to leave it.

In a country like India, where large part of its economy depends on agricultural practices, farmers have adapted to large scale monocultural practices. Many animals especially birds have adapted to these altered conditions (Ranjit Daniels, 1994). Birds constitute an important component of an ecosystem. Large numbers of birds have started depending directly or indirectly on agricultural fields. On one hand, they damage the crop at various stages, beginning from sowing to the storage state; while on other hand they benefit the crop by feeding voraciously on the pest species and in turn controlling the pest population (Gokhale, 1992). The study of birds in relation to agriculture and its application in management of agriculture crops has become an essential field of research leading to a new field of study "Agricultural Ornithology"

(Dhindsa and Saini, 1994). Hence, looking at the role of birds in agro ecosystem it can be said that the, omnivore bird species play a dual role in agriculture.

Jungle Babbler *(Turdoides striatus,* Order: Passeriformes, Family: Silvidae*),* falls in this category with a binal role. Jungle Babbler is considered as beneficial to crops (Gupta and Midha, 1994; Gokhale, 1992) especially the ones infested with *Helicoverpa armigera* Hubner, Lepidoptera: Noctuidae (Gokhale, 1992). *Helicoverpa armigera* is a devastating pest of Pigeon pea, Chick pea, cotton and other important crop plants all over the world (Patankar *et al.,* 2001). Jungle Babbler is also reported to be harmful to cereal crops like Sorghum (*Sorghum vulgare Linn.*) and Pearl millet (*Pennisetum typhoides Linn.*) as it damages the cobs (Rana, 1972; Parasharya, 1988). Jungle Babbler is known to devour on both insects and plant matter *viz.*, cereals like Sorghum, Pearl millet etc. and insect matter like Orthopterans and Lepidopterans (Gaston, 1978; Gupta and Midha, 1994; Dhindsa *et al.,* 1994). These authors have also reported seasonal variation in percentage consumed with more insect matter during monsoon when the insect population is high. With reference to agricultural ornithology, on one hand, Jungle Babbler is considered as useful species of bird as it feeds on the global pest, the pod borer, *Helicoverpa armigera* (Gokhale, 1992), whereas on the other hand the damage caused by this species to Sorghum and Pearl millet presents it as a pest species (Rana, 1972; Parasharya, 1988).

Depending on the type of the food available during various seasons, they may be considered either as useful or harmful to the crop.

The most conspicuous diurnal activity performed by the birds is the feeding activity. They spend maximum time in foraging on ground by hopping around (Andrews, 1968), turning over the leaves and digging the soil vigorously in search of the food. This foraging behavior of Jungle Babblers is probably very effective in locating the underground pupae of *Helicoverpa armigera or* the root infesting white grubs. Even the larval forms of *Helicoverpa armigera* are uncovered because of this particular foraging style of the bird.

The agricultural crops and fields selected in the present study to compare feeding activities include vegetable fields of cabbage and brinjal along with the fields of maize, cowpea and sorghum and Pigeon pea. Pigeon pea (*Cajanus Cajan*) a kharif crop grown in large scale from October to March in and around Baroda District was further investigated at various stages of cropping. The pods of this crop are known to be infested by *Helicoverpa armigera* during various stages of its growth (Patankar *et al.,* 2001).

MATERIALS AND METHODS ~

For the management of birds in the agricultural field, it is necessary to understand the bird's life. Jungle Babbler *(Turdoides striatus):* An earthy brown, untidy looking bird with a longish tail. Sexes are alike and present invariably in flocks of half a dozen or more. Distributed throughout the Indian union, plains and hills up to 2000 m elevation (Ali, 1993).

Habit & Habitat:

Inhabits outlying jungle, well wooded compounds, gardens and grooves of trees. Flocks hop about on the ground rummaging amongst the fallen leaves and mulch for insects (Andrews, 1968). It has well adapted itself in the urban as well as in man- made habitats like plantations, gardens etc. (Ali, 1993).

Breeding Period:

Breed irregularly through out the year as reported by Ali (1993), Dharmakumarsinghji (1954), Whistler (1949) and Andrews (1968). Nest is a loosely built cup of twigs and parental duties are shared by both the sexes and more or less communally (Ali, 1993).

In the present chapter preference of feeding site by Jungle Babbler in various agricultural crops as well as in one crop particular *i.e.* Pigeon pea which is prone to get heavily infested by *Helicoverpa armigera* at various stages of growth is considered .

