

Field Infestation of Some Promising Sugarcane Clones by Some Major Insect Pests

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ABSTRACT

A field experiment was conducted to observe the infestation level of three promising sugarcane clones viz., I 111-01, I 145-02, I 191-02 and two standard varieties Isd 16 and Isd 36 against some major insect pests of sugarcane at BSRI farm, Ishurdi and RSRS, Thakurgaon during the cropping seasons 2006-2007, 2007-2008 and 2008-2009. Results revealed that (pooled data) early shoot borer infestation ranged from 0.27 to 1.36 percent. Black beetle infestation was higher at Ishurdi which ranged from 3.96 to 7.53 percent. Infestation due to top shoot borer ranged from 13.56 to 19.62 percent at Ishurdi and 11.11 to 20.98 percent at Thakurgaon. Stem borer infestation (stalk basis) ranged from 10.40 to 17.95 percent and 16.78 to 30.13 percent at Ishurdi and Thakurgaon respectively. Stem borer infestation on internode basis varied from 16.25 to 20.42 percent and 17.29 to 33.02 percent among the test clones and standard varieties at Ishurdi and Thakurgaon respectively. Rootstock borer infestation ranged from 32.15 to 41.97 percent at Ishurdi whereas higher infestation was observed at Thakurgaon which ranged from 61.44 to 77.86 percent with the lowest (32.15% & 61.44%) infestation was observed in the clone I 191-02 compared to standard varieties. Infestation due to scale insect ranged from 11.29 to 21.71 percent at Thakurgaon and mealy bug infestation ranged from 30.13 to 48.68 percent in same location with the lowest infestation in the clone I 191-02 compared to standard varieties.

Key words: Infestation, insect pests, sugarcane clones

INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is one of the most important cash-cum industrial crop in Bangladesh. It is a long durable crop which requires 12-16 months from planting to harvesting. Various factors are responsible for low yield of cane in Bangladesh compared to other sugarcane growing countries of the world. So far about 70 species of insect pests have been identified and reported to feed on sugarcane in Bangladesh, (Anon., 1973-78, 1992). Among various factors, insect pests inflict considerable losses which are estimated to be around 20% in cane yield and 15% in sugar recovery (Avasthy, 1983). It is reported that the most damaging pests are early shoot borer, top shoot borer, stem borer, rootstock borer, scale insect and mealy bug. Losses in yield incurred due to borer attack was estimated to be 22-33% by early shoot borer (Patil and Hapase, 1981), 12.29-43.67% by top shoot borer (Alam *et al.*, 2006), 18.01-28.73 percent (Abdullah *et al.*, 2006) and 12.01-34.51% (Alam *et al.*, 2006) by stem borer, 10.07-55.28% (Alam *et al.*, 2006) by rootstock borer. The loss in yield due to scale insect was estimated as 43% (Khanna, 1957) and 24.1% by mealy bug (Kaira and Sidhu, 1964). Different pest management practices namely cultural, mechanical, biological and chemical methods have been recommended to control these pests. Among these, farmers of Bangladesh are mostly oriented with chemical control operation as it gives immediate and effective control of a pest. But recommended right chemical pesticides are not always available and it is expensive. Moreover, it creates environmental hazards. Continuous use of pesticides causes development of resistance to the target pests. On the other hand, use of resistant

varieties seems to be the most important method of pest management. As most of the major sugarcane pests are monophagous, there is a good scope to develop resistant sugarcane clones for their management. Selection of insect resistant clones is the first step towards developing management approach. Clones having high sugar yield potential with considerable tolerance to major insect pests' attacks would be more economic to cultivate by the sugarcane growers in Bangladesh. Therefore, continued efforts are needed among the researchers to develop clones resistant to major insect pests. In the present study three promising clones have been evaluated to observe the infestation against major insect pests of sugarcane.

