

# Study of population density and life cycle of *Clavigralla gibbosa*-pest of pigeonpea (Arhar dal) in Sagar (M.P.)

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## ABSTRACT

Indian environment is favorable for all possible crops. A large number of insect species adapted to feed over a variety of plants and animals ruthlessly causing a severe damage to our economy and even to the livestock and public health. India is the largest producer of pulses in the world, both in quality and variety. Pigeonpea (*Cajanus cajan*) is most important pulse crop of India, commonly known as "Tur", "Arhar", or red gram. It is rich in iron, iodine, and the essential amino acids. The losses of the pigeonpea crop from pest attack have been the subject of very little economic studies. The present investigation, study of population density and life cycle of *Clavigralla gibbosa* a major pest of pigeonpea was undertaken with objective to identify stages of insect infecting the seasonal and valuable crop in Sagar selected for the study.

Key words- *Clavigralla gibbosa*, pigeonpea crop, pest.

## Introduction :-

Indian environment is favorable for all possible crops. These different kinds of crops were great source of food. Our country is largest producer of pulses in the world, both in quality and variety. Pulses are primary source of protein among vegetarians who constitute majority of population in Indian subcontinent. Pigeonpea (*Cajanus cajan*) is most important pulse crop of India, commonly known as "Tur", "Arhar", or red gram. It is rich in iron, iodine, and the essential amino acids. It is grown in a wide range of agro-ecological situations, its deep rooting and drought tolerant characters make it especially useful crop in the area of low and uncertain rainfall (Subharani et al 2002).

Pigeonpea being a leguminous plant and thereby restore lot of nitrogen in the soil, it also provides very attractive and nutritious food, not only for human feed upon the seeds and other parts of the plants, with over 200 species having been recorded in India alone. This crop is infested several insect pests, which find tremendous amount of foliage



for food and nutrition. "Pest" is used very broadly for insect that cause damage to crops (Tembhare 1997). The losses of the crops from pests attack have been the subject of very limited economic studies such losses were already very high. It had been conventionally estimated that about 10-20% of the crops produced in India is lost due to pests and disease.

Dhariwal et al 2004 reported that insect pest have been a major constraint in agriculture production. In spite of all the advances made in crop protection technology losses caused by insect pest have increased with modernization of agriculture.

The previous records of pigeonpea made it quite popular due to the various food products used by man, but the literature available is very scarce regarding the pests of pigeonpea in India (Davies and Lateef (1975, 1978) Kashyap et al (1985, 1991) reported that insect constraint in agriculture in production in spite of all the advances made in crop protection technology losses have been increased.

About 100 species of insects are found on pigeonpea plants and many of them are beneficial, for they feed upon the pests, either as predators or parasitoids. Insects are found chewing or sucking plants from seedling to harvest and no part of the plant is immune to attack.

A preliminary survey revealed that most of the pest ranked as major pests of pigeonpea in other states and did not occupied this status in M.P. possibly due to different cultivation pattern and agro-climatic condition. So the present study was undertaken to investigate the population density and life cycle of pest *Claviralla gibbosa* on crop pigeonpea in Sagar (M.P.). As such studies with complete life cycle infesting the pigeonpea in Sagar are scanty. Temperature and humidity were also taken into account.

### Materials and method

#### ❖ Experimental site -

The study was conducted during kharif season in the year 2012 at Sagar (M.P.) in village of Dhana.

#### ❖ Climate -

Sagar is situated in the central tract of M.P. at 512.92 m above the sea level. The climate is sub tropical subarid.

#### ❖ Method of observation -

The present study was undertaken to investigate the population density and life cycle of pest *Claviralla gibbosa* on crop Pigeonpea in Sagar (M.P.)



Observations were recorded daily during the crop period i.e. from germination till the harvesting. The experimental plot size was chosen for the present investigation was 3m x 1m. The appearance of the different stages of life cycle of the *Clavigralla gibbosa* was noted. No plant protection against insect pest was given during the crop season.

#### • Rearing & maintenance -

The eggs, adult, nymphs and larvae were collected from their host plant in the field. The different stages of the pests was reared in the laboratory to study the detail of their life cycle.

