ISSN No: - 2456 - 2165

Influence of Neem Oil on the Egg Hatching of UziflyExorista Bombysis

Dr.Cheruku Appiya Chinnamma,
Associate Professor,
Department of Sericulture, Govt.Degree College, Kadiri, Anantapur(Dist), Andhra Pradesh-515591, India
appiyachinnamma@gmail.com

ABSTRACT:- Among the insect pests that attack silkworm, the most formidable one is a dipteran parasitoid, Uzifly. If the parasitisation occurs after the middle of the fifth instar the parasitized worms mature two days earlier and construct poor quality cocoons. Such cocoons become stained and are unfit for seed purpose and for silk reeling due to the death of worms and emergence of maggots from the cocoons by piercing it. This has drawn the attention of several research workers in the past, who suggested different approaches such as providing fly proof wire mesh and nylon net to prevent the entry of Uzi fly into the site, spray of Uzicide to kill the eggs laid on silkworms, use of Uzi trap to attract and kill the adults and releasing of natural enemies to destroy the Uzi puparia. Though recommended preventive and control measures are being followed by farmers, the Uzi fly menace is still persisting. Considering the importance of botanicals in the silkworm pest management as an eco-friendly approach, neem oil and petroleum ether leaf extract of *Vitex negundo* has been tried to control Uzifly in the present study.

Fifth instar silkworm larvae were reared in the wire mesh cage and one pair of two day old Uzifly were released into the cage for oviposition. Sixty Uzifly eggs on the body of the fifth instar silkworm larvae were selected (Silkworm larvae having minimum one egg and maximum two Uzifly eggs were selected) and treated with 0.5, 1 and 1.5 µl of neem oil / 1µl of acetone with help of automizer to record the egg hatchability. Controls and Carrier controls were maintained to compare the results and the experiments were replicated six times. Treated silkworms carrying Uzifly eggs were observed for their hatchability. The influence of 0.5µl, 1µl and 1.5 µl of neem oil/1µl of acetone on the egg hatchability of Uzifly recorded on an average was as 41.00 ± 0.541, 28.88 ± 0.611 and 24.72 ± 0.898 while in the control and carrier control it was recorded as 60.00±0.000 and 56.33± 0.881.5211 respectively. Treating the Uzifly eggs on fifth instar larvae of silkworm with neem oil reduced the egg hatchability when compared to the control.

Key Words:- *Neem oil, Uzifly (Exorista bombycis), Egg hatchability.*

I. INTRODUCTION

The injudicious use of chemical fertilizers and pesticides has resulted in multiple problems such as increase in the insect resistance to insecticides, emergence of new pests, minor pests becoming major pests and pesticide pollution to the environment (Kannaiyan, 1999). Further, the most destructive pests are known to have developed resistance against recommended insecticides (Ramasubramanyam, 2004).

Azadirachta indica A. Juss (Meliaceae) is an Indian tree, commonly called the neem tree. It has many useful compounds among them azadirachtin, a tetranortriterpenoid plant limonoid which can be used in controlling the pest population (Mordue &Blackwell, 1993).

Neem compounds having multiple action (antifeedant, ovipositon deterrent/repellent, growth disruptant and ovicidal) are used in sericulture, at multiple stages of pests, parasites and predators in tasar silkworm (Singh and Sinha 1995, Singh and Thangavelu 1992). Plant products are the indigenous products with insecticidal, anti-feedant and ovicidal activities (Agarwal, 1988). Plants are an untapped reservoir of various phytochemicals awaiting intensive exploitation for their biological properties and physiological effect on the life stages of the insects. (Banerjee *et al.,* 2000).

As the neem-based products are not toxic to humans and many beneficial arthropods, and the pests are unlikely to become resistant, these products have been advocated to replace synthetic insecticides become the more sensible to be used in most pest management programs (Walter, 1999).