MATERIALS AND METHODS

The field experiment was conducted at the experimental farm of Bangladesh Sugarcane Research Institute (BSRI), Ishurdi, Pabna and RSRS, Thakurgaon during the cropping seasons of 2006-2007, 2007-2008 and 2008-2009. The experiment was laid out in randomized complete block (RCB) design with three replications. The plot size was 6m x 5m. Blocks were 2m apart with a border of 1m. The BSRI bred sugarcane clones viz., I 111-01, I 145-02, I 191-02 and two standard varieties Isd 16 and Isd 36 were included to compare their infestation level. Planting was done through conventional sett placement in the trenches. Fertilizer application, irrigation, weeding, mulching and earthing-up were done as per normal cultural practices (Anon., 1998). All the clones and varieties were subjected to natural infestation in all the three seasons at both the locations. No pest control measure was applied.

Data on the infestation of early shoot borer (ESB), *Chilo infuscatellus* Snellen and black beetle (BB), *Alisonotum impressicollis* were recorded in the month of March of each season. Data on the incidence of top shoot borer (TSB), *Scirpophaga excerptalis* Walker, stem borer (SB), *Chilo tumidicostalis* Hampson, rootstock borer (RSB), *Emmalocera depressella* Swinhoe, scale insect (SI), *Melanaspis glomerata* Green and mealy bug (MB), *Saccharicoccus sacchari* Cockerell were recorded at harvest by counting the total and infested canes from each plot. In case of stem borer 10 stem borer infested plants were randomly splitted to count infested internodes. For rootstock borer, data were taken from 5 randomly selected clumps per plot. Infested rootstock borer up-rooted stocks were dissected to observe their infestation. The collected data were converted to percent infestation to measure the level of incidence and analyzed for comparison by using LSD at 0.05 levels for interpretation.

RESULTS AND DISCUSSION

It is evident that statistically no significant difference was observed among the test clones and standard varieties for early shoot borer, black beetle, top shoot borer, stem borer (stalk basis), stem borer (internodes basis), rootstock borer, scale insect and mealy bug infestation at BSRI location (Table 1). At RSRS, Thakurgaon location, statistically significant differences were observed in case of top shoot borer, stem borer (stalk basis), scale insect and mealy bug infestation whereas no significant differences were found in early shoot borer, black beetle, stem borer (internode basis) and rootstock borer (Table 2). The infestation of early shoot borer was very low at both locations. In case of black beetle, the lowest (4.43 %) infestation was observed in the clone I 111-01 and the highest (8.24 %) in I 191-02 whereas at Thakurgaon, the lowest (2.93%) in I 191-02 and the highest (4.47%) in standard Isd 16. Top shoot borer infestation ranged from 15.79 to 24.33 and 8.31- 20.37 percent at Ishurdi and Thakurgaon respectively. The highest (24.33%) infestation was observed in standard Isd 36. The clone I 192-02 showed the lowest (15.79% & 8.31%) infestation at both locations.

Table 1. Infestation levels of some major insect pests in promising BSRI clones. BSRI, Ishurdi, 2006-2007.

Clones/ Varieties	Percent pest infestation (mean of three replications)							
	ESB	BB	TSB	SB (stalk)	SB (inter-node)	RSB	SI	MB (100/x+319)
I 111-01	0.69	4.43	18.63	10.59	18.78	34.29	0.27	0.1469 (16.69)
I 145-02	0.79	5.27	16.07	23.09	17.15	37.55	1.37	0.1470 (11.27)
I 191-02	1.41	8.24	15.79	15.03	17.56	25.34	0.28	0.1472 (10.44)
Isd 16 (Standard)	1.25	7.60	21.82	10.77	17.48	30.92	3.70	0.1444 (19.67)
Isd 36 (Standard)	1.29	8.19	24.33	14.92	19.13	36.84	1.25	0.1452 (23.55)
LSD(5%)	NS	NS	NS	NS	NS	NS	NS	NS

ESB= Early shoot borer, BB= Black beetle, TSB= Top shoot borer, SB= Stem borer, RSB= Rootstock borer, SI= Scale insect, MB = Mealy bug, NS= Not significant
 Figures in parentheses are observed mean

