



CHANGES IN PROTEIN DURING FEMALE ADULT DEVELOPMENT OF *EARIAS VITTELLA* (FABRICIUS)

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Abstract:

Changes in protein content during female adult development of *Earias vittella* (Fabricius) have been studied. The *E. vittella* is a most severe pest of okra. The female adult development period was found to be 18 days in the months of winter. The changes in protein revealed maximum protein content in 3rd day female adult and minimum protein content was noted in 18th day female adult of *E. vittella*. The protein content of 1st day female adult was 5.32% less than 3rd day female adult and 18th day female adult was 57.45% less than 3rd day female adult of *E. vittella*. Arithmetic mean and standard deviation were found to be 0.06888 and 0.01661 respectively. The physiological role of protein was discussed during female adult development of *E. vittella*.

Keywords: Protein, insect, female adult moth, *E. vittella* (Fab.)

Introduction:

Spotted bollworm is most important pest of okra (Ambegoakar and Bilpate, 1982). The fore wings of *E. vittella* are pale white and with broad wedge shaped horizontal green band in the middle and hind wings creamy white in color. Pupae are brown in color bluntly rounded and boat shaped cocoons. Larvae are long, stout, spindle shaped and the eggs are spherical, light bluish in color (Butani and Jotwani, 1984). *E. vittella* widely distributed in North Africa, Indo-Pakistan, sub-continent and other countries of world. They are active almost throughout the year on different host plants under field condition (Arif and Attique, 1990). Okra is a chief fresh delightful vegetable crop. It is also used as dry fruits, canned or frozen for all year cooking. In West Africa leaves buds and flowers are also consumed. The dried seeds provide oil, protein vegetable curd and coffee additives or substitutes (Nosiru, 2012). Protein is important constituent of insect diet and its absence has deleterious effect on their life. The protein deficiency affects the skeletal structure, the characteristics of the integument and the developmental process associated with it. On hydrolysis proteins are converted into amino acids (Godara, 2013). In India, okra is one of the most chief vegetable. In the same way, India is the top in production and exportation of okra in the world. India rank first in production of okra to the total world production (Raut *et al.*, 2016).

Many attempts have been made on

biology of *E. vittella* (Ambegoakar and Bilpate, 1982; Butani and Jotwani, 1984; Arif and Attique, 1990; Roqaya, 2000; Nosiru, 2012; Raut *et al.*, 2016). Protein estimation noted in many insects (Kuo and Patton, 1975; Gakhar and Maleyvar, 1984; Telekar and Shelton, 1993; Wheeler *et al.*, 2000; Scharff *et al.*, 2005; Thomas and Nair, 2011; Godara, 2013; Kumar and Ramya, 2013; Shanker *et al.*, 2015 and Yesmin and Adem, 2015). The information on protein during female adult development of *E. vittella* is rather scanty. In present investigation, an attempt has been made to estimate protein during female adult development of *E. vittella* which is mainly concerned with release of energy and growth of *E. vittella*.

Materials and method:

Materials:

Survey for infested pods of okra was carried out in local market and nearby okra farms from Sagali and Satara districts. The larvae of *E. vittella* from infested pods were collected and provided with fresh okra fruits and then placed in insect rearing cage at laboratory conditions (Roqaya, 2000). Adults were fed with 10% sucrose solution in rounded glass jar having 12 cm height and 30 cm in diameter covered with muslin cloth until the deposition of eggs. Female *E. vittella* moth lays about 300 eggs. Newly emerged male and female moths of *E. vittella* were kept as 10 pairs in round glass jar. All developmental stages were examined

daily. Temperature and relative humidity was daily recorded by means of hygrometer.

Method:

