CHAPTER-VII

7 SIGNIFICANT FINDINGS

- *Spodoptera litura* is a ubiquitous, polyphagous& voracious lepidopteran pest that feeds on large range of host plants & so attracted many researchers like me to know more about this insect pest.
- Outbreak of the pest occurs due to its resistance to insecticides, favorable weather conditions and heavy rainfall after a long dry spell.
- Castor was grown in Padra, region of Gujarat, regularly and *Spodoptera litura* is one of the major pest and becomes a collection site for the research work
- During the field visit many insect pest were also observed like Jssid, Sting bug &*S. litura*. Other pests which were not observed but pest of castor include, red hairy caterpillar (*Amsacta moorei* Butler), semilooper (*Achoea janata* L.) and shoot and capsule borer (*Conogethespuncti feralis* Guen.).
- Important task during the study was to maintain culture of *Spodoptera litura* throughout the year without any failure.
- For culturing very well established method i.e. rearing of *S. litura* on artificial diet was followed (Kranthi, 2005). Diet proves to be easy and accurate method of rearing insects.
- Precautions are taken during rearing of *S. litura* while handling specially the to avoid any fungal or any other pathogenic infection
- When food was not there cannibalism recorded among larvae and due to that utmost care should be given while transferring the larvae to new/fresh food.
- Pupae were taken on regular basis from rearing tray and transferred to plastic container because if left unnoticed the adult will emerge inside rearing the cell and its wing can be stuck by artificial diet.

- Always healthy adults were chosen for the oviposition pot preparation because if not selected properly it will hamper fecundity. The adults having undisturbed scales on wings & active ones were selected which gives more egg masses.
- Neonates and 1st instar larval handling should be done in a very proper way to avoid injury to them as they are very small and delicate.
- Different factors plays significant role in influencing the normal behaviour of the insect. As insect shows response to these factors in some or the other way.
- These limiting factors are any factor that places an upper limit on the size of a population. Limiting factors may be biotic, such as the availability of food, host or abiotic, such as temperature, humidity & access to water.
- Present study emphasizes on influence of these factors on lifecycle of *S. litura*.
- In field conditions also insects respond to different abiotic & biotic factors by going into hibernation or diapauses. They slow down or faster the rate of development to cope up with these conditions.
- In the current study two abiotic factors temperature and humidity were studied.
- Selection of these parameters done on the basis of insect response seen against these fluctuating conditions in literature survey
- The data point selected for temperature and humidity were not studied earlier so curiously we want to know how *S. litura* behave to these data points.
- For studying these parameters were studied life cycle of *S. litura* on 20°C temperature and 40% humidity which denote experimental conditions and at the same time 27 $\pm$ 2°C and 70 + 5 % R.H was normal/optimum condition.
- Influences of these experimental conditions were observed in life cycle of *S. litura*.

- At normal condition (27 ± 2°C and 70 + 5 % R.H) the larval period observed was 19.66 days. At 20°C temperature larval period prolonged to 30.14 days & at 40% humidity larval period reaches to 31.76 days.
- If we talk about pupal period same type of data was observed that days were prolonged. At normal condition (27 ± 2°C and 70 + 5 % R.H) the pupal period observed was 5.01 days. At 20°C temperature larval period prolonged to 6.1 days & at 40% humidity larval period reaches to 6.04 days.
- Overall if we see total days taken for the life cycle to complete it takes 35.46 days in case of normal condition (27 ± 2°C and 70 + 5 % R.H), 49.91 days in case of 20°C temperature & 49.94 days as in case of 40% humidity.
- Different growth indexes also studied like larval growth index, pupal growth index and total developmental index. This also indicates there was influence of these abiotic factors on growth and development of the *S. litura*.
- At normal condition larval growth index was 5.08 where as it reduces to 3.32 & 3.14 in case of 20°C temperature & 40% humidity respectively.
- Pupal growth index also shows similar results and shows 19.96 pupal growth index at normal condition & 16.39 & 16.56 at 20°C temperature & 40% humidity respectively.
- Total developmental index also calculated to see overall development & it shows 2.82 growth index in case of normal condition & 2.00 & 2.00 at 20°C temperature & 40% humidity respectively.
- These figures clearly indicate influence of these abiotic factors on life cycle of *S. litura*.
- Host plant relationship also plays significant role in growth and development of insect. Insects are having wide host range but we divide into primary & secondary host because insect has selection and attraction from one to another.
- Study mainly focuses on four different hosts which were highly preferred by the *Spodoptera litura* & we want to see if four host present at the same time what will be the preference.

- Four host selected for the study were: Tomato (*Solanum lycopersicum* – Solanaceae), Chili (*Capsicum annuum* – Solanaceae), Cabbage (*Brassica oleracea* - Brassicaceae) and Cotton (*Gossypium* – Malvaceae).
- Selection of the host was based on the literature survey and economical importance of the host. Data on life cycle study of *S. litura* on these hosts under laboratory condition was not studied so we decided to take these four host plants.
- Hatched larvae were taken directly on different host plants to see how many days it takes to reach next stage. When larvae feed on tomato leaves it takes 19.40 days followed by 19.80, 21.40, 26.00 days when fed with chili, cabbage and cotton leaves.
- More time was observed in case of cotton fed larvae so it indicates less preference as compared to other hosts.
- But in case of pupal and adult period no significant difference was observed among different hosts. Pupal period was 6.20, 6.30, 6.40 and 6.80 when larvae fed with tomato, chili, cabbage and cotton leaves. Adult period was 6.20, 6.40, 6.20 and 6.40 when larvae fed with tomato, chili, cabbage and cotton leaves. This shows only leaf feeding stage i.e. larval stage was more influenced by the different hosts.
- If we see total days of life cycle when fed with tomato, chili, cabbage and cotton were 31.80, 32.50, 34.00 and 39.00 days respectively.
- So days overall days taken to complete different stage was taken when larvae fed with cotton leaves.
- Other parameters also checked on 3rd instar larvae like leaf consumption and larval weight gain which also reflect that the tomato leaf was preferred more followed by chili, cabbage and cotton leaves. 0.475g, 0.423g, 0.375g and 0.260g consumption was observed within 48 hours of feeding on tomato, chili, cabbage and cotton respectively.

- Highest weight gains in 3rd instar larvae were observed after 48 hours when larvae fed with tomato leaf i.e. 0.157g followed by 0.138g, 0.091g, 0.061g when fed with chili, cabbage and cotton leaves respectively.
- So we can say that consumption of leaves and weight gain was positively correlated with each other.
- Different growth indexes were also studied like larval growth index, pupal growth index and total developmental index when larvae were fed with different hosts.
- Data indicates that all the three growth indexes having higher values when larvae fed with tomato leaves followed by chili, cabbage and cotton leaves.
- From the life cycle, leaf consumption, larval weight gain and different growth indexes shows tomato as most preferred host among other host like chili, cabbage and cotton tested.
- So we can conclude from our study that abiotic factor (Temperature & Humidity) and biotic factor (Host) probably exert more influence upon tobacco cutworm, *Spodoptera litura*, life cycle and developmental growth rates.