Infestation due to stem borer (stalk basis), the lowest (10.59%) infestation was observed in I 111-02 with the highest (23.09%) in I 145-02 compared to standard varieties Isd 16 (10.77%) and Isd 36 (14.92%) at Ishurdi whereas at Thakurgaon, it varied from 15.24-39.97%. The stalk basis stem borer infestation to other clones of sugarcane was reported to vary from 13.99 to 44.81% (Anon., 2000). At Thakurgaon, the clone I 145-02 showed the lowest (15.24%) stem borer infestation with the highest (39.97%) in I 191-02. Stem borer infestation on internode basis, the clone I 145-02 showed the lowest (17.15% & 15.03%) infestation with the highest intensity (25.03%) as observed in I 191-02.

Table 2. Infestation levels of some major insect pests in promising BSRI clones. RSRS, Thakurgaon, 2006-2007.

Clones/ Varieties	Percent pest infestation (mean of three replications)							
	ESB	BB	TSB	SB (stalk)	SB (inter-node)	RSB	SI	MB (100/x+319)
I 111-01	0.15	3.15	3.04ab (20.37)	3.43abc (31.06)	17.70	74.72	1.78ab (5.06)	62.16bcd
I 145-02	0.50	3.19	2.96abc (19.83)	2.78d (15.24)	15.03	67.41	1.50ab (3.65)	45.49de
I 191-02	0.00	2.93	2.22c (8.31)	3.62a (39.97)	25.03	68.33	0.87bc (1.80)	39.16e
Isd 16 (Standard)	0.39	4.47	2.96abc (19.86)	2.91cd 17.53	16.41	62.50	1.99a (8.59)	84.18a
Isd 36 (Standard)	0.14	3.32	2.28c (9.72)	2.90cd 17.91	21.12	92.50	1.41abc (3.15)	54.02cde
LSD(5%)	NS	NS	0.7497	0.5637	NS	NS	0.9411	11.99

ESB= Early shoot borer, BB= Black beetle, TSB= Top shoot borer, SB= Stem borer, RSB= Rootstock borer, SI= Scale insect, MB = Mealy bug, NS= Not significant

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

The lowest (25.34%) rootstock borer infestation was obtained in I 191-02 with the highest (37.55%) in I 145-02 at Ishurdi. Heavy rootstock borer infestation was observed at Thakurgaon, which ranged from 62.50-92.50 percent among the test clones and standard varieties. In case of scale insect, the lowest (0.27%) infestation was observed in I 111-01 whereas at RSRS, Thakurgaon, the lowest (1.80%) infestation was observed in I 191-02. The standard variety Isd 16 had the highest (3.70% & 8.59%) infestation at both locations (Table 1 & 2). Higher mealy bug infestation was observed at Thakurgaon which ranged from 39.16 to 84.18%. The clone I 191-02 had the lowest (10.44% and 39.16%) infestation at both locations (Table 1 & 2). Abdullah *et al.* (2007) reported that clones viz., I 82-98, I 98-98, I 110-98, I 139-98, I 142-98 and variety Isd 29 showed 0.57 to 1.07 percent ESB infestation, 0.76 to 1.53 BB infestation at Ishurdi and 7.58 to 12.54 percent percent at Thakurgaon. They also reported 12.18 to 26.31 percent infestation by TSB at Ishurdi and 31.29 to 38.68 percent infestation at Thakurgaon. They also observed 6.40 to 12.90 percent infestation by stem borer at Ishurdi and 46.31 to 57.38 percent (stalk basis) at Thakurgaon. They also reported 22.38 to 33.86 percent RSB infestation at Ishurdi and 63.46 to 97.57 percent infestation at Thakurgaon. Their study showed that infestation due to scale insect ranged from 6.79 to 13.62 and 14.81 to 24.95 percent at Ishurdi and Thakurgaon respectively. Mealy bug infestation was observed which ranged from 15.86 to 27.72 percent at Ishurdi. The test clones and standard varieties in the present study exhibit within the range of reported results except mealy bug infestation at Thakurgaon location.