To promote ecological balance and to minimize the insect resistance to insecticides, it is necessary to shift to integrated management of pests (Reddy and Manjunath, 1999; Ravi *et al.,* 2008). Certain plants by nature possess secondary metabolites, which act as antifeedants, oviposition deterrents, larvicidal and insect growth regulators (Vasantharaj David, 2008) as well as effective against plant pathogens (Harborne, 1988). Moreover, botanicals are preferred over other methods since they are easily available, biodegradable and least toxic to non-target organisms (Wink and Guo, 1995).

ISSN No: - 2456 - 2165

Extracts of *Ocimum basilicum, Gynandropsis gynandra, Acorus calamus, Lantana camara* caused significant mortality in *Helicoverpa armigera* (Pandey *et al.*, 1983), while 0.1% neem seed kernel caused larval-pupal intermediaries and abnormal adults (Jotwani and Srivastava, 1984). Neem seed kernel extract along with pepper fruits caused oviposition deterrent activity against *Helicoverpa armigera* (Hongo and Karel, 1986). The same when applied with neem oil and *Pongamia glabra* oil (3 and 5%) on chickpea, reduced the pod damage by the insect (Kumar and Sangappa, 1984).

The combined application of neem oil with fenvalerate resulted in less damage to pigeon pea (Kotikal, 1998). There was no oviposition in an area treated with the methanol extract of neem at 0.01% for 5 days (Ayyangar and Rao, 1989). Dichloromethane and methanol extract of A*corus calamus* reduced oviposition reduction from 86.5 to 65.0% at higher concentration (Jayakumar *et al.*, 2005). Sahayaraj, K., *et al.* (2006) reported the ovicidal activity of *Pedalium murex* Linn. on *Dysdercus cingulatus* (Fab.).

Therefore, in the present study an attempt has made to record the effect of neem oil on the egg hatchability of Uzifly *Exorista bombycis.*

II. MATERIALS AND METHODS

A. Neem oil

Neem oil was purchased from local Ayurvedic shop.

0.5, 1 and 1.5 µl of neem oil was dissolved in 1 µl of acetone and used for the **treatments:**

Fifth instar silkworm larvae were reared in the wire mesh cage and one pair of two day old Uzifly were released into the cage for oviposition. Sixty Uzifly eggs on the body of the fifth instar silkworm larvae were selected (Silkworm larvae having minimum one egg and maximum two Uzifly eggs were selected) and treated with 0.5, 1 and 1.5 µl of neem oil / 1µl of acetone with help of automizer to record the egg hatchability. Controls and Carrier controls were maintained to compare the results and the experiments were replicated six times.Treated silkworms carrying Uzifly eggs were observed for their hatchability.

B. Statistical analysis

The data was subjected to ANOVA using sheffee Dunkan and Dunnet as post hoc test using SPSS 11.5 version and presented as mean±SE.

III. RESULTS

The fifth instar silkworm larvae carrying Uzifly eggs were treated topically with neem oil and the experiments were replicated six times. Experiments with 0.5µl, 1µl and 1.5µl of neem oil affected egg hatchability of Uzifly. Hatchability of eggs of Uzifly on the treated fifth instar silkworm larvae was reduced when compared to the control and the carrier control (Graph: 3.2.2).

A. Control and Carrier control

The Uzifly egg hatchability in the control and carrier control was noted that 60.00±0.00 and 56.33± 0.211 eggs were hatched respectively.

B. The influence of 0.5µl of neem oil/1µl of acetone on the egg hatchability of Uzifly

0.5µl of neem oil/1µl of acetone was sprayed on the fifth instar silkworm larvae carrying Uzifly eggs. The hatching was affected by the neem oil and hatchability of Uzifly eggs reduced to 41.00 ± 0.541 when compared to the controls.

C. The influence of 1µl of neem oil/1µl of acetone on the egg hatchability of Uzifly

1µl of neem oil/1µl of acetone of neem oil spray on the Uzifly eggs on the fifth instar silkworm larvae, affected the Uzifly egg hatchability by the neem oil and hatching was recorded on an average was as 28.88 ± 0.611.

