

SHORT COMMUNICATION

Efficacy of some Carbofuran Insecticides against Top Shoot Borer of Sugarcane

S. Akhter, M.A. Alam, M. Begum, M. N. Alam and N. Islam

Bangladesh Sugarcane Research Institute

Regional Sugarcane Research Station

Gazipur-1701

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Sugarcane (*Saccharum officinarum* L) is one of the most important agro-industrial crop in Bangladesh. But due to attack of some major pests the yield of sugarcane in tonnage is decreasing day by day. Among the insect pest top shoot borer (*Scirpophaga excerptalis* Walker) is wide spread of sugarcane growing areas of Bangladesh. The pest attacks sugarcane throughout the year, however more abundant in February to October. It is most destructive causing severe damage. Its infestation in the field ranges from 10 to 100%. Loss in cane weight due to the pest varied from 6.50 to 50.17% as reported by Khalequzzaman and Mannan (1980). The characteristics symptoms are tunnel on the mid rib, parallel shot holes on the attacked leaves and burnt 'dead heart' formation was found the lateral buds giving a 'bunchy top' appearance (Singh *et al.*, 1980). Every year it causes considerable damage to sugarcane causing reduction in yield and sucrose content (Miah *et al.*, 1980). Losses in yield and sucrose are 4.0-48.0% and 2.0-62.5% due to top shoot borer infestation (Alam *et al.*, 2003).

Although several integrated pest management strategies are being advocated for the control of this pest, yet chemical control plays a major role in its control. In recent years some workers have suggested that granular carbofuran can be an effective control measure against top shoot borer. Sandhu *et al.* (1977) reported that Carbofuran and Phorate showed better performance in controlling the top shoot borer. Similar efforts were made to control top shoot borer by many workers. Begum *et al.* (2005) found some organocarbamates (Carbofuran) effectively controlled the top shoot borer infestation at Gazipur. Mostafa *et al.* (1986) reported that Carbofuran (2,3-dihydro-2, 2-dimethyl benzofuran-7yl methylcarbamate) is a broad spectrum systemic insecticide having both properties of killing insects by contact as well as systemic actions. Therefore, the purpose of this study was screen out more suitable chemical(s) for effective control of top shoot borer. The experiment was conducted at farmer's field of Sreepur under Gazipur district during the cropping season 2004-05. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. There were ten treatments including one standard (Curaterr 5G) and one control. The individual plot size was 6m x 6m., block to block distance was 1.5m. The most popular chewing variety in that region "Amrita" was selected as planting materials and planting was done through conventional method in last week of December, 2004.

All granular carbofurans like Krishan 5G, Rexifuran 5G, Amcofuran 5G, Hextar 5G, Q-furan 5G, Baifuran 5G, Adfuran 5G and Curaterr 5G (standard) were applied twice and used @ 2.0 kg a.i. ha⁻¹ in March and May. One EC formulated Totofen was mixed with water to reach the desired dose of application and was applied three times, once in March, then May and lastly in August. The insecticides were applied after make furrow on both side of the cane rows. Before

irrigation, soil ridges were made surrounding individual plots to protect the flow of water from one plot to another and then insecticides were applied at the base of the plants and in the space between furrows and was incorporated as well as with soils followed by irrigation. Fertilizer application and other intercultural operations were done as and when necessary. Data on TSB infestation was recorded by counting total and infested cane in the month of May, August and September, 2005. The yield data was also recorded at harvest.

Data on Top shoot borer infestation were recorded in May, August and September, 2005 and calculated in percent effectiveness over control. Results presented in the Table 1 revealed that all insecticide significantly ($P < 0.05$) reduced the top shoot borer infestation compared to untreated control.

In first data there were no significant difference among the treatments in reducing the top shoot borer infestation and the percent efficacy ranged from 25.00 to 100.00. The treatments with Amcofuran 5G 5G @ 2.0 kg a.i. ha⁻¹, Q-furan 5G 5G @ 2.0 kg a.i. ha⁻¹, Rexifuran 5G5G @ 2.0 kg a.i. ha⁻¹ and Hextar 5G 5G @ 2.0 kg a.i. ha⁻¹ gave the satisfactory reduction (80% above) of top shoot borer infestation as like as standard Curaterr 5G. It was also observed that Krishan 5G, Baifuran 5G and Totofen 20EC failed to reach the desired level of efficacy i.e. 55.36, 37.50 and 25.00 percent respectively.

Table 1. Efficacy of some new Carbofuran in controlling Top Shoot Borer of sugarcane at Sreepur, Gazipur, 2004-2005.