Table 3. Infestation levels of some major insect pests in promising BSRI clones. BSRI, Ishurdi, 2007-2008.

Clones/ Varieties	Percent pest infestation (mean of three replications)							
	ESB	BB	TSB	SB (stalk)	SB (inter- node)	RSB	SI	MB
I 111-01	0.14	2.67	16.16	12.53	25.48	39.96	1.20	6.34b
I 145-02	0.86	2.82	16.86	13.66	18.20	45.41	2.27	9.15a
I 191-02	0.18	2.95	15.86	18.33	28.05	29.53	2.81	8.51ab
Isd 16 (Standard)	0.35	5.83	17.26	14.53	27.62	39.58	1.54	6.76ab
Isd 36 (Standard)	0.30	4.57	18.22	10.58	20.78	34.83	4.50	7.26ab
LSD (5%)	NS	NS	NS	NS	NS	NS	NS	2.27

ESB= Early shoot borer, BB= Black beetle, TSB= Top shoot borer, SB= Stem borer, RSB= Rootstock borer, SI= Scale insect, MB = Mealy bug, NS= Not significant

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

In the cropping season 2007-2008 test clones showed no statistically significant difference in infestation by early shoot borer, black beetle, top shoot borer, stem borer (stalk basis), stem borer (internode basis), rootstock borer and scale insect except mealy bug at Ishurdi (Table 3) and at Thakurgaon location, significant difference in infestation by early shoot borer, stem borer (internode basis) and scale insect was observed (Table 4). Early shoot borer infestation was very low at both locations and it varied from 0.14-0.86 and 0.67-2.32 percent at Ishurdi and Thakurgaon respectively. Early shoot borer infestation (0.23% to 2.92%) in different clones was reported in annual report of BSRI (Anon., 2001). The lowest (0.14% & 0.67%) early shoot borer infestation was observed in the clone I 111-01 and the highest (0.86% & 2.32%) in I 145-02 at both locations (Table 3 & Table 4).

Infestation due to black beetle, the lowest (2.67%) was in I 111-01 and the highest (5.83%) in standard Isd 16 at Ishurdi. The infestation of black beetle was very low at Thakurgaon, which ranged from 0.70 to 1.58 percent. Top shoot borer infestation ranged from 15.86 to 18.22 percent at Ishurdi and 21.05 to 29.77 percent at Thakurgaon. The infestation to other sugarcane clones of 11.11 to 28.89% and 22.22 to 38.89% was reported by BSRI in the annual report of 1997 (BSRI, 1999). The clone I 191-02 had the lowest (15.86% and 21.05%) top shoot borer infestation at both locations. Stem borer infestation (stalk basis) ranged from 10.58 to 18.33 percent and 19.35 to 35.89 percent at Ishurdi and Thakurgaon respectively. The lowest (10.58%) infestation was observed in standard Isd 36 and the highest (18.33%) in I 191-02 at Ishurdi. At Thakurgaon, the lowest (19.35%) infestation was observed in standard Isd 16 and the highest (35.89%) in I 145-02. In case of stem borer infestation on internode basis, the clone I 191-02 had the highest (28.05% & 38.13%) infestation was observed at both locations (Table 3 & 4). Rootstock borer infestation ranged from 29.53 to 45.41 and 50.93 to 72.58 percent at Ishurdi and Thakurgaon respectively. The lowest (29.53%) infestation was observed in I 191-02 at Ishurdi and the highest (45.41%) in I 145-02 whereas at Thakurgaon the lowest (50.93%) infestation was observed in I 111-01% and the highest (72.58%) in standard Isd 16. At BSRI location, scale insect infestation was found very low which ranged from 1.20-4.50 percent. At Thakurgaon, the lowest (18.40%) scale insect infestation was obtained in I 191-02 and the highest (46.43%) in I 111-01. Infestation due to mealy bug, the clone I 111-01 had the lowest (6.34% & 32.13%) infestation and the clone I 145-02 showed the highest (9.15% & 43.34%) infestation at both locations (Table 3 & 4). The mealy bug infestation was reported in other sugarcane clones ranged from 7.12 to 95.61% (Anon., 2001).