#### Results & Discussion :-

The present study was undertaken to investigate the population density and life cycle of pest of pigeonpea (*Cajanus cajan*) *Clavigralla gibbosa* from seedling stage upto harvesting. However, data shown were from the appearance of the pest till their disappearance. The temperature and the humidity were also taken into account during the study period.

During study period 2012-13 the complete life cycle was observed of-

- a) *Clavigralla gibbosa*
- b) *Evelastis atomosa*
- c) *Nezara viridula*

Whereas partial life cycle was seen in *Melanogromuza obtusa* and *Lampides boeticus*.

Population density and complete life cycle of *Clavigralla gibbosa* was observed in detail whose systematic position is

common name	-	Tur
order	-	hemiptera
family	-	coreidae.

In 2012-13, the pests was found from November 26- February 17, during which nymphal and adult population ranged from 96 to 220 nymphs/ 100 plants and 05 to 105 adult/100 plants (Table 1 & Fig.1). Pest population gradually increased on the crop as the number of pods increased and the temperature decreased. Highest population was recorded from January 7 to 27, when the average maximum, minimum temperature and relative humidity were 28.10C, 9.00C, and 56% respectively. During this year % of eggs, nymphs and adults was 44% ,38%, 18% respectively.

Nymphs and adults of the pest congregated on the pods and sucked the juice from the green pods and grain resulting in premature drying of pods and shriveling of grains.

#### Life Cycle :-

- Eggs- eggs were dark brown and oval or concave in shape. Female laid eggs in 2-8 groups on leaves and seeds (fig.2)
- Nymph- eggs hatch in 10-15 days. Freshly hatched nymphs were very delicate dark or reddish brown in color with prominent lateral spines. There were 5 nymphal instar (fig.3). Molting in nymphs from 1 instar to the next takes place 5-7 days. Nymphal period lasts for about 18-28 days.
- Adult- adult was brown and silky white in color. Female was longer than male and female size was 8mm and male size was 5mm (fig.4). The total period of life cycle from egg to adult in emergence range is from 35-45 days. They were found in all the parts of the plant.

Thus the present study of population density and life cycle of *Clavigralla gibbosa* pests of pigeonpea (arhar) in Sagar M.P. was identified and noticed that it was a major foliage feeder of pigeonpea crop. Eggs are dark brown in color and female laid eggs in 2-8 groups. Before hatching the color of egg changed from brown to deep brown. Incubation period for 10-15 days. Total nymphal period for 18-20 days. Eggs to adult life cycle was completed in 35-40 days. Similar findings have been reported earlier by Lefroy (1909), Mishra (1924), Ayyar (1940), Trehaan and Pingle (1946), Bindra (1965), Singh and Patel (1968), Nawale and Jadhav (1978).

During 2012-13 pest population of *C. gibbosa* fluctuated from 96-220 Nymphs/100 plants and 05-105 adults/100 plants. Similar findings have been reported by Naresh and Singh (1984). Their population started increasing at the time of pod formation when the temperature was low and declined at the time of crop maturity.

The present data indicates that pest caused losses so that adequate pest management could greatly increase production and profits from the existing crop. The natural enemies of pests like predator and parasite were also found on the crops. These can be very helpful in controlling the population of the pest without the use of hazardous pesticides.



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**Table 1 Showing Population of Clavigralla gibbassa**

Period 2012-13	Eggs	Nymphs	Adult
Nov. 26 to Dec. 16	105	96	5
Dec. 17 to Jan 06	275	208	103
Jan. 07 to Jan 27	249	220	105
Jan. 28 to Feb 17	180	170	92
Total	809	694	305
Mean	202.25	173.5	76.25
±SD	66.01278	48.40196	41.43293
.SE	33.00636	24.20098	20.71646

