

Varietal Performance of Sapota Against Bud and Seed Boring Insect Pests Under South Guajrat Condition

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Abstract: The varietal evaluation of sapota was carried out at Fruit Research Station, N.A.U., Gandevi during 2014-15 against bud and seed boring insect pests at peak infestation period. The performance was investigated on sixteen sapota varieties/hybrids, wherein bud and fruit damage was noted to check the seasonal susceptibility/resistant. Among bud boring pests, bud borer (*Anarsia achrasella* Bradley) infestation was low on Pilipatti, Bhuripatti, PKM-5 and Mohangoottee, while the higher bud damage in DHS-1, Kalipatti and DHS-2 during March to June. In case of chiku moth, *Nephoptyryx eugraphella* (Ragonot) activity, the lower bud damage was noticed in Bhuripatti, Singapore and Mohangoottee, whereas the higher infestation on Pilipatti, DHS-1, Murabba and Paria Collection during April, May and December. Sapota seed borer (*Trymalitis margarias* Meyrick) caused less fruit loss in PKM-5, DSH-1, PKM-2, Bhuripatti and PKM-1, however the higher fruit infestation in Kalipatti, Cricket ball and CO-2 during November-December.

Keyword: Varietal Performance, Sapota, Bud Borer, Chiku Moth, Seed Borer.

INTRODUCTION

Among tropical fruits, sapota or *Chiku* is a vital fruit of India and gaining importance among fruit crops. Gujarat shared 16 per cent sapota acreage and 17 per cent production of the country and ranked third position after Maharashtra and Karnataka [Anonymous (4)]. The persistent efforts of last two decades by scientists have resulted in identification of 16 insect pests and mites from sapota growing area of Gujarat [Patel (11)].

Among bud borer complex, bud borer (bud worm), *Anarsia achrasella* Bradley (Lepidoptera: Gelechiidae) and chiku moth (leaf webber), *Nephoptyryx eugraphella* (Ragonot) (Lepidoptera: Pyralidae) are foremost pests of sapota. They damages up to 20 to 30 per cent of flowers/buds and therefore, are considered to be key factors affecting the yield potential of sapota in Gujarat [Jhala *et al.* (7) and Patel (10)]. Besides this, seed borer, *Trymalitis margarias* Meyrick (Lepidoptera :

Tortricidae) is a new emerging insect pest in sapota orchard causing very serious fruit damage at peak bearing stage, which also deteriorates commercial value of the produce. This new pest has become a major on sapota causing huge direct fruit loss up to 35 per cent [Jayanthi and Verghese (5)]. The seed borer is a monophagous, micro-lepidopteran pest attacking immature fruits of sapota. The larva feeds only on endosperm of the seed and completes its larval period inside the seed [Jayanthi and Verghese (6)].

In way forward of developing insect pest management strategy for specific variety in changing agro-ecosystem, it is necessary to have basic information on abundance and damage intensity of pest. Therefore, the details study on bud borer, chiku moth and seed borer incidence was studied on different varieties/hybrids of sapota in changing ecological condition of South Gujarat circumstance.

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MATERIAL AND METHODS

The experiment on bud and seed boring insect pests activity was carried out during 2014-15 in sapota orchard of Fruit Research Station, Navsari Agricultural University, Gandevi. The seasonal occurrence study of bud borer, chiku moth and seed borer based on per cent bud and fruit damage on sixteen varieties of sapota *viz.*, PKM-2, PKM-1, Murabba, Mohangoottee, Zumakhiya, Bhuripatti, Pilipatti, Cricket ball, Singapore, Kirthibirthi, CO-2, Kalipatti, Paria Collection, PKM-5, DHS-1 and DHS-2 was examined on three replicated trees planted at 10 × 10 m spacing.

In sapota orchard, randomly selected 30 twig of each variety was selected at monthly interval for the incidence of bud borer and chiku moth. Total number of new bud as well as damaged bud was counted on each twig to calculate the per cent bud infestation. The bud damage was recorded at peak activity period from March to June for bud borer as well as May-June and November-December for chiku moth. For seed borer, the per cent infestation was recorded at the time of harvest at each picking during November to January at peak fruiting phase. From the randomly selected 100 sapota fruits from each plant, the damaged fruits were noted down to calculate the per cent infestation of seed borer. The average damage of observations was statistically analyzed in random block design to evaluate the varietal difference.

