CHAPTER I
INTRODUCTION

Pulses have been recognized as a major source of dietary proteins for majority of the population in India and also in the world. Pulse crop also helps in the restoration of soil fertility by fixing the atmospheric nitrogen in to soil through symbiotic nitrogen fixation with the help of bacterium called Rhizobia. Thus, every pulse plant is a mini fertilizer factory itself. Cowpea is one among the major pulse crops in our country which serves the dietary requirement of the most of the vegetarian population on daily basis.

Cowpea \([Vigna\ uNGuICuLaTa\ (L.)\ Waip]\) belongs to family Leguminocae and sub family Faboideae. It is one of the most important principle pulse crop of tropics and commonly known as crowdel pea, chala, chola or choli, chavli, lobia, southern pea and black eyed bean. Importance of this crop lies in its versatility being a fodder, a vegetable, a grain legume, green manure crop as well as most versatile kharif pulse crop because of its draught tolerant characters, soil restoring properties and multipurpose use. It is consumed as green seeds, green pods and dry grains. Cowpea plays an important role in human nutrition in a predominantly vegetarian country like India because it is considered as vegetable meat due to high amount of proteins. Cowpea grain contains about 60 per cent carbohydrates, 22 to 28 percent proteins and 11.8 per cent fat. Moreover, it is a rich source of calcium and iron (Sharma, 2000).

Cowpea originated in the Savannah region of west and central Africa (Colby and Steele, 1976). In India it is mainly grown as sole crop both in kharif as well as summer season. It is also frequently grown either as inter or mixed crop along with cereals like sorghum, maize, millet or sometimes with cotton. It is mainly grown in the States of Gujarat, West Bengal, Tamil Nadu, Andhra Pradesh, Kerala, Uttar Pradesh, Haryana, Delhi and Punjab.

In India, cowpea is cultivated in about 1.5 million hectare with an annual production of 0.5 million tones and average productivity 608 kg/ha (Swaminathan, 2007). In Gujarat, cowpea (grain legume) is cultivated in about 30470 ha area with an annual production of 322084 tones and average productivity of 845 kg/ha whereas,
vegetable purpose cowpea occupies an area of 760 ha with an annual production of 6460 mt/ha and average productivity of 8.50 mt/ha (Anonymous, 2014).

Even though all the efforts have been made by the scientists for increasing the production, the higher yield potential of various pulses including cowpea could not be able to achieve. Among the constraints responsible for low yield of such an important pulses crop, the losses due to insect-pests are considered to be an important. It is an unfortunate fact that every year about 15 to 20 per cent losses in pulses is due to the ravages of pest infestation (Lai and Sachan, 1997). The avoidable losses in yield due to insect pests have been recorded in the range of 66-100 per cent in cowpea (Pandey et al. 1991).

1. Aphid : *Aphis craccivora* (Koch.)
2. Jassid : *Empoaca kerri* (Pruthi.)
3. Whitefly : *Bemisia tabaci* (Genn.)
4. Hairy caterpillar : *Amsacta moorei* (Butl.) *Amsacta albistriga* (Walk)
5. Galerucid beetle : *Madurasia obscurella* (Jacoby)
6. Tobacco caterpillar : *Spodoptera litura* (Fabricius)
7. Cowpea pod borer : *Helicoverpa armigera* (Hubner)
8. Spotted pod borer : *Maruca testulalis* (Geyer.)
9. Blue butterfly : *Lampides boeticus* (Linn.)
10. Pink pod borer : *Cydia ptychora* (Meyr.)
11. Leaf webber : *Cydia (Eucasma) critica* (Walk.)

As many as 21 insect pests of different groups were observed on cowpea during summer and *kharif* season. Among this, only few of them are considered to be major pest of cowpea. Sucking pests like aphid, jassid and whitefly are important pests limiting profitable cultivation of cowpea not only by direct sap sucking but also by virus transmission.

Cowpea aphid, *A. craccivora* causes significant yield losses of 20-40 per cent in Asia and up to 35 per cent in Africa. The nymphs and adults suck the cell sap from host plant. The damage to the crop results in profuse draining of plant sap and development of honey dew leading to black sooty mould on leaves and leaf shedding (Kotadia and Bhalani, 1992). A virus “rosette” is known to be transmitted by this aphid (Atwal, 1976). *E. kerri* causes significant reduction in yield. Yield reduction up to 39 per cent due to jassid infection in cowpea has been reported by Singh and Van Emden in 1976. The
symptoms of damage are characteristic yellow discoloration of leaf edges, followed by
cupping of leaves mostly downwards at their edges.

Whitefly, *B. tabaci* is also of considerable importance because not only it feeds on
leaves but also transmits the yellow vein mosaic virus in cowpea. Direct feeding
damage is caused by sucking the sap from the foliage of plants. This feeding causes
weakening and early wilting of the plant and reduces the plant growth rate and yield.
It also causes leaf chlorosis, leaf withering, premature dropping of leaves and plants
death.

Correlation of pest population with different weather parameters provide a
valuable information on the basis of such data a predictive model can be developed
which can be used for forecasting of the pest population buildup and ultimately
farmers can plan for plant protection strategies. The study of seasonal incidence will
be useful to generate the information on the population buildup of sucking pests in
cowpea crop. In the recent years, these pests created a serious threat to agriculture
industry due to development of resistance towards commonly used insecticides. It has
also drawn the attention of entomologists to develop eco-friendly and sustainable
management practices.

In this view there is scope of utilizing the newer chemistry molecules such as
pyridinecarboxamide and neonicotinoids which are required in small quantity to
control the pests and are comparatively environmental safe and economically
effective for control of sucking pests in cowpea ecosystem. Flonicamid is a novel
insecticide belongs to class pyridinecarboxamide which have systemic and trans
laminar action in plant. Flonicamid has no negative impact on beneficial insect.
Dinetofuran is a relatively new insecticides belonging to class neonicotinodis.
Dinetofuran products are labeled “Reduced-Risk” by the EPA, generally safer to
humans and the environment. Moreover, imidacloprid and acetamiprid of the
neonicotinodis class of group chloronicotinyl are also reported to be comparatively
safer to environment. Keeping this in mind present study was carried out to evolve
the efficacy of newer insecticides for the management of major sucking pests of
cowpea and to find out most cost effective insecticide treatment in the field with the
following objectives.
1. Seasonal incidence of sucking pests on cowpea.
2. Bio-efficacy of different insecticides against sucking pests in cowpea.
3. Residual toxicity of different insecticides.