INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

www.ijabpt.com ISSN : 0976-4550

Volume-8, Issue-1, Jan-Mar-2017 Coden IJABFP-CAS-USA **Copyrights@2017**

Received: 10th Dec 2016 ***Revised: 24th Jan 2017*** ***Accepted: 25th Jan 2017***

DOI: 10.21276/Ijabpt, http://dx.doi.org/10.21276/ijabpt ***Research article***

EVALUATION OF PEST MANAGEMENT PRACTICES IN CHICKPEA ECOSYSTEM FOR THE CONTROL OF SUCKING PESTS AND POD BORER

G.Ramesh and P. Nagaraja Rao

Department of Zoology, University College of Science, Osmania University, Hyderabad – 500007, India

ABSTRACT: The comprehensive study was carried out during 2014 crop season for the comparisons of Sucking pests and Pod borer population against various treatments in Chickpea crop ecosystem at Nandikandi village of Sangareddy district, Telangana State. The pest control methods adapted were chemical, biological, Botanical pesticides and IPM (in which more than one of the above practices were included) and compared with farmers practice and untreated control.The assessment of the performance of various treatments on the Sucking pests and Pod borer populations were investigated. Aphids, Jassids, thrips and Whitefly population mean is lowest in IPM treatment followed by chemical control, farmer's practice treatment, treatment with botanical pesticides and biological control. All the treatments were recorded significantly less than untreated control. Similarly lowest mean of large sized larvae of *H. armigera* and *S.exigua* recorded in chemical control treatment followed by IPM, farmer's practice, biological control and treatment with Botanical pesticides.

Key words: Chickpea, Sucking pests, Pod borer, *H.armigera*, IPM

*Corresponding author: P. Nagaraja Rao, Department of Zoology, University College of Science, Osmania University, Hyderabad – 500007, India nagarajaraop@yahoo.com

INTRODUCTION

Chickpea, (*Cicer arietinum* L.) is a leguminous Pulse crop commonly called as "Chana" or "Bengal gram". It is very important component of cropping systems of dry, rain fed areas, because it can fix 80-120 Kg nitrogen fixation (Golding & Dong, 2010). India accounts for 68% of total global output of chickpea. The crop is raised mostly marginal farmers. Several factors are responsible for low production and insect pests and diseases are very important in field and during storage (Clement, 2000). Around 60 insect species are known to feed chickpea (Reed *et al.*, 1987).

Amongst the many insect pests, the pod borers, *Helicoverpa armigera*(Hubner), *Spodoptera exigua* (Hubner), sap-sucking pests especially Aphids, Jassids, Thrips, Whitefly are the most devastating pests of chickpea in Asia, Africa, and Australia (Van Emden *et al.*, 1988).In which the major insect pests are, *Helicoverpa armigera* Hubner, 1809, Lepidoptera, Noctuidae which feeds on leaves, flowers and bores holes on the pod and eat away the seeds. *Spodoptera exigua* Hubner, 1808, Lepidoptera: Noctuidae feeds on leaves. And sucking Pests includes, Aphids –*Aphis craccivora* Koch, 1854, Hemiptera,Aphididae – Sucks sap from tender leaves, flower stalks and pods and Pea aphid- *Acrythosiphon pisum* Harris, 1776, Homoptera, Aphididae- Sucks sap from growing tips, flowers and Pods. Jassids – *Empoasca kerri* Pruthi, 1940, Hemiptera, Cicadellidae, Thrips- *Megalurothrips usitatus* Bugnall, 1913, Thysanoptera, Thripidae and White fly – *Bemisia tabaci* Gennadius, 1889, Aleyrodidae, infest leaves.

Insect pests generally damage the crop either as vectors of various bacterial and fungal diseases or as destroyers of seedlings, foliage, flowering and fruiting bodies. Pod borers, Jassids, Aphids and whiteflies are important that cause economic losses. Pod borers alone were reported to cause grain losses of 400 kg/ha in chickpea. Hence, various pest managements are used in the present investigation and compared their efficacy through population estimation of each pest. The pest control methods employed were: chemical, biological, Botanical pesticides and IPM (in which more than one of the above practices were included) and compared with farmers practice and untreated control