**Fig.1 Histogram Showing Population density of egg, nymphs and adult of Clavigralla gibbosa on Pigeonpea**

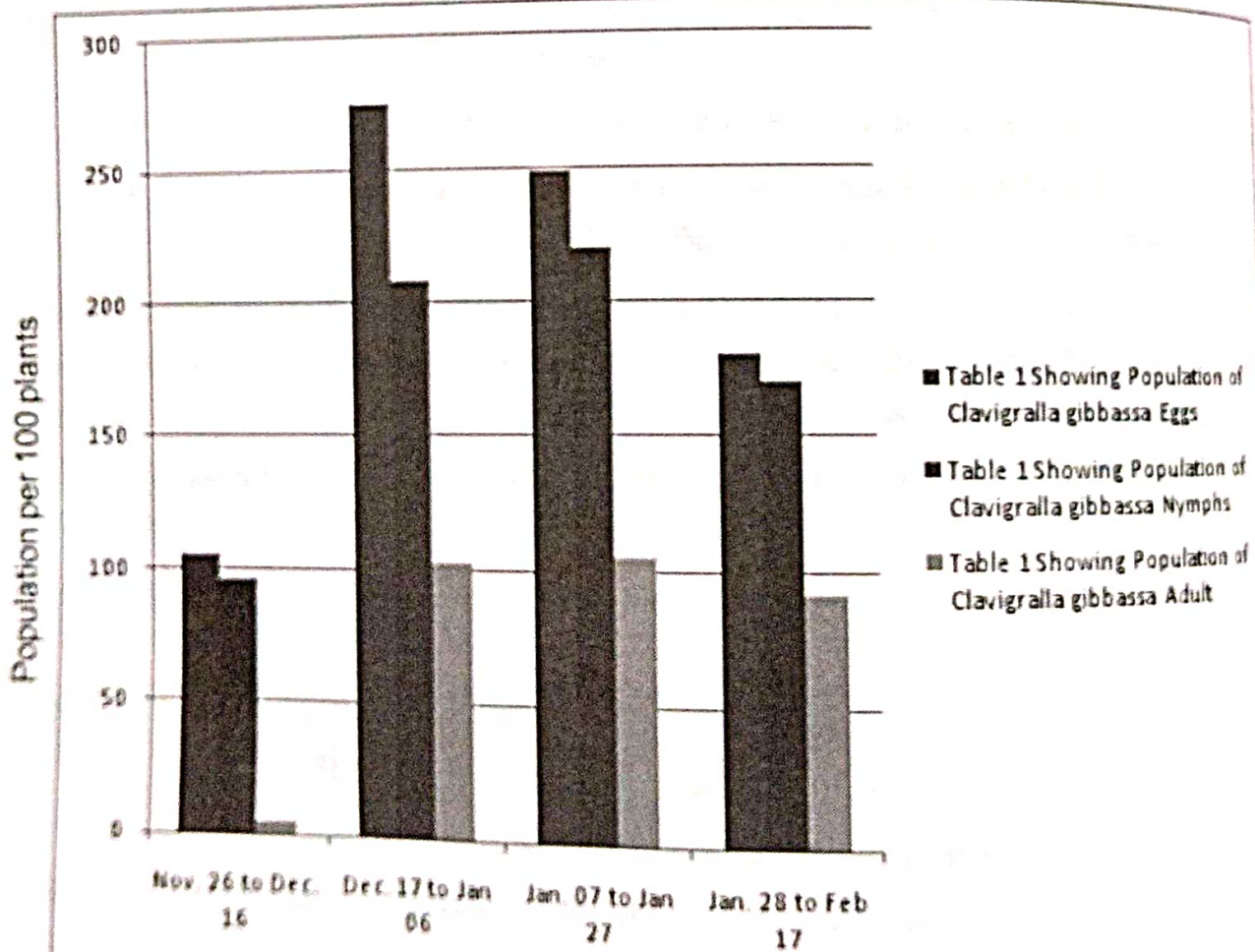






Fig. 02 a - Photograph showing egg to *Clavigralla gibbosa* on Pigeonpea Seeds

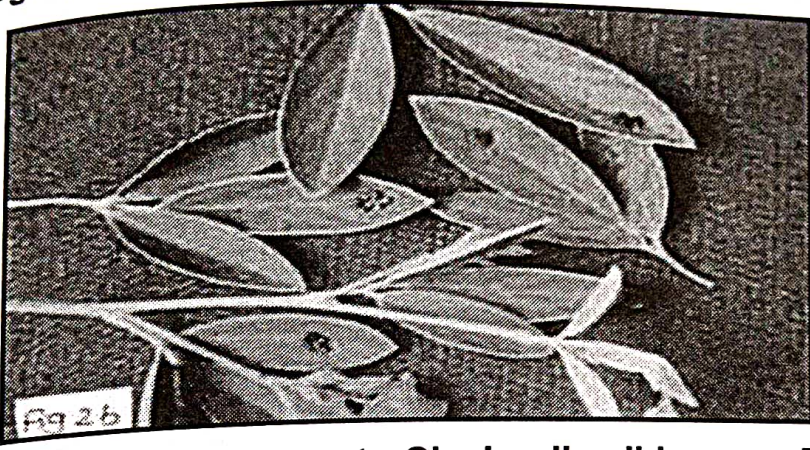


