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EFFICACY OF INSECTICIDE BASED SEED TREATMENTS WITH NEEM SEED EXTRACT SPRAYS AGAINST SORGHUM SHOOT FLY *ATHERIGONA SOCCATA* IN SORGHUM

S B Rathod*, V U Sonalkar, D B Undirwade[2], P N Mane[2] and R B Ghorade[1]

Sorghum Research Unit; [1]Department of Agricultural Entomology; [2]Oil Seed Research Unit,
Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola 444104, Maharashtra, India
*Email: siddheshwarr19@gmail.com (corresponding author): ORCID ID 0000-0003-1984-1080

ABSTRACT

This study was carried out under field conditions at the Sorghum Research Unit, Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola during kharif 2020 to ascertain the effect of neem seed extract sprays along with seed treatments against sorghum shoot fly *Atherigona soccata* (Rondani). The counts of deadhearts in % at 21 and 28 days after emergence (DAE) varied significantly with the treatment schedule- least values of 13.15 and 15.22%, respectively were observed in seed treatment with imidacloprid 48FS @ 12 ml/ kg seed followed by quinalphos 25EC @ 2 ml/ l water spray 15 DAE. The next best treatments were viz., seed treatment with imidacloprid 30FS @ 12 ml/ kg seed with 13.68 and 16.29% deadhearts, respectively; it was followed by seed treatment with thiamethoxam 48FS @ 12 ml/ kg seed. Maximum grain yield (32.33 q/ ha) was observed with seed treatment with imidacloprid 48FS @ 12 ml/ kg followed by quinalphos 25EC @ 2 ml/ l water spray at 15 DAE. Maximum incremental cost and benefit ratio (ICBR) was obtained with seed treatment of thiamethoxam 30FS @ 12 ml/ kg with 1:96.68. Neem seed extract-based treatment schedules viz., NSE 5% spray 7 DAE, treatment schedule NSE 5% spray 7 and 11 DAE, treatment schedule NSE 5% spray 7, 11 and 14 DAE and treatment schedule NSE 5% spray 7 and 18 DAE gave less ICBR values.

Key words: Sorghum, *Atherigona soccata*, seed treatment, foliar spray, neem, azadirachtin, imidacloprid 48FS, thiamethoxam 30FS, quinalphos 25EC, grain yield, cost benefits

Sorghum (*Sorghum bicolour* (L) Monesh) is an important cereal crop (Anonymous, 2014), and in India, its productivity is 1235 kg/ ha (Anonymous, 2020). Maharashtra is one of the major sorghum growing state with a productivity of 1941 kg/ ha (Anonymous, 2018). The sorghum production is hampered due to many factors, of insect pests is one of the major factors lowering productivity of sorghum. In India >150 insect pests are known (Sheshureddy, 1983), and in Maharashtra about 18 important insect pests are reported. Some of these are shoot fly *Atherigona soccata* (Rondani), stem borer *Chillo partellus* and midge fly *Contarina sorghicola.* It is essential to reduce the pesticide use, and use ecofriendly ones like neem seed extract. NSKE @ 5% cow urine-NSKE, imidacloprid 70 WS-NSKE and thiamethoxam 70 WS-NSKE have been reported significantly effective (Kumar et al., 2017). Similarly, NSKE @ 5% and azadirachtin @ 1% both in kharif and rabi were found useful (Sathish et al., 2017). Such organic amendments and botanicals conserved more coccinellids compared to insecticides. This study evaluated neem seed extract in schedule form in kharif sorghum against *A. soccata*.

MATERIALS AND METHODS

The field experiment was carried out at the Sorghum Research Unit, Dr Panjabrao Deshmukh Krishi Vidyapeeth, Akola, during kharif 2020, laid out in randomized block design with eight treatments replicated thrice. The plot was size 2.25 x 4.05 m, with seeds of var. PDKV-Kalani (AKSV-181) sown on July 23rd. 5% neem seed kernel extract was prepared following standard procedure. Eight plants/ plot in eight rows each were observed at 12 days after seedling emergence as suggested by Sharma et al. (1997). The deadhearts caused by shoot fly were recorded at 14th, 21st and 28th day after emergence (DAE), and % deadhearts computed. Grain yield/ plot obtained along with fodder yield. The data obtained were converted to appropriate transformations and were subjected to statistical analysis to test the level of significance (Gomez and Gomez, 1983).