Study Area – 1

The fields were at the Pulse Research Centre present in the middle of the Baroda city. Being a Pulse research center, the main crops grown here during kharif season is Pigeon pea whereas sorghum, maize and cowpea are also grown as alternate crops. The specific time intervals in the sowing gave at least two stages of the crop at a time in different parts of the field. During the study period, empty plots were also present which provided an excellent comparative sites.

Study Area – 2

The field selected was of a farmer, present at the outskirts of the city; where human habitat is comparatively less. The different crops grown by the farmer were vegetables like brinjal and cabbage and cereals like maize. Two empty plots were also present during study period. Among these two one was ploughed and the other was the unploughed field where fodder for livestock was stored.

Methods:

The study area was visited and the activities of Jungle Babblers were noted down for two hours in the morning from sun rise, twice in a week from October to March (1997-98). The number of birds feeding in each field and the time spent in different activities preformed by the Jungle Babbler were noted down. By taking into consideration the following criteria, the mean time spent

by Jungle Babbler in various crop fields was calculated. Here it is important to note that Jungle Babbler move around in the flocks of 6- 8 individuals.

1. Total observation time per stage per month in hours.
2. Duration: October 97' to March 98'
3. Time spent by Jungle Babblers in the field at a time and was divided by number of birds in the flock.
4. From this total time spent in feeding / bird / hr was calculated per month as well as at different stages.

The second part of the study included observations of frequency of feeding in fields other than pigeon pea *viz*; Brinjal, cabbage, cowpea, maize, sorghum and one ploughed and other unploughed empty plots.

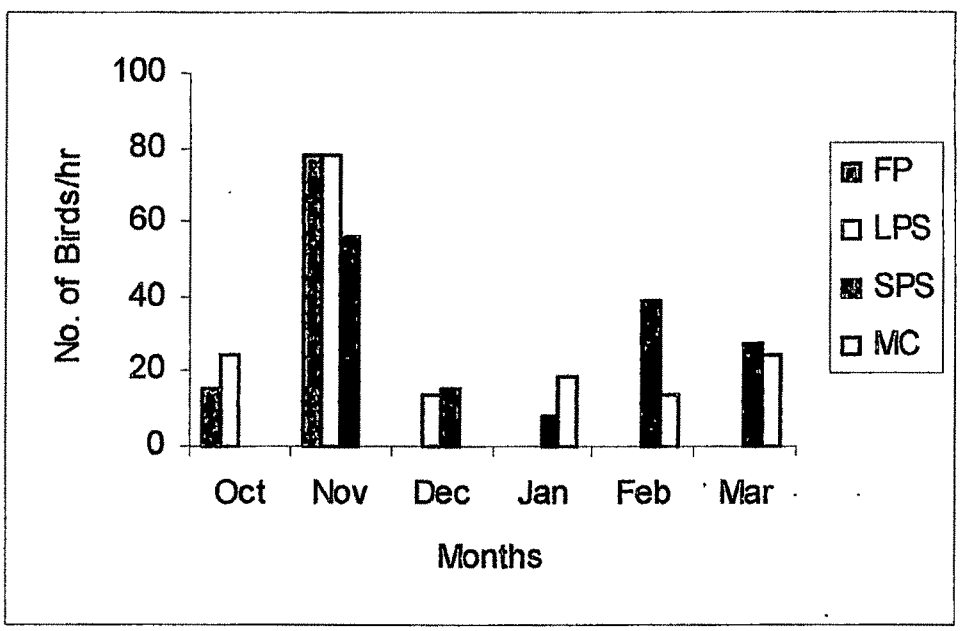
The comparative feeding activity of Jungle Babbler in the above said fields was noted and number of birds feeding / hr was calculated using the following criteria:

1. Total number of Jungle Babblers visiting the field
2. Of the total number, the number of Jungle Babblers feeding on the different crops
3. By multiplying the number of birds feeding and time spent by the flock in feeding, the total time spent in feeding by the flock was calculated
4. Finally the number of birds/ hr feeding in a particular field was calculated.

Table 1: Number of Jungle Babblers *(Turdoides striatus)* feeding in the Pigeon pea crop during different stages.

