

Efficacy of Cattle Urine as Pesticide Against Major Sugarcane Pests

M. N. A. Miah, M. A. Alam and M. A. S. Miah

Bangladesh Sugarcane Research Institute,
Ishurdi, Pabna, Bangladesh.

ABSTRACT

An experiment was set up in 2007-08 cropping season at Regional Sugarcane Research Station (RSRS), Thakurgaon and Mohan farm, Thakurgaon Sugar Mills Ltd. (TSM), Thakurgaon to the study efficacy of fermented cattle urine in controlling major sugarcane pests. Significant increase in tiller number, millable cane and yield was found at Mohan farm when 30% fermented urine was applied at 30 days interval after planting. Significant control of early shoot borer (ESB), top shoot borer (TSB), stem borers (SB), rootstock borer (RSB) and white grubs (WG) was found at both locations at different doses of fermented cattle urine, however, performance of 30% was the best. This treatment rendered 93.78-83.33% control of ESB, 50.11-87.08% control of TSB and 67.98-81.17% control of SB at RSRS in different months. At Mohan farm, control ranged from 88.29-90.27% in ESB, 56.64-83.08% in TSB, 60.16-71.47% in SB in same treatment. In case of RSB and WG, ranged from 59.10-84.96% and 47.99-82.10% respectively at RSRS and 57.37-66.15% and 55.89-76.60% respectively at Mohan farm when 30% fermented cattle urine was applied in different months. This result was at par with that obtained by recommended chemical pesticides.

Key words: Sugarcane, cattle urine, major sugarcane pests.

INTRODUCTION

The average yield of sugarcane in Bangladesh is low compared to other sugarcane growing countries of the world. Various factors are responsible for low yield of cane in Bangladesh (42.0 t ha^{-1}) (Anon., 1996) as against 56.0 t ha^{-1} in India (Yadava, 1991). Among the factors causing low production of sugarcane, the insect pests constitute the major factor. Considerable yield losses, which are estimated to be around 20% in cane yield and 15% in sugar recovery (Avasthy, 1983). In Bangladesh, sugarcane is attacked by nearly about seventy species of insect pests (Anon., 1994). Among 70 insect pests attacking sugarcane, early shoot borer, top shoot borer, stem borer, rootstock borer and white grubs are the most destructive. Chemical control of these insects has been used for a long time. The indiscriminate use of chemical pesticides has resulted in adverse effects like resistance (Saxena *et al.*, 1992, Armes *et al.*, 1992), ecological imbalance, health hazards and resurgence of secondary pests.

The problems arising out of pesticide residues are enormous. Every food article today is contaminated with considerable quantities of residual pesticides. The search for substitutes for synthetic chemical pesticides thus is being made hectically. Mulching with degradable plastic and irrigation with urine before flowering in May and in August gave the highest yield in the first crop of Bounty and Kent cultivars of strawberry in Sweden through protection of Blossom weevil (B. Svensson, 2006). Cattle urine has fungicidal

105.74 t ha⁻¹ was found in the T₄ plot followed by 103.58 and 104.38 t ha⁻¹ from T₅ plot. The lowest yield (89.13 and 81.30 t ha⁻¹) was recorded in T₀ plot at both locations.

Table 1. Effects of cattle urine on germination (%), number of tiller, millable cane and yield at RSRS & Mohan farm, Thakurgaon, 2007-08.

Treatments	Germination (%)		Tiller (X 10 ³ ha ⁻¹)		Millable cane (X 10 ³ ha ⁻¹)		Cane yield (t ha ⁻¹)	
	RSRS Farm	Mohan Farm	RSRS Farm	Mohan Farm	RSRS Farm	Mohan Farm	RSRS Farm	Mohan Farm
T ₁	38.33	37.70	137.84	134.92c	79.66	76.88 bc	91.60	88.41 bc
T ₂	37.50	38.75	138.12	135.41c	85.00	80.97 abc	97.91	93.12abc
T ₃	38.33	40.98	132.77	151.52bc	85.56	83.68 abc	98.39	96.23 abc
T ₄	42.81	43.85	159.58	170.20 a	91.67	91.94 a	105.42	105.74 a
T ₅	41.66	43.48	143.26	159.02ab	90.07	90.76 ab	103.58	104.38 ab
T ₀	34.06	34.37	122.84	114.01 d	77.50	70.70 c	89.13	81.30 c
LSD (0.05)	NS	NS	NS	17.22	NS	13.28	NS	15.27
CV%	14.43	13.31	17.25	7.92	13.61	10.68	13.67	10.68