MATERIALS AND METHODS

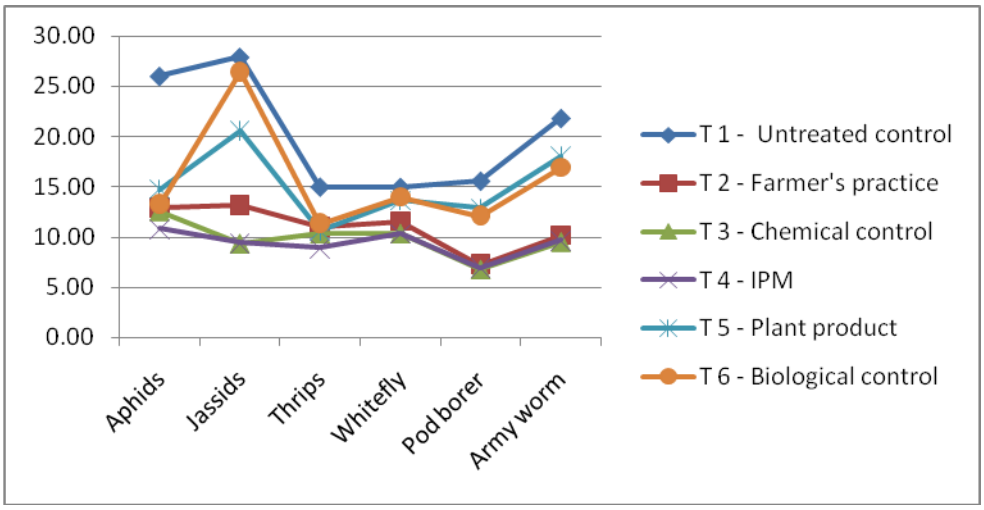
The present study is conducted for the comparative study of Pest management practices in Chickpea for the control of Sucking pests and Pod borer during Rabi season of 2014. The field investigation wascarried outaccording to RBD with Four (4) replications, randomized within each replication block. The size of each treatment plot was 200m^2 (20m ×10m). A spacing of two (2) meters between two replication blocks and 0.5 meters between two treatment plots was adopted to minimize the drift effect of one treatment over another.

Pest populations were treated with chemical control, Biological control, Botanical pesticides, Integrated Pest Management (in which more than one of the above practices was adopted) in comparison with farmers practice and untreated control. The popular Chickpea variety ICCC37 (Kranthi) is sown and similar agronomic practices were followed. The Chemical treatment includes insecticides like Acephate 75% SP, Monocrotophos 36% SL, Quinolphas 25 EC, Deltamethrin 2.8% EC, Endosulfan 35% EC were sprayed on 21st, 36th, 54th, 71st and 85th days after sowing (DAS). In IPM plot the entire crop plot is mixed with *Carthamus tinctorius* (Kusuma) for every 3 rows and is surrounded by *Tagetes patula* (Marigold) as Border crop. Azadirachtin 0.03% used as botanical pesticides and Bt, NPV were also used as biological control.

Table.No. 1 : Mean population of Sucking pests and Pod borer during 2014-15 Rabi season

Treatments	Aphids	Jassids	Thrips	Whitefly	Pod borer	Army worm	Total	Mean
T 1 - Untreated control	26.03	27.92	15.01	14.98	15.6	21.84	121.38	20.23
T 2 - Farmer's practice	12.84	13.14	10.95	11.52	7.23	10.12	65.80	10.97
T 3 - Chemical control	12.56	9.37	10.37	10.37	**6.81**	**9.53**	59.01	9.83
T 4 - IPM	**10.81**	**9.36**	**8.86**	**10.32**	6.9	9.65	**55.90**	**9.32**
T 5 - Botanical pesticides	14.73	20.58	10.58	13.60	12.86	18	90.35	15.06
T 6 - Biological control	13.23	26.48	11.31	13.94	12.08	16.91	93.95	15.66

Note: Figures in the columns are Mean values of 10 weekly observations



Graph No.1: Pest populations in different control methods.

RESULTS AND DISCUSSION

The assessment of the performance of various treatments on the Sucking pests and Pod borer populations were investigated and found that the Sucking pests (Aphids, Jassids, Thrips and Whiteflies) population mean is lowest in IPM treatment followed by chemical control, farmer's practice treatment, treatment with botanical pesticides and biological control. All the treatments were recorded significantly less than untreated control. Similarly lowest mean of large sized larvae of *H.armigera* and *S.Exigua* recorded in chemical control treatment followed by IPM, farmer's practice, biological control and treatment with Botanical pesticides.

Employing combinations of insecticides for 3 times and combinations of insecticides with a botanical pesticides for 2 – 3 times or bactericide in IPM for the successful management of mixed pest status. The bio-agents like Nuclear Polyhedrosis Virus (NPV), Bacillus thuringiensis (Bt) helped in reducing the population of insect pests. In IPM trials certain times it was noticed that the pest population like boll worms were higher than in chemical and farmers practices. However, this is having an advantage and helps for the survival of bio-agents introduced in the delicate ecosystem. Whereas in case of chemical control and farmers practice, sometimes there is total reduction of pest population and they may not support the survival of the entomophagous predators, parasite and pathogens. Apart from all other treatments, the botanical pesticides, Azadirachtin is also having broad insecticidal, repellent, IGR and ovicidal activities.

