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# DAMAGE POTENTIAL AND MANAGEMENT OF SORGHUM SHOOT FLY *ATHERIGONA SOCCATA* ON SORGHUM WITH SEED TREATMENT

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**ABSTRACT**

**A field experiment conducted at the sorghum research field, College of Agriculture, Indore Madhya Pradesh during kharif 2019-20 evaluated six seed dressing chemicals along with soil application of carbofuran against shoot fly *Atherigona soccata* (Rondani). Significantly least deadheart (1.36 to 15.95%) was observed with thiamethoxam+ cyantraniliprole followed by thiamethoxam 30FS (1.61 to 21.76%). Soil application of carbofuran resulted in less efficacy (2.96 to 38.21%). The mean yield obtained was 29.13 q/ha in protected plots as against 16.20 q/ha in unprotected plots. Mean deadheart incidence was 11.59% in protected plots and 58.23% in unprotected plots. The avoidable loss in term of deadheart was recorded to be 80.10%.**

**Key words:** Sorghum, *Atherigona soccata*, chlorantraniliprole, cyantraniliprole, imidacloprid, thiamethoxam, seed dressing, deadheart, grain yield, avoidable loss

In India, sorghum ranks fourth in area with a productivity of 780 kg/ ha (Anonymous, 2018). This low productivity is due to insect pests. At least 150 insect species damage sorghum in different agroecosystems (Jotwani et al., 1980), of which the shoot fly (*Atherigona soccata* Rondani) and stem borer (*Chilo partellus* Swinhoe) cause enormous losses. Of these the former is the most destructive at the seedling stage. Padmaja et al., (2010) observed that shoot fly ambush sorghum at 7-30 days after seedling emergence which can destruct crop > 50%. Raise in shoot fly deadhearts by 1% results in a reduction of 143 kg grain yield/ ha and an overall loss of 90-100% under delayed sowing in kharif (Dhaliwal et al., 2004). Kumar and Prabhuraj (2007) observed that seed treatment with thiamethoxam 70 WS@ 2 g/ kg led to the least amount of deadhearts (7.9%) and maximum grain yield (31.93 q/ha) besides, higher fodder yield (58.92 q/ ha). Lower dose of thiamethoxam can be used effectively and economically for shoot fly management in late sown kharif sorghum (Daware et al., 2011). Seed dressers as systemic insecticides are considered to be more selective for targeted pests. Therefore, the present study to evaluate some newly launched systemic seed dressers and their combination.

## MATERIALS AND METHODS

The field experiment was conducted at the College of Agriculture, Indore (22°70'N, 75°89'E, 555.7 masl), in randomized block design with three replications. The plot size was 4.00x 2.25 m and 2.70 x 1.50 m net, and the cultivar CSV-15 was used with a spacing of 45x 15 cm, and sown on 1st July 2019. The treatment details are: with trade name and their manufacturing companies- imidacloprid 70WS @ 3 ml/ kg of seed (Confidor, Chemet Wets and Flow Ltd.), fipronil 5SC @ 5 ml/ kg of seed (Regent, Bayer), chlorantraniliprole 18.5SC @ 1 ml/ kg of seed (Coragen, Dupont), thiamethoxam 30FS @ 10 ml/ kg of seed (Cruiser, Syngenta), thiamethoxam 19.8 w/w+ cyantraniliprole 19.8 w/w @ 6 ml/ kg of seed (Foretenza Duo, Syngenta), soil application of carbofuran 3G @ 20 kg/ ha (Furadon, FMC) and untreated plot. Deadheart count was taken at 7, 14, 21 30 and 45 days after germination of seedlings on whole plant basis to calculate % deadheart. The incidence data was subjected to arc sine transformation before ANOVA. The treatment was separated by LSD at (p= 0.05). For the estimation of yield loss caused a separate field trial was laid out with two strips. Sorghum variety RVJ-1862 was sown on 1 July, 2019 at 45 cm spacing (row to row) having plot size of 2.25x 2.0 m (6 rows of 2 m). For protected plots, the seed was treated with thiamethoxam 30FS @ 10 ml/ kg before sowing and was kept protected from shoot fly, stem borer and sorghum earhead bug infestation with insecticides (thiamethoxam+ lambda cyhalothrin @ 125 ml/ ha followed by whorl application of carbofuran 3G @