Fig. 02 b - Photograph showing egg to *Clavigralla gibbosa* on Pigeonpea Seeds

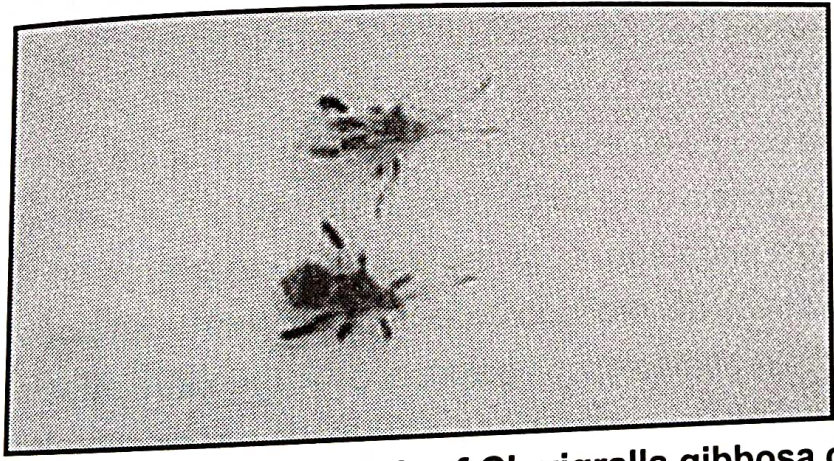


Fig. 3 - Photograph showing nymph of *Clavigralla gibbosa* on Pigeonpea

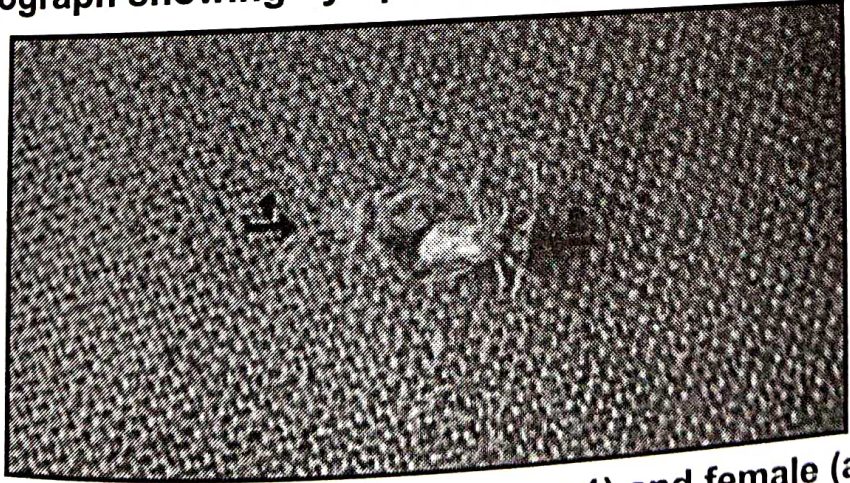


Fig. 4 - Photograph showing male (arrow 1) and female (arrow 2) of *Clavigralla gibbosa* on Pigeonpea