- Figures followed by the same letter (s) are not significantly different at 5% level as per LSD test.

The results showed that ESB infestation ranged from 0.12 to 1.36% among the plots sprayed with cattle urine where the untreated plots had 1.93% infestation in March and they did vary significantly over control (Table 2). The lowest infestation of ESB (0.12%) was observed in plots (T₄) sprayed with 30% fermented cattle urine giving 93.78% effectiveness over control followed by T₅ (recommended pesticides applied) in March. In April, T₄ gave 83.33% effectiveness followed by T₅ (82.40%) over control. At Mohan farm data collected for ESB infestation (March-April) showed that there was significant difference among the treatments in March and April compared to untreated control plot. March data showed the effectiveness of the treatments, which ranged from 42.02-88.29%, while that of April ranged from 22.22-90.27% over control (Table 3).

Table 2. Effects of cattle urine in controlling ESB, TSB and SB of sugarcane at RSRS farm, Thakurgaon, 2007-08.

Treatments	Per cent pest Infestation (mean of 4 replications)							
	ESB		TSB				SB	
	March	April	April	May	June	July	June	July
T ₁	1.32 a (31.60)	0.60 b (72.22)	1.54 ab (26.31)	4.62 a (18.94)	2.90 ab (33.02)	3.52 a (38.24)	1.63 ab (36.07)	1.38 (45.45)
T ₂	1.23 a (36.26)	0.67 b (68.95)	1.99 a (04.78)	3.36 a (41.05)	2.71 ab (37.41)	3.36 b (41.05)	0.72 bc (71.76)	1.34 (47.03)
T ₃	1.36 a (29.53)	0.63 b (70.83)	1.86 ab (11.00)	3.83 a (32.80)	2.39 ab (44.80)	3.52 b (38.24)	0.58 c (77.25)	1.09 (56.91)
T ₄	0.12 b (93.78)	0.36 b (83.33)	0.27 c (87.08)	1.53 a (73.15)	2.16 b (50.11)	2.62 b (54.03)	0.48 c (81.17)	0.81 (67.98)
T ₅	0.38 b (80.31)	0.38 b (82.40)	0.74 bc (64.59)	1.64 a (71.22)	2.06 b (52.42)	2.80 b (50.87)	0.64 c (74.90)	0.88 (65.21)
T ₀	1.93 a	2.16 a	2.09 a	5.70 a	4.33 a	5.70 a	2.56 a	2.53
LSD (0.05)	0.72	0.80	1.18	4.70	1.86	2.00	0.93	NS
CV%	45.52	66.47	55.50	90.56	44.65	37.04	56.37	69.40

- Figures in parentheses are percent effectiveness over control.

- Figures followed by the same letter (s) are not significantly different at 5% level as per LSD test.

ESB = Early shoot borer, TSB = Top shoot borer, SB = Stem borers

At RSRS farm, In case of TSB, significant difference was observed among the treatments at different times (Table 2). Top shoot borer infestation was low in April. Data collected in May showed that T_5 and T_4 treatments demonstrated 71.22 to 73.15% effectiveness to control TSB. The lowest TSB infestation (1.53%) was observed in plots (T_4) sprayed with 30% fermented cattle urine that showed 73.15% effectiveness over control plot. In June, TSB infestation varied from 2.06 to 2.90% among the treated plots where control plot had 4.33% infestation. The lowest infestation (2.06%) was observed in plots (T_5) applied with recommended pesticides that showed 52.42% effectiveness over untreated control. Significant differences were observed among the treatments for TSB infestation in July where fermented cattle urine showed 38.24 to 54.03% effectiveness to control TSB.