RESULTS AND DISCUSSION

Results revealed that treatment schedule of seed treatment, along with first spray at 7 and second at 11,

third at 14 and fourth at 18 DAE was the most effective. Significantly least number of deadhearts (10.74%) were observed with the schedule T5 (imidacloprid 48FS @12 ml/ kg seed), schedule T7 (NSE 5% spray 7 and 18 DAE), T3 (NSE 5% spray 7, 11 and 14 DAE), T1-NSE 5% spray 7 DAE; and T2 (NSE 5% spray 7 and 11 DAE) was at par with untreated control (T8) and thus the least effective. The least deadhearts i.e.13.15% were observed in schedule T4, seed treatment with imidacloprid 48FS @ 12 ml/ kg seed followed with quinalphos 25EC @ 2 ml/ l spray 15 DAE. Similar results were obtained at 28 DAE with T4 (Fig. 1). Thus, seed treatment-based schedules were observed to be the most effective. These results corroborate with those of Aghav et al. (2007), Yadav et al. (2017), Kumar et al. (2018) and Sonalkar et al. (2018). Maximum grain yield i.e. 32.33 q/ ha was obtained with schedule T4 (seed treatment with imidacloprid 48FS @ 12 ml/ kg seed followed by quinalphos 25EC @ 20 ml/ 10l spray 15 DAE. Results with fodder yield gave similar trend (Table 1).

Satish et al. (2017) revealed that higher grain yield was noted with imidacloprid seed treatment. Yadav et al. (2017) and Karabhantanal et al. (2018) also recorded higher grain yield with seed treatment of imidacloprid. Costs of treatment and incremental benefit revealed minimum cost of Rs. 560/ ha in the treatment schedule T5 (imidacloprid 48FS @ 12 ml/ kg seed); and Rs. 36660/ ha was obtained with treatment schedule T4 (seed treatment with imidacloprid 48FS @ 12 ml/ kg seed followed by quinalphos 25EC @ 2 ml/ l spray at

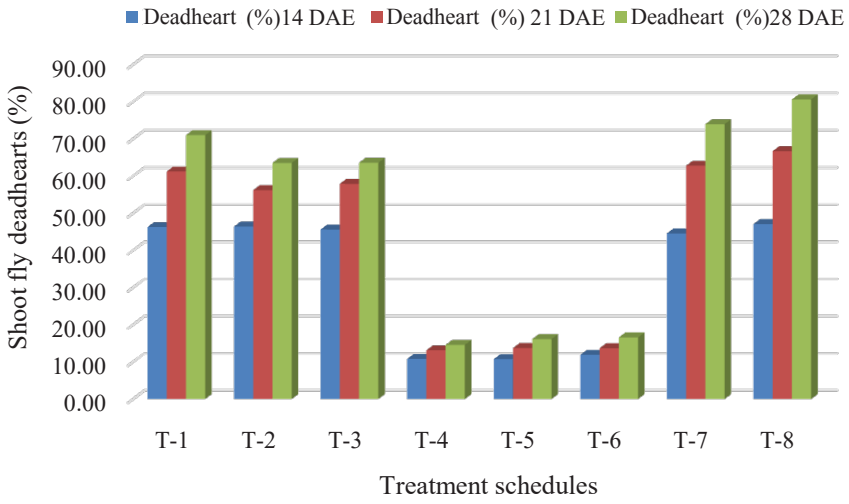

Fig. 1. Effect of treatments on *A. soccata* deadhearts

Table 1. Economics of the treatments and incremental cost benefit ratio (ICBR)

Treatment	Grain Yield increase over control (q/ ha	Fodder yield increase over control (q/ ha)	Income from increased grain yield (Rs/ ha)A	Income from increased fodder yield (Rs/ ha) B	Total income from increased yield (Rs/ ha)	Total cost of the treatment (Rs./ ha) (A+B+C+D+E)	ICBR (I/F)
						F	J
T1	3.41	13.56	5115.00	2712.00	7827.00	2059.00	1:3.80
T2	6.18	23.60	9270.00	4720.00	13990.00	4207.00	1:3.33
T3	6.00	24.08	9000.00	4816.00	13816.00	6429.00	1:2.15
T4	24.44	91.79	36660.00	18358.00	55018.00	1234.00	1:44.26
T5	24.00	90.41	36000.00	18082.00	54082.00	560.00	1:96.58
T6	24.04	90.41	36060.00	18082.00	54142.00	600.00	1:96.68
T7	2.15	9.49	3225.00	1898.00	5123.00	4398.00	1:1.16
T8	0	0	0.00	0	0	0	

Rate of grain sorghum Rs. 1500/ q, rate of fodder sorghum Rs. 200/ q. *NSE 5 kg neem seed for 100 l water + 200 g detergent therefore for 463 l water neem seed required 21.85 kg; cost of kg neem powder Rs. 50/ kg- 21.85 kg = 1092.50; detergent 926 g/ ha @ Rs 150/ kg. Neem powder Rs.50/ kg.

15 DAE). Similar was the case with fodder yield. Thus, gross income from grain and fodder was maximum (Rs. 55018/ ha) with treatment schedule T4 giving more incremental income (yield and fodder) (Table 1). Satish et al. (2017) revealed that higher grain yield was obtained with imidacloprid seed treatment. Yadav et al. (2017) and Karabhantanal et al. (2018) also observed similar increase in grain yield with seed treatment of imidacloprid 70 WS @ 5 gm/ kg.

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