CONCLUSION

In farmers practice abuse of pesticides was seen very much.Farmer has misused insecticides by employingfor5-6 times in each season which is much above the recommended levels in chickpea agro-ecosystem. This has resulted in insecticidal resistance in boll worm and whitefly during 2014.

Our IPM chickpea yields were higher than untreated plots, biological control and botanical pesticides. Biological control and botanical pesticides will be good components of IPM but cannot be employed individually for receiving higher yields. IPM gives a special care for increasing the natural enemy populations, reduction of the pesticide rounds, combinations and their residues. The yields of chickpea among different trials in Rabi season isIPM>CC>FP>PP>BC>UC. But in ecological prospects the relationship among different treatments is BC>PP>IPM>CC>FP>UC.

Thus, with this field study, the IPM practice is very successful and useful in managing chickpea sucking pests and pod borers effectively in the existing ecosystem of Sangareddy district of Telangana. It is environmentally a safer approach for receiving good yields.

REFERENCES

Anandhi, D.M.P., Elamathi, S. and Sobita Simon (2011). Evaluation of bio-rational insecticides for management of *Helicoverpa armigera* (Hubner) in chick pea. Annals of Plant Protection Sciences, 22 (1):207-209.

Kulkarni,K.A., Kambrekar,D.N and Gundannavar, K.P. (2005). Management of *Helicoverpa armigera* Hubner on chickpea through bio pesticides. Karnataka J. Agricul.Sci. 18(4): 1114-1116

Lateef, S.S. (1985). Gram pod borer (*Heliothis armigera* Hub.) resistance in chickpeas. Agriculture, Ecosystems and Environment, 4: 95-102.

Mosier, A.R., Syers, J.K. & Freney, J.R. (2004). Nitrogen fertilizer: an essential component of increased food, feed, and fibre production. In A.R. Mosier, K. Syers & J.R. Freney, eds. Agriculture and the nitrogen cycle. Washington, DC, Island Press. 291 pp.

Nene YL and Reddy MV. (1987). Chickpea diseases and their control. Pages 233- 270 in The chickpea (Saxena MC and Singh KB, eds).. Wallingford, Oxon, UK: CAB International.

Parsai, S.K. (2005). Damage by pod borer, *H. armigera* (Hub.) to different varieties of chickpea. Food legumes 21 (2): 135-136.

Pandey, R. and Ujagir, R. (2008). Effect of intercropping on *Helicoverpa armigera* (Hub.) infesting chickpea. Annals of Plant Protection Sciences 16 (2): 320-324.

Pradhan, S. (1964). Assessment of losses caused by insect pests of crops and estimation of insect population. In Entomology in India (Ed.), N.C. Pant, Silver Jubilee number of Indian J. Ent. pp. 17-58.

P. Devendra, and K. Binay, (2002). "Impact of intercropping and endosulfan on the incidence of gram pod borer infesting chickpea". Indian J. Entom. 64(4): 405-410.

Reed, W., C. Cardona, S. Sithanantham and S.S. Lateef. (1987). Chickpea insect pests and their control. In: *The Chickpea.* (Eds.): M.C. Saxena& K.B. Singh. CAB International, Wallingford, Oxon, U.K., pp. 283-318.

Sachan, JN and Katti, G (1994). Integrated Pest Management.*Proceedings of International Symposium on Pulses Research, April 2-6, 1994, IARI, New Delhi, India.pp.23-30.*

Shukla, A.; Goydani, B.M. and Shukla, A. (1996). Evaluation of nuclear polyhedrosis virus (NPV) for the control of *Helicoverpa armigera* (Hub.) on chickpea under the Agro- ecosystem of Satpura plateau region of Madhya Pradesh. Advances in plant sciences 9 (2) : 143-146.

Singh, S.S. and S. K. Yadav. (2006). Evaluation of chickpea varieties for their resistance against gram pod borer, *Helicoverpa armigera*. *Indian Journal of Entomology*, 68(4): 321-324.

Sinha, S.N. (1993). Control of *Helicoverpa armigera* (Hub.) infesting chickpea field efficacy of neem product and insect growth regulators. Indian J. plant protection, 21 (1): 80-84.

Srivastava, C. P., (1995). Insecticide resistance in *Helicoverpa armigera* in India. Resist. Pest Manage., 7: 4-5.

Weigand, S., S.S. Lateef, N.E.S. El-Din, S.F. Mahmoud, K. Ahmed and K. Ali. (1992). Integrated control of insect pests of cool season food legumes. *Proc. Second Inter.Food Legume Res.Confer.on pea, lentil, faba bean, chickpea, and grass pea, Cairo, Egypt,* 12-16 April, 679-694.

ISSN : 0976-4550

INTERNATIONAL JOURNAL OF APPLIED BIOLOGY AND PHARMACEUTICAL TECHNOLOGY

Email : ijabpt@gmail.com

Website: www.ijabpt.com