Table 3. Efficacy of cattle urine in controlling ESB, TSB and SB of sugarcane at Mohan farm, Thakurgaon Sugar Mills, Thakurgaon, 2007-08.

Treatments	Per cent pest infestation (mean of 4 replications)							
	ESB		TSB				SB	
	March	April	April	May	June	July	June	July
T_1	1.09 b (42.02)	0.56 ab (22.22)	0.86 ab (45.58)	4.54 ab (41.19)	2.15 ab (16.98)	2.32 ab (26.58)	2.00 a (15.25)	2.13 ab (30.16)
T_2	1.05 bc (44.14)	0.29 bc (59.72)	0.42 b (69.11)	3.35 ab (56.60)	1.58 bc (38.99)	1.86 b (41.13)	1.31 b (44.49)	1.72 bc (43.60)
T_3	1.02 bc (45.74)	0.21 bc (70.83)	0.22 b (83.82)	3.26 ab (57.77)	1.68 bc (35.13)	1.49 b (40.18)	0.91 b (54.23)	1.32 bc (56.72)
T_4	0.22 d (88.29)	0.07 c (90.27)	0.23 b (83.08)	1.58 b (79.53)	1.11 c (57.14)	1.37 b (56.64)	0.94 b (60.16)	0.87 c (71.47)
T_5	0.35 cd (81.38)	0.11 c (84.72)	0.17 b (87.50)	1.59 b (79.40)	1.30 c (49.80)	1.89 b (52.84)	1.08 b (61.44)	1.25 bc (59.02)
T_6	1.88 a	0.72 a	1.36 a	7.72 a	2.59 a	3.16 a	2.36 a	3.05 a
LSD (0.05)	0.70	0.41	0.67	4.29	0.76	1.11	0.66	1.18
CV%	49.57	83.12	82.25	77.44	29.37	36.69	30.62	45.30

- Figures in parentheses are percent effectiveness over control.
- Figures followed by the same letter (s) are not significantly different at 5% level as per LSD test.

ESB = Early shoot borer, TSB = Top shoot borer, SB = Stem borers

At Mohan farm, data collected during April-July showed that there was significant difference among the treatments in April-July for TSB infestation compared to untreated control. April data showed the effectiveness of the treatments, which ranged from 45.58-87.50%, while that of May, June and July ranged from 41.19-79.53%, 16.98-57.14 and 26.58-56.64% respectively over control. In May-July, better performance in the treatment T_4 was found, that gave 79.53, 57.14 and 56.64% effectiveness over control followed by T_5 (79.40, 49.80 and 52.84%) as shown in Table 3. The lowest infestation of

TSB (0.17%) was observed in plots (T_5) applied with recommended pesticides giving 87.50% effectiveness over control followed by T_3 (20% fermented cattle urine) in April.

At RSRS farm, data collected for SB infestation was done in June and July. June data showed that almost all the treatments gave satisfactory control of SB resulting above 70% effectiveness except T_1 (36.07%) over control (Table 2). July data of treatments were not significantly different with control. The lowest SB infestation (0.81%) was observed in T_4 plots that showed 67.98% effectiveness followed by 0.88% infestation in T_5 with 65.21% effectiveness over control. SB infestation at Mohan farm from June to July showed that there was significant difference among the treatments in reducing SB infestation although July data showed some better performance in the treatment T_4 that demonstrated 71.47% effectiveness followed by T_5 (59.02%) as shown in Table 3.

Table 4. Efficacy of cattle urine in controlling rootstock borer and white grubs of sugarcane at RSRS farm, Thakurgaon, 2007-08.

