



## EVALUATION OF BIOINTENSIVE IPM MODULES AGAINST PESTS OF RABI SORGHUM

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### ABSTRACT

Some biointensive IPM modules against sorghum pests explored in the present study revealed that seed treatment with imidacloprid 48%FS @ 12 ml/kg- cypermethrin @ 2 ml/l spray at 45 days after emergence (DAE)- treatment T5 and soil application of carbofuran 3G (25 kg/ha) -seed treatment with chlorpyrifos 20EC @ 5 ml in 20 ml of water- spray of cypermethrin @ 2.0 ml/l at 25DAE (treatment T5- Recommended package of practices of UAS, Dharwad) were significant and on par against shoot fly *Atherigona soccata* (Rondani) (13.70 and 14.59% deadhearts), aphid (*Rhopalosiphum maidis* (Fitch) (20.94 and 17.36 aphids/ 5cm<sup>2</sup> leaf) and shoot bugs (*Peregrinus maidis* Ashmead) (9.77 and 10.62 shoot bugs/ plant). In case of stem borer *Chilo partellus* (Swinhoe) incidence was less with treatment T6: soil application of carbofuran 3G (25 kg/ha)- seed treatment with chlorpyrifos 20EC @ 5 ml in 20 ml of water spray of cypermethrin @ 2.0 ml/l at 25 DAE (3.43% deadhearts) followed by T1 (seed treatment with imidacloprid 48%FS @ 12 ml/kg + intercropping with chickpea: sorghum (4:2)- NSKE (5%) spray at 45 DAE). The yields were superior with T5 and T6 (2200 and 2317 kg/ha, respectively).

**Key words:** Sorghum, azospirillum, *Trichoderma*, vermicompost, intercropping, *Lecanicillium lecanii*, *Atherigona soccata*, *Rhopalosiphum maidis*, *Peregrinus maidis*, seed treatment, cypermethrin, imidacloprid, yield

Sorghum in India is an important cereal crop cultivated in warmer climates, with most of its varieties drought and heat-tolerant (Satyagopal et al., 2014). But, it is infested with about 150 insect pests (Guo et al., 2011), and of these about 10 to 12 cause 12 to 83% avoidable damage (Premkishore, 1987). Among these pests, shoot fly *Atherigona soccata* (Rondani) causes yield losses up to 90% (Jotwani and Srivastava, 1970). Rensburg and Hamberg (1976) highlighted severity of aphid damage causing 77% reduction in grain yield and shoot bug in India causes 41% yield loss (Hosmani and Chittapur, 1997). The term IPM earlier used as 'integrated control' by Bartlett (Bartlett, 1956) and was further elaborated by Stern and co-workers (Stern et al., 1959). Several crop management practices were out but among them IPM provides ecofriendly management with beneficial yield to farmers. This study focuses on few biointensive IPM against sorghum pests.

### MATERIALS AND METHODS

The field experiment was laid out during rabi 2016-17 and 2017-18 at the Regional Agricultural Research Station (RARS), Vijayapur, Karnataka, India. Sowing was done at second fortnight of September following package of practice recommended except plant protection. The experiment was laid out in randomized block design with seven treatments replicated thrice

(for details see Table 1). The incidence of *A. soccata*, aphid *Rhopalosiphum maidis* (Fitch), shoot bug *Peregrinus maidis* Ashmead and stem borer *Chilo partellus* (Swinhoe) were evaluated following standard procedure (Sharma et al., 2008). The deadhearts due to *A. soccata* was recorded at 28 days after emergence (DAE) by counting the total number of plants and plants with deadheart symptoms; while that of *C. partellus* was recorded at 45 DAE. The incidence of *R. maidis* was observed as number of aphids/ sq.cm leaf area on five randomly selected plants (3 leaves/ plant i.e. top, middle, bottom leaves), and rated in 0-9 scale; while *P. maidis* was observed from five randomly selected plants and rated using 0-9 scale. The data were subjected to ANOVA and the treatment means were compared by DMRT (Gomez and Gomez, 1976).

### RESULTS AND DISCUSSION

The results revealed the IPM module T<sub>6</sub> (soil application of carbofuran 3G 25 kg/ha-seed treatment with chlorpyrifos 20EC @ 5 ml in 20 ml of water-spray of cypermethrin @2.0 ml/l at 25 days after emergence (DAE) (RPP of UAS, Dharwad) gave best results against *A. soccata* (14.59% deadhearts), *C. partellus* (3.43% deadhearts), *R. maidis* (17.36/ 5 cm<sup>2</sup> leaf) and *P. maidis* (10.62/ plant). This treatment was on par with the module T<sub>5</sub> (seed treatment with

Table 1. Efficacy of BIPM modules in rabi sorghum (2016-17, 2017-18, pooled data)