RESULTS AND DISCUSSION

Bud Borer

The varietal performance of sapota was evaluated during peak bud borer (*A. achrasella*) damage span from March to June at flowering period and the pooled results are presented in Table 1. The varietal evaluation data showed that the lower bud damage was noticed in Pilipatti (2.03%), followed by Bhuripatti (2.93%), PKM-5 (2.96%) and Mohangoottee (2.97%). However, the higher bud damage was reported in DHS-1 (5.38%), followed by Kalipatti (5.27%) and DHS-2 (4.78%). The sapota hybrids *viz.*, DHS-1 and DHS-2 were found more susceptible to the bud borer attack to the extent of 6.32 and 5.52 per cent in the month of April at peak flowering flush, respectively.

While, Kalipatti was highly infested up to 6.66 per cent at peak flowering phase during June. Other varieties were moderately infested by bud borer during March to June and no major variation was reported between average and maximum bud damage.

In earlier reports, Kalipatti and DHS-1 found more prone to bud borer damage as compare to PKM-1 under South Gujarat condition [Anonymous (1), (2) and (3)]. Recently on evaluation of eight varieties, Kalipatti, PKM-3 and DHS-1 were highly infested with bud borer, while the varieties *viz.*, CO-3, Cricket ball, and DHS-2 were found less susceptible to bud borer [Khambhu (8)] and these results are comparable to present study.

Chiku Moth

The evaluation results of sapota varieties/hybrids against chiku moth (*N. eugraphella*) bud damage (Table 1) showed that the lower bud infestation was observed in Bhuripatti (2.40), Singapore (2.74), Mohangoottee (2.94%) and Zumakhiya (3.20%), whereas the higher bud damage was reported in Pilipatti (8.70%), DHS-1 (8.43%), Murabba (7.76%) Paria collection (7.88%) and Kalipatti (6.66%) during May and December. The varieties *i.e.* Pilipatti and Murabba had highest bud damage up to 8.70 and 7.76 per cent during May, respectively at peak flowering stage. While, Paria Collection, DHS-1 and Kalipatti was highly infested during December month at main fruiting phase to the extent of 9.52, 9.50 and 9.26 per cent, respectively. Other varieties/hybrids were moderately damaged with chiku moth with less difference between average and maximum infestation.

In previous reports, Kalipatti found more susceptible to chiku moth [Anonymous (1) and (2)] comparable with the present findings. However in contrast, Cricket ball was reported to be more susceptible in findings of Patel (9) as well as PKM-1 as least susceptible in another report [Anonymous (3)], which may be due to seasonal variability. Similarly, Khambhu (8) recorded the lowest chiku moth bud infestation in CO-3, PKM-1 and PKM-4, while DHS-2 and Kalipatti had more bud damage, which support the present investigation.

Table 1
Varietal performance of sapota against bud and seed boring insect pests (2014-15)