Treatments	Per cent pest infestation (mean of 4 replications)							
	RSB Pop ⁿ /5 clumps per plot				WG pop ⁿ /5 clumps per plot			
	April	May	June	July	April	May	June	July
T_1	2.09ab (58.11)	21.51ab (22.76)	33.24ab (18.31)	33.36abc (18.31)	2.87 (31.50)	14.93ab (8.37)	17.60 (10.70)	27.52a (10.88)
T_2	4.30 a (13.82)	19.19abc (31.09)	28.31bc (30.68)	35.29 ab (13.61)	2.50 (40.33)	13.81ab (24.49)	17.50 (11.21)	21.07b (31.76)
T_3	0.80 b (83.96)	16.32bc (41.40)	23.11cd (43.41)	26.53bcd (35.03)	0.80 (80.90)	7.71 bc (57.85)	11.55 (41.40)	26.18a (15.22)
T_4	0.75 b (84.96)	8.83 c (68.29)	13.96 d (65.81)	16.70 d (59.10)	0.75 (82.10)	3.39 c (81.47)	10.25 (47.99)	8.92 c (71.11)
T_5	0.80 b (83.96)	9.40 c (67.32)	14.13 d (65.42)	20.38 cd (50.12)	00 (100.00)	3.41 c (81.35)	11.25 (42.92)	10.56bc (65.83)
T_0	4.99 a	27.85	40.85 a	40.85 a	4.19	18.30 a	19.71	30.88 a
LSD (0.05)	3.12	10.21	9.37	13.43	NS	8.79	NS	11.10
CV%	90.48	39.52	24.29	30.89	62.75	56.86	69.93	35.31

- Figures in parentheses are percent effectiveness over control.
- Figures followed by the same letter (s) are not significantly different at 5% level as per LSD test.

RSB = Root stock borer, WG = White grubs

In case of RSB at RSRS farm, significant differences were observed among the treated plots in April-July where RSB infestation varied from 0.75-40.85% and the efficacy ranged from 13.61-84.96% over untreated control (Table 4). The lowest RSB infestation (0.75-16.70%) was observed in plots (T_4) sprayed with 30% fermented cattle urine that showed 59.10-84.96% effectiveness followed by T_5 (50.12-83.96%). At Mohan farm, data collected during April-July showed that there was significant difference among the treatments in reducing the RSB infestation. The effectiveness of the treatments in April ranged from 59.31-68.37%, while that of May, June and July ranged from 26.83-66.15, 27.25-61.49 and 17.43-57.37% respectively over control (Table 5).

At RSRS farm, data on white grub population/5clumps/plot taken in May and July showed that there was significant difference among the treatments in reducing the white grub population but those taken in April and June were not significantly different from

untreated control (Table 4). The treatment T_4 showed the highest effectiveness (47.99-81.47%) in May-July followed by T_5 (42.92-81.35%). In April, T_5 showed 100% effectiveness followed by T_4 (82.10%) over control. In case of Mohan farm, the treatment T_5 showed the highest efficacy (63.52-79.33%) in May-July followed by T_4 (55.89-76.59%) over control. The lowest infestation of WG (6.25%) was observed in T_4 treatment showing 76.60% effectiveness over control followed by T_5 in April (Table 5).

Table 5. Efficacy of cattle urine in controlling rootstock borer and white grubs of sugarcane at Mohan farm, Thakurgaon, 2007-08.