Table 4. Infestation levels of some major insect pests in promising BSRI clones. RSRS, Thakurganon, 2007-2008.

Clones/ Varieties	Percent pest infestation (mean of three replications)							
	ESB	BB	TSB	SB (stalk)	SB (internode)	RSB	SI	MB
I 111-01	0.67b	1.58	29.77	20.34	22.69b	50.93	46.43a	32.13
I 145-02	2.32a	1.49	27.59	35.89	20.22b	71.43	22.57b	43.34
I 191-02	0.96b	0.70	21.05	33.12	38.13a	55.38	18.40b	42.02
Isd 16 (Standard)	1.54ab	1.33	28.78	19.35	24.42b	72.58	20.84b	41.47
Isd 36 (Standard)	2.22a	1.18	24.90	24.99	18.80b	69.92	20.02b	32.91
LSD (5%)	1.20	NS	NS	NS	10.51	NS	21.99	NS

ESB= Early shoot borer, BB= Black beetle, TSB= Top shoot borer, SB= Stem borer, RSB= Rootstock borer, SI= Scale insect, MB = Mealy bug, Not= Not significant

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

In the cropping season 2008-2009 no statistically significant difference was observed in infestation of early shoot borer, black beetle, top shoot borer, stem borer (internode basis), rootstock borer and scale insect except stem borer (stalk basis) and mealy bug among the test clones and standard varieties at Ishurdi (Table 5). At Thakurgaon, test clones showed statistically significant difference in infestation by top shoot borer, stem borer (internode basis), scale insect and mealy bug (Table 6). Early shoot borer infestation was very low at both locations (Table 5 & Table 6). At Ishurdi, black beetle infestation varied from 4.78 to 10.13 percent among the test clones and standard varieties which was higher than Thakurgaon location. Infestation due to top shoot borer, the clone I

145-02 had the lowest (7.76%) infestation with the highest (16.30%) in standard Isd 36 whereas at Thakurgaon, the lowest (3.96%) infestation was observed in I 191-02 and the highest (12.80%) in I 111-01. Biswas *et al.* (2004) and Abdullah *et al.* (2004) reported that 16.14-41.16% and 5.81-12.75% top shoot borer infestation respectively when studied with some sugarcane clones. In case of stem borer (stalk basis) the highest (17.11%) infestation was observed in I 145-02 at Ishurdi. The lowest (7.96% & 8.69%) stem borer infestation was observed in standard variety Isd 36 at both locations (Table 5 & Table 6). At Thakurgaon, the highest (17.30%) stem borer infestation was observed in I 191-02. Stem borer infestation on internode basis varied from 10.84 to 16.54 percent at Ishurdi and 11.47 to 35.89 percent at Thakurgaon with the highest intensity (35.89%) in I 191-02 (Table 6). The lowest (41.58%) rootstock borer infestation was observed in I 191-02 and the highest (51.98%) in standard Isd 16 at Ishurdi. At Thakurgaon, the standard variety Isd 16 had the lowest (58.81%) rootstock borer infestation was observed and the highest (71.42%) in I 111-01. Scale insect infestation was low among the test clones and standard varieties at Ishurdi which ranged from 5.08 to 9.29 percent with the lowest (5.08%) in standard Isd 36 whereas at Thakurgaon, it ranged from 12.27 to 21.01 percent with the lowest (12.27%) in I 145-02. The scale insect infestation was reported in other sugarcane clones ranged from 4.33 to 26.67% in BSRI (Anon., 1995). The lowest (6.28%) mealy bug infestation was observed in I 191-02 and the highest (26.10%) in standard Isd 36 at Ishurdi. At Thakurgaon, the lowest (7.72%) infestation was observed in I 145-02 and the standard variety Isd 16 showed the highest (20.38%) infestation (Table 6). Abdullah *et al.* (2006) reported that clones viz., I 245-99, I 262-99, I 429-99, I 433-99, I 446-99 and I 486-99 and varieties Isd 20 and Isd 32 showed 0.51 to 3.32% infestation by early shoot borer, 0.22 to 15.48% infestation by black beetle, 4.55 to 53.58% infestation by top shoot borer, 5.25 to 55.21% (stalk basis) infestation by stem borer. The test clones and standard varieties in the present study exhibit within the range of reported pest infestation results.

