International Journal of Environment, Agriculture and Biotechnology (IJEAB) *Vol-1, Issue-4, Nov-Dec- 2016*
http://dx.doi.org/10.22161/ijeab/1.4.60 *ISSN: 2456-1878*

Field Evaluation of Different Modules against Insect Pest and Diseases of Soybean

Y. V. Ingle, M. S. Dandge, P. R. Awaghad, P. V. Mohod

AICRP on Soybean, Regional Research Center, (Dr. PDKV), Amravati (MS), India

Abstract— *Four different modules like chemical, adoptive, bio-intensive and control module tested in natural field condition for insect pest and disease management. Chemical module (ST with thiram + carboxin @ 2 g/kg + spraying with lamda-cyalothrin @ 0.05% + spray hexaconazole @ 0.01 @ 0.1% at 45 DAS followed by second spray at 60 DAS with hexaconazole @ 0.1% and spinosad @ 0.05% followed by spray with carbendazim 0.1% at 70 and 85 DAS was found best as least leaf defoliator population (3.20 /mrl) and low girdle beetle infestation (3.30 %) were observed in field. In respect of disease, minimum charcoal rot (23.26 %) and Alternaria leaf spot (10.76 %) were recorded in chemical module followed by Adoptive module (28.08 and 17.17% respectively). In regards to yield, chemical module proved in yield maximization (1383.70 kg/ha) as compare to other modules.*

Keywords— Soybean, insect pest, disease, modules, management.

I. INTRODUCTION

Soybean (*Glycine max* (L.) Merrill) is the most significant source of protein and oil. It plays a predominant role in Maharashtra and particular Vidarbha region farmer's economy. In present with the increased area expansion, constant mono cropping of soybean in same fields, same variety has led to built up of numerous insect pests and diseases which contributing for rising severity and yield losses year after year. Mono-culturing usually catch the attention of pest and diseases and spread rapidly in entire cultivated area, thereby regular pest and disease outbreaks observed in Vidarbha region causes reduction in the yield and productivity in comparison to state and world level.

In Vidarbha region, habitual incidence of leaf defoliators, girdle beetle, stem fly, charcoal rot and fungal foliar disease recorded and cause potential loss in soybean production. The level of production could be increased if problems with insect pest and disease could be avoided. Under such circumstances integrated pest and disease management modules need to be developed and test their efficacy under natural field condition. In view of that for effective management of pest and disease and to achieve higher production of soybean crop present investigation was undertaken to identify effective modules for pest and disease management.

II. MATERIAL AND METHODS

A field trial was conducted at field of Regional Research Center, Amravati during *kharif* 2014 season. The experiment was laid out in Randomized Block Design with four modules *viz.*, Bio-intensive, Chemical control, Adaptive and Control. The details of modules treatments as follows- **Module-I:Bio-intensive module**-Seed treatment with *T. harzianum* @ 6 g/kg + spray cow urine @ 10% + neem oil @ 0.5%, *Nomuraea rileyi* @ 5g/lit at 45 DAS followed by sprays of cow urine @10% + neem oil @ 0.5% at 55 DAS and spray with cow urine @10% + neem oil @ 0.5% at 65 DAS. **Module-II:Chemical control module**-Seed treatment with thiram + carboxin @ 2g/kg + spray with Lamda-cyhalothrin @ 0.05 % + spray Hexaconazole @ 0.1% at 45 DAS followed by second spray at 60 DAS with Hexaconazole @ 0.1% and Spinosad @ 0.05% followed by spray with Carbendazim 0.1% at 70 and 85 DAS. **Module-III: Adaptive module**-Seed treatment with *T. harzianum* @6g/kg + *Rhizobium* @ 25 g/kg of seeds + spray neem oil @ 0.1%, *Nomuraea rileyi* @ 5 g/ha at 45 DAS followed by second spray at 60 DAS with Hexaconazole @ 0.1%. Spinosad @ 0.05% and *Pseudomonas fluorescens* @ 0.5% at 75 DAS. **Module-IV: Control-** Seed treatment with *Rhizobium* @ 25 g/kg seed only. The soybean cv. JS-335 was sown and each module had gross plot of 8 x 6 m and replicated five times at a row spacing 45 cm. The crop was raised under recommended fertilizer package of practices. The data on all growth and yield parameters were recorded at maturity stages and analyzed as per design. Bio-efficacy comparisons of modules were based on leaf defoliator's population per meter row length (mrl), girdle beetle and stem fly infestation in per cent and per cent disease index (PDI) were recorded according to the uniform method of insect pest and disease rating Anonymous (2013).

III. RESULTS AND DISCUSSION

Growth parameters:

Plant height, plant dry weight, number of pods/plant and 100 seed weight measured in different modules after crop harvest (Table 1). Maximum plant height (41.26 cm), utmost plant dry weight (21.71 g), highest number of pods per plant (50.66) and more 100 seed weight (12.15 g) were recorded in Chemical module. Next best was Adoptive modules in regards to growth parameter. Control module found less effective in growth parameter characteristics.

Pest management:

The data on leaf defoliator population (semilooper and Spodoptera) /mrl revealed that chemical module shown their efficiency in reducing the leaf defoliators over other modules (Table 2). Significantly less population of leaf defoliators (3.0/mrl) was observed in adoptive module. Second superlative low population i.e. 3.20/mrl were recorded in chemical module. The data in respect of % infestation of girdle beetle revealed that chemical module shown their effectiveness in controlling the girdle beetle over other modules. Least per cent (3.30%) of girdle beetle infestation was recorded in chemical module followed by adoptive module (5.15%). Highest per cent (6.0 %) of girdle beetle infestation was observed in control. Lower per cent infestation (1.88 %) of stem fly was observed due to chemical module. Higher per cent of stem fly infestation (7.80%) was recorded in control module. The present findings are supported by several workers; Suganya Kanna *et al.* (2005) reported that emamectin 5 SG @ 10 g a.i./ha was more effective against tomato fruit borer when compared to profenophos 50 EC and lambda cyhalothrin 5 EC but it was comparable with spinosad 2.5 SC in reducing the larval population and damage which ultimately increased the yield.