Months	Stages of Crop			
	Flowering Plants	Small pod stage	Large pod stage	Mature crop
October	15.6 bird / hr	24 bird / hr	-	-
November	-	78 bird / hr	55.8 bird /hr	-
December	-	13.8 bird / hr	15.6 bird /hr	-
January	-	-	7.8 bird / hr	18.6 bird /hr
February	-	-	39.0 bird /hr	13.8 bird /hr
March	-	-	27.6 bird / hr	24.6 bird /hr

Figure 1: Number of Jungle Babblers *(Turdoides striatus)* feeding in the pigeon pea field during different stages.



- **FPS - Flowering stage**
- **SPS - Small pod stage**
- **LPS - Large pod stage**
- **MC - Mature crop**

Table 2 : Comparitive feeding activity of Jungle Babbler in various fields.

	Brinjal	Cabbage	Maize	Cowpea	Ploughed field	Unploughed field
Total hours of Observation	16 hrs	16hrs	16 hrs	16 hrs	16 hrs	16 hrs
Total no of Birds	42	69	69	58	132	43
Total time in Feeding	4.63 hrs	9.5 hrs	4.31 hrs	1.68 hrs	8.48 hrs	6.08 hrs
No of birds Feeding	9.0	7.26	16	34.2	15.5	7.07

Table 3: Jungle Babbler *(Turdoides striatus)* in various crops fields and empty plots during kharif season

Cowpea	Brinjal	Cabbage	Maize	Ploughed	Unploughed
72.6 birds / hr	49.8 birds / hr	121.06 birds / hr	86.6 birds / hr	140.06 birds / hr	48.06 birds / hr

RESULTS ~

Several species of birds were observed in the pigeon pea fields which included birds like Jungle Babblers, Bank myna, Common myna, Blue rock pigeon, Rose ringed parakeet, House sparrow and Red vented bulbul etc. Out of these, the omnivore species like Jungle Babblers, Common myna and Bank myna were frequent visitors to the Pigeon pea fields. For the present study, the feeding frequency of Jungle Babbler was recorded at the two sites through the kharif season *i.e.* from October 97' to March 98'.

Pigeon pea is generally sown in September. At the beginning of the study in October 1997, the crop was at the flowering stage in one field and at small pod stage in the other. Looking at the Table 1, Fig. 1 it can be seen that in October 1997, the number of Jungle Babblers visiting the Pigeon pea fields/hr at the flowering stage was 15.6 bird/hr and in the small pod stage was 24 bird/hr. The number of birds increased significantly in the small pod stage to 78 bird/hr during November when the flowering stage of October developed into small pod stage. At the end of November and the beginning of December, pigeon peas were heavily infested with *Helicoverpa armigera,* and the crop was sprayed with three applications of insecticide Monocrotophos and Dunnate at the interval of ten days each. This brought down the *Helicoverpa armigera* infestation which is reflected by the decrease in the number of Jungle Babblers in the small pod stage to 13.8 bird/hr.

The small pod stage of October grew to large pod stage of November. The relative frequency of Jungle Babblers feeding in the large pod stage in November was 55.8 bird/hr. This was the period when *Helicoverpa armigera* infestation was high as is indicated for the small pod stage too and later on sprayed with insecticides in December. This resulted in a significant decline in the number of Jungle Babblers visiting the large pod stage fields in December to 15.6 birds/hr. The relative frequency of Jungle Babblers further decreased in large pod stage to 7.8 bird/hr in January.

During February and March the Pigeon pea were in large pod stage and during this period number of Jungle Babblers feeding in the large pod stage reached to the relative frequency of 39.0 birds/ hr and 27.6 birds/hr respectively. The pods of the pigeon pea crop started maturing around January. The number of Jungle Babblers feeding in the mature crop fields in this month was 18.6 bird/hr. As the pigeon pea crop of other fields started maturing during February, the number of Jungle Babblers visiting the mature crop stage was 13.8 bird/hr which increased during March to 24.6 bird/hr.

In the pigeon pea fields, Jungle Babblers were always seen feeding on the ground, mulching and digging the soil and occasionally perching on the crop. The flock size varied between 4 – 8 and rarely going up to 13 – 14. No territorial behavior was noted on the feeding grounds, occasionally they were seen chasing away Rose ringed parakeet and House sparrow.

The second part of the study includes observations (Table 2 & Table 3) on presence of Jungle Babblers in the other crops like Cowpea, Brinjal, Cabbage, Maize, Sorghum and also the Ploughed and unploughed fields.

