Agriways Journal ISSN (Print) 2321-8614&ISSN (Online) 2454-2318
(A Multidisciplinary Peer –Reviewed Refereed Journal)
www.agriwaysjournal.com Vol 11 Issue 01Jun (2023)

Varietal screening of sapota against bud borer, *Anarsiaachrasella* Bradley

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Abstract:

To study the varietal screening of sapota against bud borer, *A. achrasella*experimental site was selected at Jambuvadi Farm, Junagadh Agricultural University, Junagadh during the year 2021-22. Among eight varieties of sapota, Pilipatti varietywasfound resistant to the damage of sapota bud borer with 2.38 per cent bud damage. Varieties *viz*.,Murabba, Mohangoottee,Bhuripatti and Zumakhiyaweregrouped under moderately resistant category with 2.98, 3.46, 4.78 and 5.31 per cent bud damage, respectively.Calcutti special variety was found moderately susceptible with 7.62 per cent bud damage. Cricket ball and Kalipatti varieties werefound susceptible with 10.19 and 12.79 per cent bud damage, respectively. In contrast, Kalipatti variety recorded highest yield (136.56 kg/tree/year), it was at par with Cricket ball (129.25 kg/tree/year), whereas, the lowest yield was recorded fromPilipatti variety(65.41 kg/tree/year).

Key words: Varietal screening**,** Sapota, Bud borer (*Anarsiaachrasella* Bradley)

Date of Submission: 17-03-2023 **Date of Acceptance: 20-06-2023**

Introduction:

Sapota, *Manilkaraachras* (Mill.) Fosberg belongs to the family *Sapotaceae* and subfamily *Sapotoidae* and is commonly known as *chiku*, *ciku*, *dilly*, *naseberry*, *sapodilla*, *plum* and

chico (Purseglove, 1968 and Smith, 1976). It is a native of Mexico and Central America and is now widely cultivated throughout the tropics (Purseglove, 1968). The ripened fruits are used for making jams, jellies, osmo-dehydrated slices and squash (Reddy, 1959). The pulp of fruit is also useful for preparation of sherbet and halva. Sapota is also eaten as a dessert fruit (Singh *et al*., 1963). Products like sweet chutney, dried sapota pieces, sapota milkshake, nectar, blended sapota drinks, pickle, preserve and candy can also be prepared with good sensory quality (Sawant, 1989).Many cultivars of sapota are available which differ in branching, foliage colour, fruit shape, fruit texture, colour and pulp quality. A small number of seeds with sweet pulp are the main characteristics of an acceptable fruit (Hiwale, 2015). Some varieties produce characteristically round fruits such as Calcutta round, Cricket ball and Barmasi. Whereas, the varieties such as Badam, Oval, Guthi and Vavivalasa produce oval-shaped fruits. The varieties Kalipatti and Chattri produce both round and oval-shaped fruits on the same tree (Gandhi, 1956). Among 41 varieties grown all over India, “Kalipatti” is an outstanding variety of sapota and is popularly cultivated in Gujarat as well as Maharashtra. It is popular for its excellent taste and aroma, soft mellow flesh with a fewer number of seeds, high productivity, continuous fruiting throughout the year and free from physiological disorders. The sapota plays a significant role in the socio-economic upliftment of both marginal and big farmers (Shukla, 2009).In India, sapota is cultivated under 84,000 ha area with a total production of 9,06,000 MT during 2019-20 (Anon., 2021). In Gujarat, it is grown under 26,988 ha area with a production of 2,73,866 MT during 2020-2021 (Anon., 2022). Monoculture of variety “Kalipatti” in Gujarat may cause an increase in the pest population of sapota bud borer for that it is necessary to screen out other resistant varieties of sapota against bud borer.

MATERIALS AND METHODS

To study the screening of different eight varieties of sapota*viz*., Bhuripatti,Calcutti special, Cricket ball,Kalipatti,Murabba,Mohangoottee,Pilipatti andZumakhiya against sapota bud borer, ten years old plants planted earlier at 8 m × 8 m spacing from 896 m^2area were

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selected. The experiment was laid out in CRD (Completely Randomized Design) at the Jambuvadi Farm, Junagadh Agricultural University, Junagadh. All the agronomic practices werefollowed as per recommendations.