D. The influence of 1.5µl of neem oil/1 µl of acetone on the egg hatchability of Uzifly

1.5µl of neem oil/1 µl of acetone was sprayed on the fifth instar silkworm larvae carrying Uzifly eggs. The egg hatching was affected by the neem oil and hatching was reduced to 24.72 ± 0.898 when compared to the control Uzifly egg hatching.

IV. DISCUSSION

Fifth instar silkworm larvae carrying Uzifly eggs were topically treated with neem oil. Experiments with 0.5µl, 1µl and 1.5µl of neem oil affected egg hatchability of Uzifly *Exorista bombycis* and it was reduced when compared to control and the carrier control.

The present study reveals that topical application with neem oil in different concentrations on the fifth instar silkworm larvae after oviposition of Uzifly reduced the Uzifly egg hatching. Egg hatching reduced with increase in concentration.

The reduction in egg hatchability of Uzifly may be due to the biochemicals present in the neem oil which might have entered through chorion and interfered with embryogenesis by

ISSN No: - 2456 - 2165

blocking the vitellogenesis. Similar observations were reported by Narayanaswamy, (1998) working with the aqueous extracts of plant products from flowers of *Melia azedarach* and seeds of *Azadirachta indica* against Uzifly.

Exposure of eggs of *Exorista bombycis* to the neem oil may have caused lesser hatchability due to the presence of active ingredients of neem oil as also reported by Narayanaswamy, (1998) with crushed leaves of *Eucalyptus citriodora*.

Treatment of Uzifly eggs carried by the fifth instar silkworm larvae with neem oil reduced the egg hatchability of Uzifly. The decrease in egg hatching might be due to the entry of chemical ingredients present in the neem oil entered into the eggs through the micropile of the egg chorion. This could have caused death of the developing embryo. These results are in agreement with the reports of Patil (1989).

The significant reduction in egg hatchability of Uzifly mihgt be due to the diffusion of biochemical constituents of neem oil into the egg chorion as also reported by Narayanaswamy and Dandin, (1998) working with *Allium sativum* against Uzifly *Exorista bombycis*.

In the present study treatment of Uzifly eggs on the body of fifth instar silkworm larvae with different concentrations of neem oil reduced the egg hatchability of Uzifly. Toxic substance present in the neem oil might have entered into the egg through chorion and suppress the embryonic development of Uzifly as also reported by Keita *et al.* (2001) working with *Ocimum basilicum* L. and *Ocimum* gratissimum L. on *Callosobruchus maculates.*

Neem oil treatments on Uzifly eggs parasitizing the fifth instar silkworm resulted in failure of egg hatching of Uzifly as also observed by Javaregowda and L. Krishna Naik. (2007) working with Leaf extract of *Drosera indica*.

The present findings of reduction in egg hatchability of Uzifly with neem oil on dose dependent manner were recorded with three concentrations viz., 0.5, 1 and 1.5 µl. These findings are in agreement with the reports of Loke *et al.*, (1992), Verkerk and Wright (1993), Sannaveerappanavar (1995), Chen *et al.*, 1996) and Mahmoud and Shoeib (2008) .

The present results of decrease in egg hatchability of Uzifly on the treated fifth instar silkworm larvae with neem oil over the control were also in agreement with the reports of Holihosur *et al.*, (1996).

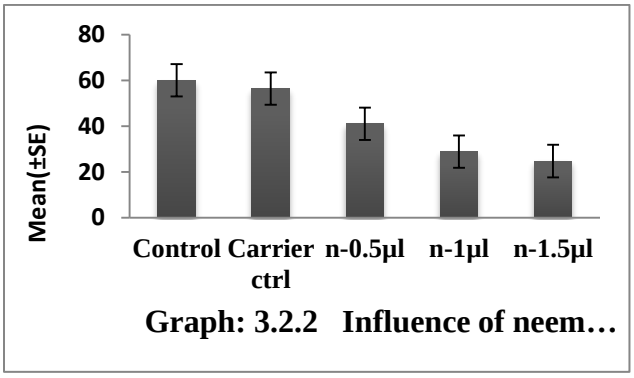
In the present study neem oil might have inhibited Uzifly egg hatching due to cessation of embryogenesis as also reported by Abo-El-Ghar *et al.*, (1996), Enslee and Riddiford (1977) and Deepa *et al.*, (2011).