Treatments	Per cent TSB infestation and efficiency					
	1st data (May)		2nd data (August)		Final data (September)	
	Mean	% efficacy	Mean (Ln+1)	% efficacy	Mean (Ln+1)	% efficacy
T ₁ – Krishan 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	0.25	55.36	1.03bc (5.33)	67.15	1.02cd (1.79)	81.11
T ₂ - Amcofuran 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	0.00	100.00	0.68def (2.67)	82.03	1.03cd (1.81)	80.89
T ₃ – Q-furan 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	0.00	100.00	0.93bcde (4.33)	70.05	1.16c (2.38)	74.81
T ₄ . Adfuran 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	0.06	89.29	0.97bcd (4.33)	69.51	1.19c (2.23)	75.71
T ₅ – Rexifuran 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	0.00	100.00	0.68def (2.67)	82.03	0.81d (1.25)	86.91
T ₆ – Hextar 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	0.10	82.14	0.64ef (2.33)	83.67	0.92cd (1.54)	83.74
T ₇ – Baifuran 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	0.35	37.50	0.72cdef (2.67)	80.58	1.09cd (1.98)	79.09
T ₈ – Totofen 20 EC @ 1.0 litre ha ⁻¹ (March + May+August)	0.42	25.00	1.10b (5.67)	64.07	1.66b (4.30)	54.59
T ₉ – Curater 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	0.00	100.00	0.57 (2.00)	86.03	0.85d (1.35)	85.74
T ₀ – Untreated control.	0.56	-	1.85a (14.67)	-	2.34a (9.47)	-
LSD (5%)	NS		0.33		0.31	

*Figure in perenthesis are observed mean

The efficacy range was found from 64.07 to 86.03% at second data in which Rexifuran 5G @ 2.0 kg a.i. ha⁻¹, Amcofuran 5G @ 2.0 kg a.i. ha⁻¹, Hextar 5G @ 2.0 kg a.i. ha⁻¹ and Baifuran 5G @ 2.0 kg a.i. ha⁻¹ reached the desire level of efficacy and all the treatments were statistically significant over control.

In final data all treatments were statistically significant in reducing the top shoot borer over control and the percent efficacy ranged from 54.59 to 86.91. The treatments with Rexifuran 5G @ 2.0 kg a.i. ha⁻¹, Hextar 5G @ 2.0 kg a.i. ha⁻¹, Krishan 5G @ 2.0 kg a.i. ha⁻¹ and Amcofuran 5G @ 2.0 kg a.i. ha⁻¹ gave the satisfactory reduction of top shoot borer infestation which were 86.91, 83.74, 81.11 and 80.89 respectively. Biswas *et al.* (1994) suggested application of Furadan and Curaterr (commonly carbofuran) against white grub @ 2.0 kg a.i. ha⁻¹ and they recommended the same dose for the control of the top shoot borer. Similar result was obtained in previous studies by Begum *et al.* (2005) that some Organocarbamates (Carbofurans) like Carbofuran 5G, Paradox 5G, Chazer 3G and Hayfuran 5G @ 2.0 kg ai ha⁻¹ applied in May and July reduced the incidence of the top shoot borer compared to check plot at Sreepur, Gazipur.

The yield data (Table 2) showed statistically significant differences among the treatments but comparatively better yield (124.7 TCH) was obtained from standard Curater @ 2.0kg a.i. ha⁻¹ applied plot. The treatment Totofen 20EC @ 1.0 litre a.i. ha⁻¹, Amcofuran 5G, Adfuran 5G and Hextar 5G also produced well yield of 121.5, 111.5, 102.9 and 101.9 TCH respectively. The yield increase over control in different treatments varied from -9.67 to 25.05%. The treatment Q-furan 5G and Rexifuran 5G showed negative performance in yield increase. Miah and Akhter (1985) reported that by using Furadan (Carbofuran) yield increased might be due to profuse root development through increased mitotic index that enhanced nutrient uptake and ultimately reflected increase the cane yield. According to the Pesticide Technical Advisory Committee (PTAC, 1980), a government body if any insecticides reached 80% or above effectiveness to approve the use of that insecticides in agriculture then should be recommended. Considering upon the present findings Amcofuran 5G, Rexifuran 5G, Hextar 5G, Krishan 5G, Adfuran 5G and Q-furan 5G at doses @ 2.0 kg a.i. ha⁻¹ may be recommended for the effective control of sugarcane top shoot borer with two frequencies (March and May) of application during the pest abundance period.

Table 2. Effectiveness of different Carbofuran insecticides on the yield of sugarcane at Sreepur, Gazipur, 2004.

Treatments	Yield (TCH)	% Increase over control
T ₁ -Krishan 5G @ 2.0 kg a.i. ha ⁻¹ (March +May)	101.74abc	2.01
T ₂ -Amcofuran 5G @ 2.0 kg a.i. ha ⁻¹ (March+May)	111.50abc	11.80
T ₃ -Q-furan 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	97.04bc	-2.78
T ₄ -Adfuran 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	102.92abc	3.19
T ₅ -Rexifuran 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	90.10c	-9.67
T ₆ -Hextar 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	101.94abc	2.21
T ₇ -Baifuran 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	100.81abc	1.07
T ₈ -Totofen 20 EC @ 1.0 litre ha ⁻¹ (March + May)	121.50ab	21.82
T ₉ -Curater 5G @ 2.0 kg a.i. ha ⁻¹ (March + May)	124.72a	25.05
T ₀ -Untreated control.	99.74bc	
LSD (5%)	24.67	

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