Table 5. Infestation levels of some major insect pests in promising BSRI clones. BSRI, Ishurdi, 2008- 2009.

Clones/ Varieties	Percent pest infestation (mean of three replications)							
	ESB	BB	TSB	SB (stalk)	SB (inter- node)	RSB	SI	MB
I 111-01	2.12	4.78	14.95	8.09b	16.54	46.81	7.18	14.11b
I 145-02	1.70	9.12	7.76	17.11a	13.40	42.95	6.46	10.33bc
I 191-02	2.06	10.13	13.85	12.38ab	14.53	41.58	9.29	6.28c
Isd 16 (Standard)	2.47	7.15	8.30	10.49ab	16.16	51.98	5.16	10.22bc
Isd 36 (Standard)	2.18	9.84	16.30	7.96b	10.84	50.16	5.08	26.10a
LSD (5%)	NS	NS	NS	7.464	NS	NS	NS	6.078

ESB= Early shoot borer, BB= Black beetle, TSB= Top shoot borer, SB= Stem borer, RSB= Rootstock borer, SI=Scale insect, MB = Mealy bug, NS= Not significant

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

Table 6. Infestation levels of some major insect pests in promising BSRI clones. RSRS, Thakurgaon, 2008- 2009.

Clones/ Varieties	Percent pest infestation (mean of three replications)							
	ESB	BB	TSB	SB (stalk)	SB (inter- node)	RSB	SI	MB
I 111-01	0.00	1.27	12.80a	12.88	11.47b	71.42	13.63b	17.32a
I 145-02	0.28	1.42	10.74ab	16.54	17.60ab	63.82	12.27b	7.72c
I 191-02	0.33	1.31	3.96c	17.30	35.89a	60.61	13.68b	9.21bc
Isd 16 (Standard)	0.00	0.80	7.31abc	13.47	21.99ab	58.81	20.95a	20.38a
Isd 36 (Standard)	0.17	0.65	6.24bc	8.69	21.02ab	71.16	21.01a	15.02ab
LSD (5%)	NS	NS	5.612	NS	20.41	NS	6.420	6.123

ESB= Early shoot borer, BB= Black beetle, TSB= Top shoot borer, SB= Stem borer, RSB= Rootstock borer, SI= Scale insect, MB = Mealy bug, NS= Not significant

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

It revealed from the pooled data that early shoot borer infestation was very low at both locations among the test clones and standard varieties. The infestation ranged from 0.98 to 1.36 and 0.27 to 1.03 percent at Ishurdi and Thakurgaon respectively with the lowest (0.98% & 0.27%) in the clone I 111-01 at both locations. (Table 7 & Table 8). Black beetle infestation ranged from 3.96 to 7.53 percent showing the lowest (3.96%) in the clone I 111-01 and the highest (7.53%) in standard Isd 36 whereas the same pest had 1.65 to 2.20 percent infestation at Thakurgaon. Top shoot borer infestation ranged from 13.56 to 19.62 and 11.11 to 20.98 percent at Ishurdi and Thakurgaon respectively with the lowest (13.56%) infestation as observed in I 145-02 and the highest (19.62%) in standard Isd 36 at Ishurdi. At Thakurgaon, the lowest (11.11%) infestation was observed in I 191-02 and the highest (20.98%) in I 111-01.