Table 1. Efficacy of seed dressing treatments against *A. s occata* in sorghum

| S. No. | Treatment | Dose/ kg of seed | % deadheart 7 DAS | 14 DAS | 21 DAS | 30 DAS | 45 DAS |
|---|---|---|---|---|---|---|---|
| T1 | Imidacloprid 70WS | 3 ml | 2.65 (9.12)* | 20.23 (26.73) | 25.78 (30.51) | 27.01 (31.21) | 29.10 (32.64) |
| T2 | Fipronil 5SC | 5 ml | 2.32 (8.73) | 14.82 (22.63) | 20.12 (26.64) | 24.77 (29.85) | 25.40 (30.26) |
| T3 | Chlorantraniliprole 18.5SC | 1 ml | 2.82 (9.67) | 17.85 (24.98) | 20.90 (27.09) | 26.29 (30.84) | 26.66 (31.08) |
| T4 | Thiamethoxam 30FS | 10 ml | 1.61 (7.25) | 11.04 (19.40) | 14.49 (22.37) | 19.08 (25.90) | 21.76 (27.81) |
| T5 | Thiamethoxam (19.8 w/w) + Cyantraniliprole (19.8 w/w) | 6 ml | 1.36 (6.70) | 8.39 (16.82) | 11.34 (19.67) | 14.97 (22.75) | 15.95 (23.54) |
| T6 | Soil application of Carbofuran 3G | 20 kg/ ha | 2.96 (9.90) | 22.96 (28.61) | 28.61 (32.33) | 36.18 (36.98) | 38.21 (38.18) |
| T7 | Untreated | - | 4.22 (11.85) | 35.49 (37.57) | 44.67 (41.94) | 55.09 (47.92) | 58.29 (49.77) |
| | S. E(m)± | | 0.60 | 0.62 | 0.89 | 0.86 | 0.35 |
| | CD (p=0.05) | | 1.84 | 1.90 | 2.74 | 2.66 | 1.09 |

*value in parentheses arc sine transformed; DAS= Days After Sowing

10kg/ ha and chlorantraniliprole 18.5SC @ 100ml/ ha). Unprotected plots were exposed to natural infestation. Ten plants were selected randomly from each plot, and the losses calculated using paired plot design.

## RESULTS AND DISCUSSION

*Atherigona soccata* on sorghum was observed on shoots at 7, 14, 21, 30 and 45 days after emergence and it was observed that significantly least deadhearts (1.36 to 15.95%) were observed with thiamethoxam+ cyantraniliprole followed by thiamethoxam (1.61 to 21.76%); deadhearts were less with fipronil 5SC (2.32 to 25.40%), chlorantraniliprole 18.5SC (2.82 to 26.66%), and imidacloprid 70WS (2.65 to 29.10%). The soil application of carbofuran 3G (2.96 to 38.21%) was intermediate in its efficacy (Table 1). Wadghule (2005) observed that seed treatment with thiamethoxam 70WS @ 2 g/ kg was the best. Karibasavaraja et al. (2005) showed that seed dressing with thiomethoxarn 70WS @ 4g a.i. kg seeds was very effective. The present results agree with those of Balikai (2011) on seed treatment with thiamethoxam 70WS @ 3g/ kg seeds. The loss caused by *A. soccata* in terms of deadheart and reduction in grain yield in variety RVJ-1862 of sorghum was worked out by paired plot technique. When the crop was unprotected, it had 5.02x more deadheart and highly significant (p=0.01). The avoidable losses amounted to 80.10% with yield of 29.13 q/ ha in protected plots and 16.20 q/ha in untreated plots, respectively, and thus highly significant (p=0.01), with increase in yield being 79.82%. The mean avoidable loss in grain yield worked out to be 44.39%. The present observations indicate more losses than that reported by Kamakshi et al. (2021). Patra et al. (2013) observed that the maize crop damaged by major pests resulted in loss estimated at 8.5-21.75%. Thus, seed treatment with combination of thiamethoxam (19.8 w/w) + cyantraniliprole (19.8 w/w) 6 ml/ kg can be recommended as a new combination against *A. soccata* in sorghum, with thiamethoxam 30 FS 10 ml/ kg as a good option.

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