During the month of October 97', the cowpea crop was fully matured and the crop had been harvested and the mound was made in the middle of the field for drying. The number of Jungle Babblers visiting the crop was 72.6 bird/hr. The other crops like cabbage and brinjal were grown in small plots. The number of the Jungle Babblers in the cabbage field was 129 birds/hr and brinjal was 49.8 birds/hr whereas in Maize it was 81.6 birds/hr. Among the two empty plots, the ploughed field attracted more Jungle Babblers then the unploughed one; the number of birds in ploughed being 141 bird/hr and for unploughed 48.06 birds/hr.

DISCUSSION ~

Since the insect pest species have started developing resistance to synthetic insecticides, the application of Integral Pest Management (IPM) is becoming extensively popular in recent times. Insectivorous birds are the single most important factor regulating the population of *Helicoverpa armigera* under natural conditions, the pest which is known to inflict heavy economical losses to pulses (Gokhale, 1992). Pigeon pea is one of the heavily infested crops and highly vulnerable from the predation by *Helicoverpa armigera,* the pod borer, especially at the time of the pod formation stage. All the instars of *Helicoverpa armigera* have been observed feeding on the pods of Pigeon pea, *Cajanus Cajan* (Steveson *et al.,* 2002). Bird predation starts as medium and large larvae become available and they continue to do so till the harvestation. As the larvae gets better hiding facility and poor searching ability by the birds in the dense growth because of closer spacing or less inter distance cropping, increases the Larval population (Gokhale, 1992). Among the several insectivore bird species visiting Pigeon pea, Jungle Babblers are also regular visitors. The diet of the Jungle Babblers varies from graminivore type to being insectivore and *vice – versa* depending on the availability of the food (Gaston, 1978). As seen in Table 1 maximum number of Jungle Babblers were observed in November in small pod stage and in large pod stage. The

number of Jungle Babblers in these two stages is a reflection of heavy infestation of *Helicoverpa armigera* as this is the pod formation time when the plants get infested with the pod borer. Infestation is comparatively less in flowering stage and fully mature stage due to non-availability of pods and this is reflected by the comparatively less number of Jungle Babblers in these stages.

In Gujarat, fresh green Pigeon peas are extensively used in the kitchen as long as they are available in the market. Farmers pick up the fresh pods regularly from the fields. These plucking practices of fresh Pigeon pea pods as well as other human activities within the crop fields may also lead to the fall of *Helicoverpa armigera* larvae on the soil helping in predation by Jungle Babblers on the ground. In October, when the two fields of Pigeon pea were at flowering stage and small pod stage, the number of Jungle Babblers observed in the later stage was higher indicating the possible availability of food while during the flowering stage as pest infestation is not pronounced the number of insectivorous birds including Jungle Babblers was less. In the following month when flowering stage grew to small pod stage and small pod stage to large pod stage, the number was still higher in these fields suggesting the ample availability of pest population. The infestation of pest is more in large pod stage and thus the number of Jungle Babblers feeding in Pigeon pea fields with large pods is also higher during this period. By the end of November and December 1997 the three applications of insecticide resulted in the decrease in

the number of larval population which in turn caused the decrease in the number of the larvae as well as underground pupae, influencing the number of Jungle Babblers feeding in the pigeon pea fields. The index of population trend of *Helicoverpa armigera* in cotton crop decreases after contently spraying chemical pesticides and the number of predators also decreases because it could inhibit the population increase of pest (Yang *et al.,* 2000). The reduction in the number of Jungle Babblers indicates that they do not feed on the pods but were depredating on the larvae and pupae of the pod borer. During the life cycle *Helicoverpa armigera,* undergoes a short day, low temperature pupal diapause (Zhou *et al.,* 2000). The pupal stage is known to inhabit underground soil and the feeding activity of Jungle Babblers is mainly restricted at the ground level. They are seen digging and mulching the soil but never seen perching on the plants for feeding (Andrews, 1968). During the present study also Jungle Babblers were rarely seen perching on plants to feed. In the present case also Jungle Babblers were seen digging and mulching for the pupae as well as for the fallen larvae of the pest. Jungle Babblers do not show feeding territory amongst them as well as with the other birds and are very rarely observed defending their territories outside the breeding season (Andrews, 1968). In the present study also no territorial activities were observed as the food was available in large quantities.