For varietal screening, three trees of each variety as three repetitions per treatment was selected. Total eight twigs (20 cm length) per tree were selected (2 twigs from each side of the tree, total twenty-four twigs were selected from each variety). Observations of infestation of sapota bud borer were recorded at fortnightly intervals throughout the year. The sapota orchard under the experiment was kept without spraying of insecticides throughout the season. The percent infestation on the flower bud of sapota due to bud borer was calculated with the help of the following formula (Vijayaraghavendra and Basavanagoud, 2016).

$$\text{Per cent infestation (\%)} = \frac{\text{Number of danaged flower buds by sapota bud borer}}{\text{Total number of flower buds observed}} \times 100$$

Table 1 : Scale used for categorization different varieties of sapota

Category of resistance	Scale for resistance
Highly resistant	$\bar{X}_i \leq (\bar{X} - 2SD)$
Resistant	$(\bar{X} - SD) \geq \bar{X}_i > (\bar{X} - 2SD)$
Moderately Resistant	$\bar{X} \geq \bar{X}_i > (\bar{X} - SD)$
Moderately susceptible	$\bar{X} < \bar{X}_i \leq (\bar{X} + SD)$
Susceptible	$(\bar{X} + SD) < \bar{X}_i \leq (\bar{X} + 2SD)$
Highly Susceptible	$\bar{X}_i > (\bar{X} + 2SD)$

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Categorization of sapota varieties

The sapota varieties were grouped into six categories for their susceptibility to bud borer *viz.*, highly resistant, resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible based on percent bud damage. For this purpose, mean value of individual variety $\bar{X}_i$ was compared with mean value of all varieties $\bar{X}$ and standard deviation (SD) by following scale.

RESULTS AND DISCUSSION

From the data on mean number of percent bud damage in Table 2 and percent bud damage graphically depicted in Figure 1, it could be seen that none of variety was free from incidence of bud borer. However, minimum 2.38 per cent damage was recorded in variety Pilipatti, which was at par with Murabba (2.98 per cent) and Mohangoottee (3.46 per cent). While, maximum 12.79 per cent damage was recorded in variety Kalipatti, followed by Cricket ball (10.19 per cent), Calcutti special (7.62 per cent), Zumakhiya (5.31 per cent) and Bhuripatti (4.78 per cent).

Table 2: Percent bud damage caused by sapota bud borer, *A. achrasella* and yield of different varieties of sapota during the year 2021-22

Sr. No.	Varieties	Mean per cent bud damage caused by *A. achrasella*	Yield (kg/tree/year)
1	Bhuripatti	2.18(4.78)*	81.04
2	Calcutti special	2.75(7.62)	101.36
3	Cricket ball	3.18(10.19)	129.25
4	Kalipatti	3.57(12.79)	136.56
5	Mohangoottee	1.86(3.46)	69.67

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6	Murabba	1.72(2.98)	71.81
7	Pilipatti	1.54(2.38)	65.41
8	Zumakhiya	2.30(5.31)	96.69
	S.Em. ±	0.22	4.28
	C.D. at 5%	0.63	12.84
	C.V.%	7.31	7.89

*The figures in parentheses are retransformed values, those outside are square root transformed values.

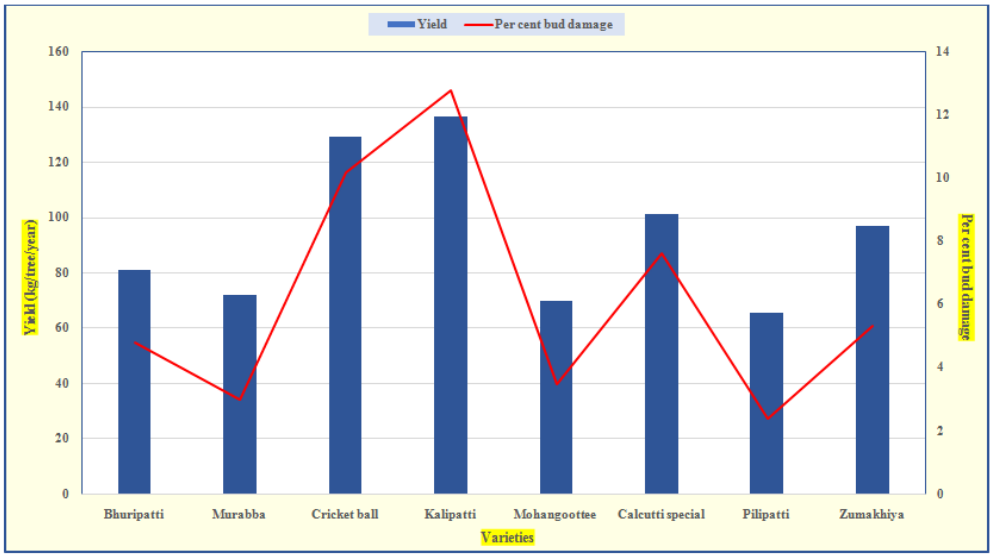

Figure 1: Per cent bud damage by bud borer, *A. achrasella* and yield of different sapota varieties