Treatment No.	Treatments	<i>A. soccata</i> deadheart (%)	<i>C. partellus</i> deadheart (%)	<i>R. maidis</i> / 5 cm <sup>2</sup> /leaf	<i>P. maidis</i> / plant	Crop yield (kg/ ha)
T <sub>1</sub>	Seed treatment with imidacloprid 48% FS @ 12ml/kg + intercropping with chickpea: sorghum (4:2)- NSKE (5%) spray at 45DAE	15.07 (3.94)	3.62 (2.03)	35.89 (6.02)	12.80 (3.64)	2171
T <sub>2</sub>	Seed treatment with biofertilizers ( <i>Trichoderma</i> + PSB + Azospirillum) + 50% neem cake (1q/ha) +50% + vermicompost (4q/ha) at the time of sowing- NSKE (5%) spray at 45DAE	19.66 (4.47)	6.00 (2.55)	27.54 (5.29)	14.53 (3.87)	2095
T <sub>3</sub>	Seed treatment with biofertilizers ( <i>Trichoderma</i> + PSB + Azospirillum) + Btk @ 2g/lt at 25 DAE -Spray of <i>Lecanicillium lecani</i> @ 2ml/l at 45DAE	19.30 (4.45)	4.31 (2.19)	30.94 (5.61)	16.95 (4.17)	2213
T <sub>4</sub>	Seed treatment with imidacloprid 48% FS @ 12ml/kg + eco feast crop like one row of cowpea around sorghum - NSKE (5%) spray at 45DAE	15.58 (4.00)	4.19 (2.14)	29.81 (5.50)	12.84 (3.65)	2175
T <sub>5</sub>	Seed treatment with imidacloprid 48% FS @ 12ml/kg- cypermethrin @ 2ml/l spray at 45DAE	13.70 (3.77)	4.34 (2.19)	20.94 (4.63)	9.77 (3.20)	2200
T <sub>6</sub>	Soil application of carbofuran 3G (25kg/ha) -seed treatment with chlorpyriphos 20EC @ 5ml in 20ml of water- spray of cypermethrin @ 2.0ml/l at 25DAE (RPP of UAS, Dharwad)	14.59 (3.88)	3.43 (1.98)	17.36 (4.22)	10.62 (3.32)	2317
T <sub>7</sub>	Farmer practice (Untreated)	23.19 (4.86)	6.68 (2.67)	52.58 (7.32)	21.54 (4.69)	1860
	CD (p=0.05)	0.71	0.41	1.09	0.76	400.0
	S Em ±	0.24	0.13	0.36	0.25	132.0
	CV (%)	10.02	10.39	11.31	11.45	10.58

imidacloprid 48%FS @ 12 ml/ kg- cypermethrin @ 2ml/ l spray at 45DAE) except for *C. partellus*, which was found to be less (3.62% dead hearts) with treatment T<sub>1</sub> (seed treatment with imidacloprid 48%FS @ 12ml/kg + intercropping with chickpea: sorghum (4:2)- NSKE (5%) spray at 45DAE) (Table 1). These results corroborate with those of Balikai (1998; 1999) and Balikai and Lingappa (2003) who observed that seed treatment with 10 g imidacloprid 70 WS/ 100 g seed was the most effective against *A. soccata* and aphids. Karabhantanal et al. (2018) also observed that the module with imidacloprid 70 WS @ 3 g/ kg seed significantly reduced *A. soccata*, aphids (13.85/sq. cm) and shoot bugs. The yields obtained was maximum with T<sub>6</sub>; soil application of carbofuran 3G (25 kg/ ha) -seed treatment with chlorpyriphos 20EC @ 5 ml in 20 ml of water- spray of cypermethrin @ 2.0 ml/ l at 25DAE (RPP of UAS, Dharwad) (2317 kg/ ha). These results are similar to Karabhantanal et al. (2018) and Balikai (1998, 1999) with seeds treated with imidacloprid 70 WS @ 3 g/ kg seed at 45 DAE. Thus, maximum yield can be obtained with soil application of carbofuran 3G (25 kg/ ha) -seed treatment with chlorpyriphos 20EC

@ 5 ml in 20 ml of water- spray of cypermethrin @ 2.0ml/l at 25DAE (RPP of UAS, Dharwad).

#### ACKNOWLEDGEMENTS

The authors thank all the technical and non-technical staff of All India Coordinated Sorghum Improvement Project (AICSP), Regional Agricultural Research Station (RARS), College of Agriculture, Vijayapur for supportance and providing facilities.

#### FINANCIAL SUPPORT

The financial support from the Indian Institute of Millets Research (IIMR), Rajendranagar, Hyderabad is acknowledged.

#### AUTHOR CONTRIBUTION STATEMENT

Karabhantanal designed and conducted experiments. Dharavath analyzed data and wrote the manuscript. All authors read and approved the manuscript.

#### CONFLICT OF INTEREST

Authors clearly state that there does not exist any conflict of interest.

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(Manuscript Received: July, 2021; Revised: December, 2021;

Accepted: December, 2021; Online Published: April, 2022)

Online First in [www.entosocindia.org](http://www.entosocindia.org) and [indianentomology.org](http://indianentomology.org) Ref. No. e21170