In the present study reduction of egg hatching of Uzifly on the fifth instar silkworm larvae treated with neem oil might be due to the impairment of cuticle secretion in affected embryo as also reported by Kostyukovsky and Trostanetsky (2006).

In the present study neem oil prevented hatchability of egg of Uzifly was also reported by Borges *et al., (*2003) working with *Melia azedarach* against *Boophilus microplus* and by Deepa *et al.*, (2011) working on *Hyblaea puera Cramer* (Lepidoptera: Hyblaeidae).

V. CONCLUSION

The above results infer that the neem oil was effective in combating the Uzifly at the egg stage itself and thereby prevent the damage caused by the maggot stages to silkworm. This helps in increasing the quantity and quality of the silk by reducing the percentage of pierced cocoons formed, which is beneficiary to the siriculturists.



Graph: 3.2.2 Influence of neem…

REFERENCES

[1]. Abo-El-Ghar, G. E. S., Khalil,M. E. and Eid, T. M. (1996). Some biochemical effects of plant extracts in the black cutworm, *Agrotis ipsilon* (Hufnagel) (Lepidoptera: Noctuidae). *Journal of Applied Entomology,* 120*:* 477-482.

[2]. Agarwal, I. L., (1988). Studies on the biological effects of some plant products in certain insects. *Ph.D. thesis*, University of Kanpur, India. pp 186.

[3]. Ayyangar, G. S. G. and Rao, P. J. (1989). Neem (*Azadirachta indica* A. Juss) extracts as larval repellents and ovipositional deterrents to *Spodoptera litura* (Fabricius). Indian Journal of Entomology, 51: 121-124.

[4]. Banerjee, P. K., Das,H. P. and Hui, A. K. (2000). Loss in crop yield by pests. *Environment and Ecology*, 18: 532-533.

[5]. Chen, C. C., Chang, S. J., Cheng, L. L. and Hou, R. F., (1996). Effect of chinaberry fruit extract on feeding, growth and fecundity of the diamondback moth, *Plutellaxylostella* (L.) (lepidoptera : Yponomeutidae). *Journal of Applied Entomology*,120 : 341-345.

[6]. Deepa B. and O.K. Remadevi(2011). Insecticidal Activity of the Phyto-extracts Derived from Different parts of the trees of Fabaceae family against *Hyblaea puera* Cramer (Lepidoptera: Hyblaeidae), Biological Forum ó An International Journal, 3(2): 1-8(2011).

[7]. Dongre, T. K. and Rahalkar, G. W. (1992). Deterrent and antibiosis activity in *Thespesia populnea* Cav. Against the spotted bollworm, *Earias vitella* (Fabricius). *Insect Science and its Application,* 13**:** 673-677.

[8]. Enslee, E.C. and Riddiford, L.M. (1977). Morphological effects of juvenile hormone mimics on embryonic development in the bug, *Pyrrhocoris apterus*.*Biomedical and Life Sciences,* 181**:** 163-181.

[9]. Harborne, J. B. (1988). Introduction to ecological biochemistry, II Edn. Academic Press, New York. 278, P**.** Borges, L.M.F.; Ferri, P.H.; Silva, W.J.; Silva, W.C. and Silva, J.G. (2003): In vitro efficacy of extract of *Melia azedarach* against the tick *Boophilus microplus*. Vet. Entomol., 17:228-231.

[10]. Holihosur, S.N., Lingappa, S., Kulgod, R.V. and Vastrad, A.S., (1996). Antifeedant and repellent properties of some botanicals against castor semilooper, *Achaea janata* L., *Natl. Symp. on Animal Behvr.*, Karnataka Univ., Dharwad, p.15.

[11]. Hongo, H. and Karel, A. K. (1986). Effect of plant extract on insect pest of common beans. *Z. Angew. Entomology*,102**:** 164-169.