Kalipatti is most widely grown variety of sapota in Gujarat, which was found susceptible to damage of bud borer even though recorded highest yield *i.e.*, 136.56 kg/tree/year. Contrast in the results may be due to luxurious growth of variety attracted bud borer or high yielding capacity of variety, it was at par with Cricket ball (129.25 kg/tree/year). Next highest yield was recorded from Calcutti special (101.36 kg/tree/year), Zumakhiya (96.69 kg/tree/year),

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Bhuripatti (81.04 kg/tree/year), Murabba (71.81 kg/tree/year), Mohangoottee (69.67 kg/tree/year) and Pilipatti (65.41 kg/tree/year).

Categorization of sapota varieties for resistance

Based on the categorization of resistance presented in Table 3.2, none of a variety of sapotawas found highly resistant and highly susceptible to the damage of sapota bud borer. While, variety Pilipatti found resistant to the damage of sapotabud borer. Variety Murabba, Mohangoottee, Bhuripatti, and Zumakhiyagrouped under moderately resistant category. Calcutti special variety was found moderately susceptible. Variety Cricket ball and Kalipatti found susceptible to the damage of sapotabud borer.

Table 3: Categorization of different varieties of sapota for their resistance against bud borer,*A. achrasella*during the year 2021-22

Category of resistance	Scale for resistance	Varieties	Per cent bud damage
Highly resistant	$\bar{X}_i \leq -1.24$	-	-
Resistant	$2.24 \geq \bar{X}_i > -1.24$	Pilipatti	2.38
Moderately resistant	$6.19 \geq \bar{X}_i > 2.48$	Murabba Mohangoottee Bhuripatti Zumakhiya	2.98 3.46 4.78 5.31
Moderately susceptible	$6.19 < \bar{X}_i \leq 9.90$	Calcutti special	7.62
Susceptible	$9.90 < \bar{X}_i \leq 19.62$	Cricket ball	10.19

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		Kalipatti	12.79
Highly Susceptible	$\overline{X_i} > 13.62$	-	-

Where, $\overline{X_i}$ = Mean value of individual variety

Above results are based on the study on varietal screening of sapota against bud borer was carried out at Fruit Research Station, Gandevi revealed that the minimum bud damage was found in Pilipatti (2.03 %), followed by PKM- 5 (2.96 %) and Mohangoottee (2.97 %). However, the maximum bud damage (5.33 %) was reported in DHS-1, followed by Kalipatti (5.27 %) and DHS-2 (4.78 %), (Anon., 2015). Bisane and Naik (2016) at South Gujarat observed the sixteen varieties of sapota, in which bud borer, *A. achrasella* infestation was lower on Pilipatti, Bhuripatti, PKM-5 and Mohangoottee, while it wasreported higher in DHS-1, Kalipatti and DHS-2 varieties, during March to June. Vaja*et al.* (2018) tested eight varieties of sapota against bud borer at Junagadh (Gujarat), among them variety Cricket ball showed most susceptible 5.62 per cent infestation. While, variety Mohangoottee showed moderately susceptible 2.75 per cent infestation followed by Bhuripatti, Zumakhiya, Calcutti special and Kalipatti were recorded 2.96, 3.45, 4.82 and 5.12 per cent infestation, respectively. Variety of PKM-1 showed the least susceptible 2.39 per cent infestation and it was at par with Pilipatti2.60 percent infestation.

CONCLUSION

Current findings on varietal screening of sapota varieties against bud borer, *A. achrasella*revealed that, among eight varieties of sapota, Pilipatti variety found resistant to the damage of sapota bud borer with 2.38 per cent bud damage. Varieties *viz*., Murabba, Mohangoottee, Bhuripatti and Zumakhiyawere grouped under moderately resistant category with 2.98, 3.46, 4.78 and 5.31 per cent bud damage, respectively. Calcutti special variety was found moderately susceptible with 7.62 per cent bud damage. Cricket ball and Kalipatti varieties were found susceptible with 10.19 and 12.79 per cent bud damage, respectively. In contrast, Kalipatti variety recorded highest yield (136.56 kg/tree/year), it was at par with

Cricket ball (129.25 kg/tree/year). Next high yielding varieties were Calcutti special (101.36 kg/tree/year), Zumakhiya (96.69 kg/tree/year),Bhuripatti (81.04 kg/tree/year), Murabba (71.81 kg/tree/year), and Mohangoottee (69.67 kg/tree/year),whereas, the lowest yield was recorded fromPilipatti variety (65.41 kg/tree/year).

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