Tr. No.	Varieties	Per cent bud damage due to bud borer			Per cent bud damage due to chiku moth			Per cent fruit damage due to seed borer		
		Average	Maximum	Peak activity month	Average	Maximum	Peak activity month	Average	Maximum	Peak activity month
T ₁	PKM-2	3.85 (11.29) ^{cde}	5.50	June	5.14 (13.09) ^c	6.58	December	3.20 (10.25) ^{abc}	4.00	November
T ₂	PKM-1	3.44 (10.69) ^{bcd}	4.24	June	5.70 (13.81) ^{cd}	6.25	April	3.61 (10.79) ^{abcd}	5.67	December
T ₃	Murabba	3.86 (11.33) ^{de}	4.78	May	7.96 (16.37) ^{ef}	9.70	May	4.79 (12.61) ^{abcde}	5.68	November
T ₄	Mohangootee	2.97 (9.88) ^b	4.02	April	2.94 (9.84) ^{ab}	3.80	May	5.26 (13.23) ^{bcddefg}	6.00	December
T ₅	Zumakhiya	3.41 (10.64) ^{bcd}	3.91	April	3.20 (10.28) ^{ab}	4.41	December	5.90 (13.95) ^{def}	11.83	December
T ₆	Bhuripatti	2.93 (9.83) ^b	3.30	April	2.40 (8.91) ^a	2.97	May	3.58 (10.83) ^{abcd}	4.67	December
T ₇	Pilipatti	2.03 (8.18) ^a	2.40	June	8.70 (17.15) ^f	9.85	May	3.97 (11.45) ^{abcde}	6.33	December
T ₈	Cricknet ball	4.31 (11.96) ^{ef}	5.06	March	3.69 (11.02) ^b	3.93	December	7.84 (16.18) ^{fg}	14.11	December
T ₉	Singapore	4.53 (12.27) ^{efg}	5.74	June	2.74 (9.51) ^{ab}	3.46	May	6.00 (13.95) ^{def}	11.11	December
T ₁₀	Kirthibarthi	4.25 (11.90) ^{def}	5.32	May	5.46 (13.51) ^{cd}	6.79	April	5.61 (13.62) ^{cdef}	6.33	December
T ₁₁	CO-2	3.08 (10.06) ^{bc}	3.76	April	5.98 (14.14) ^{cd}	6.76	April	6.24 (14.40) ^{ef}	8.56	November
T ₁₂	Kalipatti	5.27 (13.28) ^g	6.66	June	6.66 (14.94) ^{de}	9.26	December	11.40 (19.64) ^g	17.67	December
T ₁₃	Paria Collection	4.03 (11.58) ^{def}	4.53	May	7.88 (16.28) ^{ef}	9.52	December	5.65 (13.72) ^{cdef}	6.56	December
T ₁₄	PKM-5	2.96 (9.88) ^b	3.77	March	6.07 (14.23) ^{cd}	7.40	December	2.98 (9.72) ^a	3.89	December
T ₁₅	DHS-1	5.38 (13.40) ^g	6.32	April	8.43 (16.86) ^f	9.50	December	3.20 (9.99) ^{ab}	4.05	December
T ₁₆	DHS-2	4.78 (12.61) ^{fg}	5.52	April	4.90 (12.76) ^c	5.82	April	3.82 (11.26) ^{abcde}	5.56	December
SEM +		0.44	-	-	0.54	-	-	1.20	-	-
CD at 5 %		1.26	-	-	1.56	-	-	3.47	-	-
CV%		6.76	-	-	7.05	-	-	16.18	-	-

*Figures in parenthesis are arc sin transformed values.

Seed Borer

The varietal evaluation experiment against seed borer (*T. margarias*) was initiated from November at the commencement of harvesting and per cent fruit damage recorded at each picking during November, December and January (Table 1). The mean data on sapota seed borer infestation indicated that the lowest fruit damage was reported in PKM-5 (2.98%), followed by DHS-1 (3.20%), PKM-2 (3.20%), Bhuripatti (3.58%) and PKM-1 (3.61%) during November-December. However, the highest fruit loss due to seed borer was found in Kalipatti (11.40%), Cricket ball (7.84%) and CO-2 (6.24%) and these varieties showed more susceptibility towards seed borer. The maximum loss to the extent of 17.67 and 14.11 per cent due to seed borer was exhibited in Kalipatti and Cricket ball, respectively at peak fruiting phase of December month. Whereas, the higher activity of seed borer (8.56%) was observed in CO-2 during November. There was not major variation in fruit damage among other sapota varieties/hybrids and were moderately susceptible at peak fruiting phase.

Recently, PKM-3, PKM-4 and CO-3 had less infestation due to seed borer, while Kalipatti, Cricket ball and DHS-2 recorded higher fruit damage and more prone to susceptibility among eight varieties tested [Khambhu (8)]. Besides this, there is no more literature available on varietal differences against seed borer as it is a new pest introduced during 2000.

On evaluation of sapota varieties/hybrids against major three insect pests of bud and fruit it is concluded that the Kalipatti is highly susceptible to all pest may be due to monoculture cultivation in area as well as Paria Collection and DHS-1 also more

susceptible towards bud boring insect pests. While, Bhuripatti, Zumakhiya and Mohangoottee are less infested by these insect pests in sapota orchard.

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