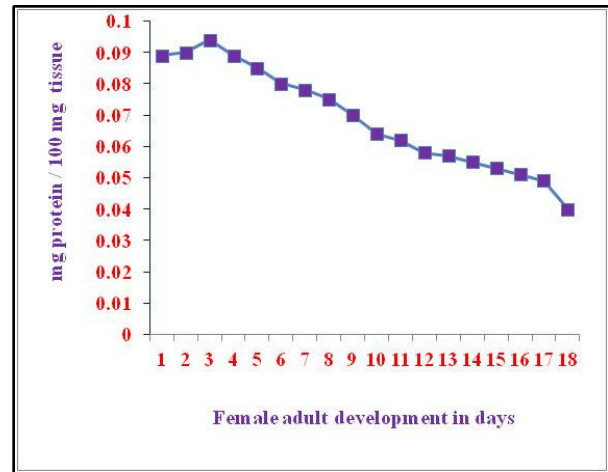
The estimation of protein concentration is essential in many fields of protein study. An assay originally described by Lowry *et al.* (1951) was adopted for present study. For protein assay chemicals like sodium carbonate (Na_2CO_3), bovine albumin and di-sodium tartarate ($\text{CHOH.COONa}_2 \cdot 2\text{H}_2\text{O}$) were obtained from Loba chemie, Mumbai. While, copper sulphate (CuSO_4), folin and ciocateu's (phenol reagent), reagent gained from Research lab fine chem. Industries, Mumbai. The sodium hydroxide (NaOH) purchased from Merck specialties Pvt. Ltd. Mumbai. The homogenates of female adult moths were prepared in chilled distilled water. The homogenates of female adult of *E. vittella* were prepared by using glass mortal pestle. Homogenate was filtered and centrifuged for protein estimation. Protein assay contains 0.5 ml homogenate, 4.5 ml of reagent I mixed well and allowed to stand for 10 minutes of incubation at room temperature. Immediately, 0.5 ml reagent II was added rapidly performing the total volume of 5.5 ml. After 30 minutes of incubation reading was taken calorimetrically at 750 nm. Reagent A included 2 per cent Na_2CO_3 in 0.1N NaOH , reagent B included 1 per cent sodium tartarate and reagent C included 0.5 per cent CuSO_4 . For reagent D (I) mixed 48 ml of reagent A + 1ml of reagent B + 1ml of reagent C and reagent E (II) included 1 part of folin and ciocateu's reagent (phenol reagent) [2N] and 1 part of water. Bovine serum albumin (BSA) standard protein was prepared as 1mg/ml in 0.1N NaOH . Reagent I and Reagent II were prepared freshly just before experiment.

Results and discussion:

Results:

Changes in protein content during female adult development of *E. vittella* (Fabricius) have been studied. The *E. vittella* is a most severe pest of okra. The female adult development period was found to be 18 days in the months of winter. The changes in protein revealed maximum protein content in 3rd day adult and minimum protein content was noted in 18th day adult of *E. vittella*. The protein content of 1st day female adult was 5.32% less than 3rd day female adult and 18th day female adult was 57.45% less than 3rd day female adult of *E. vittella*. Arithmetic mean and standard deviation were found to be 0.06888

and 0.01661 respectively. The biochemical role of protein was discussed in female adult development of *E. vittella*. The changes in the protein content during female adult development



of *E. vittella* are shown in fig. 1.

Fig.1. The changes in protein content during female adult development of *E. vittella*.

Discussion:

Conjugated proteins from the haemolymph of young adult female of *Acheta domestica* (L.) separated by electrophoresis and characterized histochemically (Kuo and Patton, 1975). During adult life the concentration of soluble proteins declined within 24 hrs of emergence in both sexes. Thereafter, the increase in the protein content in male moth may be due to the process of degradation during senescence (Gakhar and Maleyvar, 1984). Protein destined for eggs must be obtained during the larval stage and stored until synthesis of yolk proteins begins. In some species, eggs are matured during the pupal stage and egg development is complete by the time of eclosion. However, in many species, synthesis of egg proteins does not begin after eclosion (Telekar and Shelton, 1993). A significant amount of storage protein remained in female of diamond back moth *Plutella xylostella* (Wheeler *et al.*, 2000). Female specific protein, vitellogenin, has been studied in many insects, which was found to be the precursor protein of egg yolk. This protein was synthesized under the influence of juvenile hormone in the fat body and then released into the female haemolymph during vitellogenesis and subsequently taken up by the oocyte (Scharff *et al.*, 2005). The protein in the haemolymph of adult female of *Rhynchophorus ferrugineus* was characterized (Thomas and Nair, 2011). The fat body content of protein was recorded highest on the first days of female adult moth and slowly declined when the life span advances in multivoltine and

bivoltine silkworm strains (Kumar and Ramya, 2013). The protein content (mg/gm) in multivoltine race of female adult silk moth was found to be 17.01 and in bivoltine race 32.01 of *Bombyx mori* (Shanker *et al.*, 2015). In female the protein level was increased in the first five days of adult life but then decreased afterwards in *Galleria mellonella* (Yesmin and Adem, 2015). In the present study, increase in protein content from 1st day to 3th day female adult of *E. vittella* indicates active beginning stage of adult life for flight and egg production. The decrease in protein content from 3th day female adult of *E. vittella* suggests decrease in anabolic reactions. Similar findings were noted by above authors.

Acknowledgement:

We are grateful to Principal, Dr. Rajendra Kuralapkar, Smt. K. R. P. Kanya Mahavidyalaya Islampur and Principal, Dr. Mohan Rajmane, S. G. M. College, Karad for administrative help in research work.

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