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Research Note

Efficacy of *Bacillus thuringiensis* var. kurstaki against sorghum stem borer, *Chilo parellus* (Swinhoe)

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ABSTRACT: **The experiment was conducted to test efficacy of *Bacillus thuringiensis* products in comparison with recommended conventional insecticide against sorghum stem borer, *Chilo parellus* (Swinhoe) at Sorghum Research Unit, Dr. P. D. K. V., Akola. The result revealed significant superiority of *Bacillus thuringiensis* and endosulfan treatments at one to three sprays than untreated control in case of leaf injury. In case of peduncle damage, application of two sprays of *Bacillus thuringiensis* (@ 1 kg/ha) on 25th and 35th day was on par with three sprays of both endosufan and *Bacillus thuringiensis*. Similarly on the basis of grain yield, three sprays of *Bt* recorded maximum grain yield and it was significantly higher than untreated control and also the treatment *viz.* one spray of *Bacillus thuringiensis* or endosulfan..**

KEY WORDS: *Bacillus thuringiensis kurstaki, Chilo parellus,* efficacy, endosulfan

Sorghum stem borer, *Chilo partellus* (Swinhoe) has been recorded as a serious pest not only from the Indian sub-continent but also from a number of African countries, Indonesia, Malaysia, Taiwan and Srilanka (Young and Teetes, 1977). In India, it is an important pest of sorghum in Vidarbha region of Maharashtra state. Avoidable grain losses of 55 to 83 per cent on CSH 1 and CSV 1 have been reported by Jotwani *et al.* (1971). Sufficient work on the chemical control of this pest on sorghum has been done (Atwal *et al.*, 1970; Prem kishore, 1989). However, work on biocontrol is scanty. Since biocontrol is the major component in integrated pest management programme, it was felt necessary to evaluate some safer biopesticide like *Bacillus thuringiensis* var. kurstaki for its efficacy against sorghum stem borer.

The experiments were conducted for three years at the farm of Sorghum Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during *Kharif* season of 2000, 2001 and 2002 in a Randomized Block Design with three replications. The plot size was 6.75m^2. Sowing was done by dibbling method with sorghum hybrid CHS 9 at the spacing of 45x15cm.

In all ten treatments, including two *Bacillus thuringiensis* products and one conventional insecticide endosulfan along with untreated control were evaluated. The treatment details are given in the Table 1. the observations were recorded on total plants and damage was recorded at harvest. Ten plants were randomly selected for recording the peduncle damage and length of peduncle

Table 1. Influenced of different treatments on dead hearts, leaf injury, peduncle damage, peduncle length tunneled and grain yield

Sl. no.	Treatment	Pooled Averages				
		Dead hearts (%)	Leaf injury(%)	Peduncle damage(%)	Peduncle length tunneled (%)	Grain yield (q/ha)
1.	Bt k (Halt) @ 1Kg/ha on 25th day AG	1.44 (6.18)	18.46 (24.04)	18.00 (24.61)	44.31 (41.55)	37.24
2.	Bt k (Halt @ 1Kg/ha on 25th and 35th day AG	1.37 (5.58)	16.39 (22.44)	15.95 (23.24)	36.81 (37.06)	39.74
3.	Bt k (Halt) @ 1Kg/ha on 25th, 35th and 50th day AG	1.47 (6.17)	15.04 (21.99)	13.50 (21.45)	34.02 (35.39)	40.05
4.	Endosulfan @ 0.05% on 25th day AG	1.38 (5.93)	18.91 (23.90)	17.61 (24.57)	39.13 (38.49)	37.19
5.	Endosulfan @ 0.05% on 25th and 35th day AG	1.67 (6.34)	13.99 (20.77)	15.37 (24.79)	36.57 (36.84)	38.70
6.	Endosulfan @ 0.05% on 25th , 35th and 50th day AG	1.55 (6.00)	14.46 (21.08)	14.29 (21.88)	34.74 (36.03)	38.91
7.	Bt k (Dr. PDKV) @ 1L/ha on 25th day AG	1.73 (6.17)	16.77 (23.11)	17.59 (24.43)	40.18 (39.04)	36.34
8.	Bt k (Dr. PDKV) @ 1 L/ha on 25th, 35th day AG	1.95 (6.67)	16.76 (23.51)	16.83 (23.74)	38.69 (38.24)	37.86
9.	Bt k (Dr. PDKV) @ 1L/ha on 25th, 35th and 50th day AG	1.76 (6.22)	16.67 (23.16)	14.86 (22.14)	36.87 (37.08)	38.34
10.	Untreated control.	2.01 (7.05)	23.67 (27.70)	20.61 (26.68)	49.41 (44.70)	34.26
	SEM±	0.59	1.14	1.12	1.14	0.76
	CD (P=0.05)	-	3.22	3.16	3.20	2.13
	CV (%)	16.30	8.58	8.20	5.13	3.47

Figures in the parentheses denote arcsine values.

AG=After Germination

tunneled. Grain yield was also recorded in each treatment.

The per cent dead hearts in various treatments ranged from 1.37-2.01 and were statistically non significant. The per cent leaf injury differed significantly in all the biocontrol and insecticidal treatments to untreated control. Further it was observed that endosulfan (0.05%) at 25th and 35th day recorded significantly minimum leaf injury (13.99%) and it was followed by endosulfan three sprays, Bt k (Halt) three sprays, Bt k (Halt) one sprays, Bt k (Dr. PDKV) three sprays, Bt k (Dr. PDKV) one spray, where in 14.46, 15.04, 16.39, 16.37, 16.76 and 18.46 per cent leaf injury was recorded,

respectively. All these treatments were on par with each other.

The per cent peduncle damage at harvest varied significantly between treatments. The treatments with Bt k (Halt) three sprays recorded minimum per cent peduncle damage of 13.50 and this treatment was found on par with endosulfan (0.05%) three sprays (14.29%), Bt k (Dr. PDKV) three sprays (14.86%), Bt k (Halt) two sprays (15.95%), Bt (Dr. PDKV) two sprays, (16.89%), and Bt k (Halt) one spray (18.10%). Untreated control revealed maximum 20.61 per cent peduncle damage followed by endosulfan (0.05%) two sprays, Bt k (Halt) one spray, endosulfan (0.05%) one spray and Bt k (Dr. PDKV) one spray, and these treatments were on par with each other.

The per cent peduncle length tunneled by *C. partellus* larvae varied significantly. Minimum peduncle tunneled (34.02%) was recorded in Bt k (halt) three sprays, and maximum tunnel length (49.41%) was noticed in untreated control, which was on par with Bt k (Halt) one spray. In other treatment, peduncle tunneled was on par with each other.

The yield data presented in Table 1 indicated significant differences in respect of grain yield. Maximum grain yield of 40.05 q/ha was obtained in Bt k (Halt) three sprays 25, 35, and 50 days, followed by Bt k (Halt) two sprays, endosulfan (0.05%) three sprays, Bt k (Dr. PDKV) three sprays and endosulfan two sprays and all these treatments were on par with each other. The treatment Bt k (Dr. PDKV) two sprays was also found on par with the above treatments except Bt k (Halt) three sprays. Minimum yield 34.26 q/ha was recorded in untreated control.

The above results are in agreement with the earlier findings of Singh and Chaudhary (1995) and Singh (1998), who reported that Bt pesticide, *Bacillus thuringiensis* and endosulfan are quite effective and safer in controlling sorghum stem borer.

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