Table 7. Pooled infestation (%) of some major insect pests in promising BSRI clones. BSRI, Ishurdi, 2006-2009.

Clones/ Varieties	Percent pest infestation (mean of three replications)							
	ESB	BB	TSB	SB (stalk)	SB (inter- node)	RSB	SI	MB
I 111-01	0.98	3.96	16.58	10.40	20.27	40.35	2.88	12.38
I 145-02	1.12	5.74	13.56	17.95	16.25	41.97	3.37	10.25
I 191-02	1.22	7.11	15.17	15.25	20.05	32.15	4.13	8.41
Isd 16 (Standard)	1.36	6.86	15.79	11.93	20.42	40.83	3.47	12.22
Isd 36 (Standard)	1.26	7.53	19.62	11.15	16.92	40.61	3.61	18.97

Table 8. Pooled infestation (%) of some major insect pests in promising BSRI clones. RSRS, Thakurgaon, 2006-2009.

Clones/ Variety	Percent pest infestation (mean of three replications)							
	ESB	BB	TSB	SB (stalk)	SB (inter- node)	RSB	SI	MB
I 111-01	0.27	2.00	20.98	21.43	17.29	65.69	21.71	37.20
I 145-02	1.03	2.03	19.39	22.56	17.62	67.55	12.83	32.18
I 191-02	0.43	1.65	11.11	30.13	33.02	61.44	11.29	30.13
Isd 16 (Standard)	0.64	2.20	18.65	16.78	20.94	64.63	16.79	48.68
Isd 36 (Standard)	0.84	1.72	13.62	17.20	20.31	77.86	14.73	33.98

At Ishurdi, stem borer infestation (stalk basis) varied from 10.40 to 17.95 percent with the lowest (10.40%) in I 111-01 and the highest (17.95%) in I 145-02. The test clones had higher stem borer infestation (stalk basis) which ranged from 16.78 to 30.13 percent at Thakurgaon showing the lowest (16.78%) in standard Isd 16 and the highest (30.13%) in I 191-02. Stem borer infestation (internode basis) ranged from 16.25 to 20.42 and 17.29 to 33.02 percent among the test clones and standard varieties at Ishurdi and Thakurgaon respectively. The clone I 191-02 had the highest intensity (33.02%) at Thakurgaon. Rootstock borer infestation was higher at Thakurgaon which ranged from 61.44 to 77.86 percent whereas at Ishurdi, it varied from 32.15 to 41.97 percent among the test clones and standard varieties showing the lowest (32.15% & 61.44%) in I 191-02 at both locations (Table 7 & Table 8). Scale insect infestation was higher at Thakurgaon which ranged from 11.29 to 21.71 percent whereas at Ishurdi, it ranged from 2.88 to 4.13 percent among the test clones and standard varieties showing the lowest (2.88%) in I 111-01 and the highest (4.13%) in I 191-02. Mealy bug infestation ranged from 8.41 to 18.97 percent and 30.13 to 48.68 percent at Ishurdi and Thakurgaon respectively among the test clones and standard varieties and the lowest (8.41% & 30.13%) infestation was observed in the clone I 191-02 at both the locations (Table 7 & Table 8). At BSRI location, early shoot borer, black beetle, top shoot borer, stem borer (stalk basis), rootstock borer, scale insect and mealy bug infestations in the test clone I 111-01 were lower than standard variety Isd 36. The clone I 191-02 was better than standard variety Isd 16 and Isd 36 because insects like top shoot borer, stem borer (internode basis) and rootstock borer have lesser negative impact on I 191-02. In case of stem borer (stalk basis), the same clone showed inferior than standards. At Thakurgaon, early shoot borer and black beetle infestations in the test clones and standards were almost similar. The infestation of top shoot borer, stem borer (stalk basis) and rootstock borer in I 111-01 and I 145-02 were higher than standards. Pest reaction to genotypes is a comparative study; it may vary with the change in the favourable conditions of the pest development.

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