Disease management:

During crop growth period, *Alternaria* Leaf Spot (ALS) and Charcoal rot (CR) were observed in field. Least per cent disease of Alternaria Leaf Spot (10.76%) and Charcoal rot (23.26%) was recorded in chemical module followed by adoptive module (17.17% and 28.08% respectively). Maximum disease incidence of *Alternaria* Leaf Spot and Charcoal rot was observed in control module *i.e.* 34.77 % and 48.92 % respectively (Table 3). Gupta and Sharma (2009) reported that seed treatment with carboxin + thiram @ 0.2% was best in reducing post emergence mortality and enhancing seed yield.

Yield:

Data in respect of the yield of soybean (kg/ha) revealed that chemical module have shown their effect on yield of soybean (Table 3). Maximum yield (1383.70 kg/ha) was recorded in chemical module. Second best was adoptive module in respect of yield (1100.74 kg/ha). Least yield was recorded in control module *i.e.* 669.63 kg/ha. Chemical module proved effective for yield maximization due to better growth parameter, minimum pest and disease pressure. These findings were supported by Singh and Singh (1990), Ashok Kumar *et al.* (2006), Arbind Kumar *et al.* (2010) who reported that maximum yield was obtained due to chemical insecticides application which gives quick results. No doubt chemical module found better in pest and disease management but the use of chemical pesticides for effective plant protection often promotes selection for pest resurgence, resistant and also leads to environmental contamination. Therefore for long term benefits of environment adoptive module treatments strategies may worthwhile event at the risk of small reduction in production.

ACKNOWLEDGEMENTS

The authors thanks to Director, DOSR, Indore for the support provided for this study. Thanks also extended to the I/c, AICRP on Soybean and PI, Plant Pathology DOSR, Indore for technical help.

REFERENCES

[1] Anonymous, 2013: Proceeding and Technical Programme of 43nd Annual Group Meeting of All India Coordinated Research Project on Soybean. *Annexure* -I

[2] Arbind Kumar, Rai, Mayank Kumar and S. S. Singh, 2010: Efficacy of neem product vis-à-vis triazophos for the management of soybean stem borers. *Annals of Plant Protection Science.* 18(1):133-140.

[3] Ashok Kumar, M. M. Kumawat, and N. K. Meena, 2006: Field evaluation of triazophos against insect pest of soybean and its impact on yield. *Pestology.* 30 (8):14-15.

[4] Gupta, G.K. and S. K. Sharma, 2009: Influence, optimization, energy budgeting and monetary considerations of different time intervals between fungicidal seed treatment and sowing on *Sclertoium* blight of soybean. *Crop Protection.* 28:854-858

[5] Singh, K. J. and O. P. Singh, 1990: Economics of spray schedule for the control of green semilooper and stem fly on soybean in Madhya Pradesh. *Indian J. Plant Protection.* 18 :31-35

[6] Suganya Kanna S., S. Chandrasekaran, A. Regupathy, and D. Lavanya, 2005: Field efficacy of Emamectin 5 SG against tomato fruit borer *Helicoverpa armigera*. *Pestology.* 24 (4):21-24

http://dx.doi.org/10.22161/ijeab/1.4.60 *ISSN: 2456-1878*

Table.1: Effect of different module treatment on growth parameters of soybean

Modules	Plant height (cm)	Plant Dry Wt. (g)	No. of pods/plant	100 seed wt.
1 Bio-intensive	34.18	15.06	33.56	9.79
2. Chemical	41.26	21.71	50.66	12.15
3. Adoptive	35.25	16.86	39.76	10.80
4. Control	30.00	13.18	27.50	8.50
SE m±	1.11	1.14	2.18	0.49
CD (p=0.05)	3.41	3.50	6.71	1.50
CV %	7.07	15.29	12.91	10.65

Table.2: Effect of different module treatment on major insect pests of soybean

Modules	Leaf defoliator population/mrl	Girdle beetle Infestation (%)	Stem fly infestation (%)
1 Bio-intensive	4.84 (2.19)*	6.16 (2.47)*	4.00 (1.95)*
2. Chemical	3.20 (1.78)	3.30 (1.81)	1.88 (1.36)
3. Adoptive	3.00 (1.70)	5.15 (2.25)	3.01 (1.73)
4. Control	6.00 (2.44)	9.70 (3.10)	7.80 (2.77)
SE m±	0.11	0.13	0.17
CD (p=0.05)	0.35	0.40	0.53
CV %	12.69	12.26	19.98

*Figures indicate Square root transformed value

Table.3: Effect of different module treatment on major disease and yield of soybean

Modules	ALS	CR	Yield (kg/ha)
1 Bio-intensive	28.04 (31.88)#	36.80 (37.31)#	985.18
2. Chemical	10.76 (19.08)	23.26 (28.71)	1383.70
3. Adoptive	17.17 (24.35)	28.08 (31.97)	1100.74
4. Control	34.77 (36.11)	48.92 (44.38)	669.63
SE m±	1.44	1.66	86.90
CD (p=0.05)	4.42	5.10	266.71
CV %	11.57	10.44	18.77

Figures indicate arc sin transformed value

http://dx.doi.org/10.22161/ijeab/1.4.60 *ISSN: 2456-1878*


Alternaria leaf spot


charcoal rot


Soybean sem0ilooper


Girdle beetle


Spodoptera