Treatments	Per cent pest infestation (mean of 4 replications)							
	RSB Pop ^o /5 clumps per plot				WG pop ^o /5 clumps per plot			
	April	May	June	July	April	May	June	July
T_1	7.14 a (59.31)	18.71ab (34.44)	27.37b (27.25)	38.78 a (17.43)	14.52ab (45.65)	12.20ab (34.51)	25.44a (4.32)	28.67 a (11.45)
T_2	6.66 a (62.05)	20.88ab (26.83)	24.67 b (34.40)	31.82ab (17.97)	12.91 b (51.68)	10.44bc (43.96)	19.43a (26.92)	25.00ab (22.82)
T_3	6.07 a (65.41)	15.52 b (45.65)	21.64bc (42.48)	23.29bc (39.94)	7.14 b (73.27)	7.48 bc (59.84)	16.93ab (36.32)	23.48ab (27.48)
T_4	6.69 a (61.88)	9.66 b (66.15)	14.64 c (61.10)	16.53 c (57.37)	6.25 b (76.60)	4.36 c (76.59)	8.20 bc (69.16)	14.29 b (55.89)
T_5	5.55 a (68.37)	11.22 b (60.72)	14.49 c (61.49)	18.23 c (53.01)	9.12 b (65.86)	3.85 c (79.33)	6.81 c (74.38)	11.82 b (63.52)
T_0	17.56a	28.54 a	37.61 a	38.78 a	26.73 a	18.64 a	26.59 a	32.39 a
LSD (0.05)	11.07	11.28	8.39	11.21	12.80	7.50	9.78	14.20
CV%	88.69	42.94	23.81	28.23	66.44	52.47	37.67	41.68

- Figures in parentheses are percent effectiveness over control.
- Figures followed by the same letter (s) are not significantly different at 5% level as per LSD test.

RSB = Root stock borer, WG = White grubs

Therefore, in the present experiment, T_4 (30% fermented cattle urine spray at 30 days interval) was found superior to other treatments in controlling TSB, SB and WG in sugarcane. The effectiveness of cattle urine as evident in the present experiment is in conformity with the findings of other researchers (NRI, 2003), who reported the different effect of cattle dung and urine extracts mixture against egg laying and leaf feeding by *H. armigera* and *S. litura*. Thus, it may be concluded that 30% fermented cattle urine at 30 days intervals could be used as a good bio-pesticide against major sugarcane pests. However, more evaluation is needed for standardization.

REFERENCES

- Armes, N.J.; Jadhav, D.R., Bond, G.S. and King, A.B.S.1992. Insecticide resistance in the pod borer, *Helicoverpa armigera* in South India. *Pestic.Sci.*, **34**: 355-364.
- Avasthy, P.N.1983. Insect Pest Management for Sugarcane in India. In: Sugarcane Pest Management in India (Eds. M. Balasubramanian and A.R. Solayappan). Tamil Nadu Co-operative Sugar Federation, Madras. pp.71-77.
- Anonymous.1994. SRTI Annual Report.Sugarcane Research and Training Institute, Ishurdi, Pabna, Bangladesh.pp 88-94.
- Anonymous.1996. Statistical Pocket Book of Bangladesh. Bangladesh Bureau of Statistics, Dhaka. 187p.
- Anonymous.1998. Sugarcane Cultivation: Transferable Improved Technologies (in Bengali). Bangladesh Sugarcane Research Institute, Ishurdi, Pabna.Publication No.74, 34p.
- Gabriele stoll (1986). Natural Crop Protection in the Tropics. 2nd Edition, Margraf verlag, Germany, pp.376.
- Mansinghka, S.S.2007. Biproducts of cattle-organic manure and Cow urine-Medicines-Draught-Gas-Electricity: Explanatory Note of Justice Guman Mal Lodha. Chapter V-Part 1.
- National Resources Institute. 2003. Launching of SUSVEG Project on IPM of Brinjal and Tomato. Launching of SUSVEG-ASIA Non-Pesticide Management. United Kingdom and Centre for World Solidarity.
- Svensson, B. 2006. Organic growing of strawberries, with control of insects and mulching/fertilization.ISHS Acta Horticulturae 567: IV International Stawberry Symposium.
- Saxena, J. D.; Banerjee, S. K. and Sinha, S. R. 1992. Pyrethroids resistance in field population of pink bollworm, *Pectinophora gossypiella* Sauders in India. *Indian J. Entomology*, **54**(3): 347-350.
- Sulyo. 2008. Field School Results. ESP East Java, Watershed Management, ESP News. W. Prabow & Christina H. Putri, East Java.
- Yadava, R. I. 1991. Sugarcane Production Technology. IBH Publishing Co. Pvt. Ltd. Janapath, New Delhi, 20p.