[12]. Javaregowda and L. Krishna Naik. (2007). Ovicidal Properties of Plant Extracts Against the Eggs of Teak Defoliator, *Hyblaea puera* Cramer, Department of Forest Protection Forestry College Sirsi - 581 401 ,Karnataka, India, *Karnataka J. Agric. Sci., 20(2): (291-293) 2007.*

[13]. Jayakumar, M., John William, S. and Ignacimuthu, S.(2005). Evaluation of some plants extracts on the Oviposition deterrent and adult emergency activity of *Callosobruchus maculatus* F. (Bruchidae: Coleoptera). *Pestology*, 29(1): 37-41.

[14]. Jotwani, M.G. and Srivastava, K.P. (1984). A review of neem research in India in relation to insects. *Proceedings of second International Neem onference*, (Rauischholzhausen 1983), 43 P.

[15]. Kannaiyan, S. (1999). Botanicals in pest control. Inaugural address in the Training Programme on Botanicals in Pest Management. Dec. 1- 10, 1999, TN Agricultural University, Coimbatore, India.

[16]. Keita, S. ML, Vincent, C, Schmit, J. P., Arnason, J. T., Belanger, A. (2001). Efficacy of essential oil of *Ocimum basilicum* L. and *Ocimum* gratissimum L. applied as an insecticidal fumigant and powder to control Callosobruchus *maculatus* (Fab.) (Coleoptera: Bruchidae). Journal of Stored Products Research, 37(4): 339-349.

[17]. Kostyukovsky, M. and Trostanetsky, A. (2006). The effect of a new chitin synthesis inhibitor, novaluron, on various developmental stages of *Tribolium castaneum* (Herbst). J. of stores products Research, 42: 136 – 148.

[18]. Kotikal, Y.K. (1998). Efficacy of synthetic pyrethroids in sequence with neem seed extract against *Helicoverpa armigera* (Hubner) infesting pigeonpea. *Karnataka Journal of Agricultural Sciences,* 11: 4, 937-940.

[19]. Kumar, A. R. V. and Sangappa, H. K. (1984). A note on the performance of plant products in control of gram caterpillar in bengalgram. *Current Research, University of Agricultural Sciences, Bangalore,* 13(4-6): 38-40.

[20]. Loke, J.K. J. H., Heng, C. K., Rejab, A., Basirun, N. and Mardih, C. A., (1992). Studies on neem (*Azadirachrin indica* A. Juss) in Malaysia. In : *Proceedings of the Third International Conference on Plant Protection in the Tropics* (Eds. Coi P. A. C., Lim G. S. and Teng P. S.), Kaulalampur, Malaysia, *Malaysian Plant Protection Society*, 2 : 103-107.

[21]. Mahmoud, M.F. and Shoeib, M.A. (2008). Sterilant and oviposition deterrent activity of neem formulation on peach fruit fly *Bactrocera zonata* (Sounders) (Diptera: Tephritidae). *Journal of Biopesticides*, 1(2) : 177 – 181.

[22]. Mordue, A.J. & Blackwell, A. (1993). Azadirachtin : an update. Journal of Insect Physiology 39: 903-924.

[23]. Narayanaswamy, K.C., (1998). Effect of exposing eggs of *Exorista bombycis* (Louis) to volatiles of *Eucalyptus citriodora* Hook. Annals Trop. Res., 41**:** 15-18.

[24]. Narayanaswamy, K.C. and Dandin, S.B., (1998). Effect of exposing eggs of uzi Fly, *Exorista bombycis* (Louis) (Diptera: Tachinidae) to volatiles of *Allium sativum* (Lilliaceae). Korean J. Seric. Sci., 40 (1): 23-26.

[25]. Pandey, U. K., AlokKumar,S., AshokKumar,S. and Mamta,P. (1983). Evaluation of some plant origin insecticides against gram caterpillar, *Helicoverpa armigera* Hubner.*Indian Journal of Entomology,* 45(2): 211.