Brinjal and cabbage are some of the important vegetables grown around and are known to be infested by *Helicoverpa armigera*,

diamond back moth, aphids etc. In brinjal, the larvae are not exposed since they are present within the fruit. This is reflected by less number of Jungle Babblers in the brinjal field as compared to the other crops studied. The insect pests diamond back moth and aphids present in the cabbage fields are depredated not alone by the birds but by the Lady Bird beetles as well. The population of Lady Bird beetles in the cabbage field was quite high during the study period. These beetles are responsible to keep the pest population in check (Raheja and Tewari, 1995). Here it can be suggested that in addition to the pest species Jungle Babblers may also be feeding though to a lesser extent on Lady Bird beetles. About 4% of Coleopterans have been reported in the gut content of Jungle Babblers (Dhindsa *et al.,* 1994).

Among the other crops studied in the October, the cowpea crop fields were fully mature. The crop had been harvested and the pods were collected in the middle of the field for drying. The number of Jungle Babblers seen in this crop was less suggesting that they did not feed on the dry pods. The size of the cowpea seeds is larger than sorghum and Bajra which probably prohibits Jungle Babblers to feed on them. The graminivore bird Blue Rock Pigeon (*Columba livia*) were seen in this field in large numbers reaching up to 30 – 40 depredating on the seeds.

Maize, a cereal crop which is grown during the kharif season at large scale in and around Baroda district is known to be depredated by number of graminivore birds. The cobs are damaged causing heavy

economic loss. Among the number of graminivore and omnivore bird species visiting the maize fields, Jungle Babblers are present in small numbers. Because of their particular foraging style, they were rarely seen perching on the maize plant and thus damage caused by them is nil. Moreover, the size of the maize grain is large for a bird like Jungle Babbler which in comparison to graminivore birds like Blue Rock Pigeon has smaller beak size.

Infestation of White Grub is severe during the kharif season causing the heavy damage to sorghum, pearl millet and maize (Parasharya *et al.,* 1994). White Grub (*Holotrichia* sp. Scarabidae) is a noxious subterranean pest which damages the root system of several crops. Chemical control of the Grub is ineffective but as the field is prepared before sowing by ploughing, a large number of Grubs are exposed attracting large number of birds (Parasharya *et al.,* 1994). Several insectivore as well as omnivore birds can be seen visiting the ploughed fields during the agricultural practices feeding on the exposed insects and small animals. Jungle Babblers are also seen in large numbers in such ploughed field suggesting their possible involvement with other species of birds in controlling the pest population. In the unploughed fields the number of Jungle Babblers was the least as there is decrease in the availability of the food in the hard ground. The field was used as a storage ground for the fodder of the livestock.

The diet of some birds changes from insectivorous type to graminivorous type and *vice versa* depending on the availability of the food and season, the same is true for Jungle Babblers too (Gaston, 1978). Jungle Babblers have been considered as pests to the crops of sorghum, pearl millet and Bajra (Parasharya, 1988) and since they devour on the pod borer (Gokhale, 1992) are useful to the crops heavily infested by the pod borer and reports suggest that Jungle Babblers are beneficial to these crops At the present study site, sorghum was grown next to Pigeon pea but Jungle Babblers were seen only couple of times visiting the sorghum field. The regular visitors to the Sorghum field were birds like Rose ringed parakeet, Blue rock pigeon, House sparrow and Red vented bulbul. This suggests that Jungle Babblers preferred insects available in the pigeon pea fields to the grains of Sorghum. This food preference suggests that if proteinaceous food is available, carbohydrate diet is not preferred. The diet of the adult birds constitute maximum of protein rich food (Gaston, 1978; Gupta and Midha, 1994). Therefore Pigeon pea and Sorghum can be grown as an alternate or a decoy crop to protect the other from the omnivore bird pests.

In the conclusion it can be said that Jungle Babblers being an omnivore bird are both beneficial as well as harmful to the agriculture depending on the crop or on the availability of the type of the food during different seasons.

In case of Jungle Babblers, insect pest, *Helicoverpa armigera* is the preferred food over grains *i.e.* Sorghum, therefore proteinaceous food is preferred over the carbohydrate diet.

Jungle Babblers collect their food by digging and mulching the soil. Due to this habit underground pupae of *Helicoverpa armigera* can be controlled.

When Pigeon pea and Sorghum are planted in near by fields they prefer feeding on pest present in Pigeon pea than on Sorghum. Hence Pigeon pea can be an alternative crop for Sorghum to protect it from heavy losses by the omnivore birds.