[26]. Patil, M.S., (1989). Ovicidal activity of *Parthenium hysterophorus* on the eggs of *Spodoptera litura*., J. Bombay Nat. Hist., 86 (3): 472-473.

[27]. Ramasubramanyam,T.(2004). Magnitude, mechanism and management of pyrethroids resistance in *Helicoverpa armigera*. (Hubner) in India. *Journal of Entomology,* 1: 6 -11.

[28]. Ravi, M., Santharam, G. and Sathiah, N. (2008). Ecofriendly management of tomato borer, *Helicoverpa armigera* (Hubner). *Journal of Biopesticides,* 1 (2): 134 – 137.

[29]. Reddy, G. V. P. and Manjunatha, M. (1999). Influence of host plants on parasitism of *Helicoverpa armigera* (Lepidoptera: Noctuidae) by two egg parasitoids, *Trichogramma chilonis* and *Trichogramma Achaea* (Hymenoptera: Trichogrammatidae). *International Pest Control,* 41**:** 223-225.

[30]. Sahayaraj, K., Joe Alakiaraj, R. and Francis Borgio, J. (2006). Ovicidal and ovipositional effect of *Pedalium murex* Linn. (Pedaliaceae) root extracts on *Dysdercus cingulatus* (Fab.). *Entomon*, 31(1):57-60.

[31]. Sannaveerappanavar, V. T., (1995). Studies on insecticidal resistance in the diamondback moth, *Plutella xylostella* (L.) (Lepidoptera : Yponomeutidae) and strategies for its management. *Ph. D. Thesis,* University of Agricultural Sciences, Bangalore.

[32]. Schmutterer H.,(1992). Einfl uB von azadirachtin. einer azadirachtinfreien fraktion eines alkoholischen niemsamenextraktes und von formulierten extrakten auf verpuppung, schlupf und imaginesder kohlweiglingsbrackwespe Apanteles glomeratus (L.) (Hym., Braconidae). J. appl. Ent. 113, 79-87.

[33]. Singh and Thangavelu, K. (1992). Prospectives of biological control in Tasar culture. Indian silk 31(7): 46-47.

[34]. Singh, R.N. and Sinha, S.S. (1995). Reproductive strategy of an ectophagous parasitoid *Trichomalopis apanteloctena (Hymenoptera: Pteromalidae*) on pupae of *Blepharipa Zebina. (Diptera : Tachinidae*) Indian J.Ecol. 22(12):27-29.

[35]. Singh, V., Dayal, R. & Bartley, J.P. (1999). Volatile constituents of Vitex negundo leaves. Planta Medica 65, 580-582.

[36]. Sahayaraj, K., Joe Alakiaraj, R. and Francis Borgio, J. (2006). Ovicidal and ovipositional effect of *Pedalium murex*Linn. (Pedaliaceae) root extracts on *Dysdercus cingulatus* (Fab.). *Entomon*, 31(1):57-60.

[37]. Tan MT and Sudderuddin KI (1978). Effects of neem tree (*Azadriachta indica*) extract on diamond back moth (*Plutella xylostella* L.) Melay. Appl. Biol.7, 1-9.

[38]. Vasantharaj David, B. (2008). Biotechnological approaches in IPM and their impact on environment. *Journal of Biopesticides,* 1(1): 1-5.

[39]. Verkerk, R. H. J. and Wright, D. J., (1993). Biological activity of neem seed kernel extracts and synthetic azadirachtin against larvae of *Plutella xylostella*. *Pesticide Science,* 37 : 83-91.

[40]. Walter, J. F. (1999). Commercial experience with neem products. In: Hall, F.R., Menn, J.J. (Eds.), Method in Biotechnology 5:Biopesticides. Human Press, Totowa, NJ, pp 155-170.

[41]. Wink, K. M. and Guo, Y. Y. (1995). Production and application of phytochemicals from an agricultural perspective. In: *Phytochemistry and Agriculture,* Claredon Press Oxford, United Kingdom, 171-213 pp.