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Seasonal occurrence of chiku moth *[Nephopteryx eugraphella]* (Ragonot) and bud borer *[Anarsia achrasella]* Bradley on sapota

Chirag V. Khambhu[1] and K. D. Bisane[2*]

[1]Department of Agricultural Entomology, N. M. College of Agriculture, Navsari Agricultural University, Navsari 396 450, Gujarat, India; [2]Fruit Research Station, Navsari Agricultural University, Gandevi 396 360, Gujarat, India, Email: *kdbisane@yahoo.co.in*

ABSTRACT: Seasonal occurrence of bud boring insect pests *viz.*, chiku moth (*Nephopteryx eugraphella*) and bud borer (*Anarsia achrasella*) on eight varieties of sapota as PKM-1, PKM-3, PKM-4, DHS-1, DHS-2, Kalipatti, Cricket ball and CO-3 revealed that the maximum bud damage due to chiku moth was observed during second fortnight of April to first fortnight of June to the extent of 9.93 to 10.78 per cent, while bud borer showed maximum infestation of 9.03 and 9.47 per cent during month of May and then decline from June onwards. The temperature and evaporation rate had significant influence on chiku moth and bud borer incedence. Among the varieties, CO-3 had comparatively low bud in pest infestation due to both pests. DHS-2 showed higher bud damage by chiku moth, whereas bud borer damage was higher in Kalipatti. © 2017 Association for Advancement of Entomology

KEY WORD: Seasonal occurrence, *Nephopteryx eugraphella, Anarsia achrasella*, sapota

INTRODUCTION

In India, sapota or sapodilla is an important fruit of tropical region and gaining importance among fruit crops. Gujarat shared 16% sapota area and 17% production of the country and ranked third position after Maharashtra and Karnataka (Anonymous, 2014b). In Gujarat, cultivation of sapota coupled with intensive monoculture of Kalipatti variety supported by changing environmental condition as well as unchecked pest population caused outburst of insect pests in wider area. Among different bud boring insect pests, chiku moth (leaf webber), *Nephopteryx eugraphella* (Ragonot) (Lepidoptera: Pyrilidae) and bud borer (bud worm), *Anarsia achrasella* Bradley (Lepidoptera: Gelechiidae) 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*., 1986 and Patel, 2001). About 25-28 per cent yield losses due to bud borer and chiku moth can be avoided in protected condition (Anonymous, 2014 a and 2015 b). The caterpillar of chiku moth feeds on leaves, buds and flowers and sometimes on tender fruits. The caterpillars clump the leaves together by webbing and feed within on the chlorophyll and leaving behind a network of veins. The buds were bored and ultimately wither away. The bud borer bores through the upper tapering part of the flower bud of sapota and eats up inner content leading to no flower setting or retention.

* Author for correspondence

In way forward of developing pest management strategy detail study on chiku moth and bud borer incidence was studied on different varieties of sapota in changing ecological condition of South Gujarat.

MATERIALS AND METHODS

The experiment on bud boring pest activity was carried out during 2014-15 in sapota orchard of Fruit Research Station, Navsari Agricultural University, Gandevi. The seasonal occurrence study of chiku moth and bud borer based on per cent bud damage on eight varieties of sapota *viz.*, PKM-1, PKM-3, PKM-4, DHS-1, DHS-2, Kalipatti, Cricket ball and CO-3 was examined on three replicated trees planted at 5 x 5 m spacing under high density plantation. In sapota orchard, randomly selected 5 twig of each variety was selected at fortnightly interval for the incidence of chiku moth and bud borer in new buds. The total numbers of new buds as well as buds damaged by chiku moth and bud borer were recorded separately from each twig. The per cent bud infestation was calculated from the data of bud damage. To evaluate the influence of various ecological factors on progression of bud boring pest, the bud damage was correlated with different meteorological parameters *viz.*, maximum and minimum temperature; morning and evening relative humidity; bright sunshine hrs; rainfall and evaporation.

RESULTS AND DISCUSSION

Chiku moth (*N. eugraphella*):

The seasonal occurrence of chiku moth showed a varying degree of bud infestation throughout the year in the different varieties of sapota (Table 1). The average maximum infestation of chiku moth on buds was 9.93 to 10.78 per cent observed between second fortnight of April to first fortnight of June at peak flowering period and then decline onwards. It was minimum (3.98-4.17%) during January and increased towards February and again reached maximum in April at beginning of crest flowering span. Among varieties, early peak bud infestation was commenced from March in PKM-3, PKM-4, DHS-1, DHS-2 and Kalipatti, while it was observed from April onwards in PKM-1, Cricket ball and CO-3 variety. In Kalipatti, second peak bud damage was occurred during October-November between 6.23 to 7.52 per cent incidence, while in Cricket ball, it was observed in second fortnight of November (7.86%) and first fortnight of December (6.48%). The lowest incidence intensity was also vary among varieties, wherein minimum bud damage was reported during August in DHS-2 (4.44%), November in DHS-1 (2.78%), December in PKM-4 (3.14%) and February in Cricket ball (2.56%) as well as other varieties (PKM-1, PKM-3, Kalipatti and CO-3) had lowest in January as similar with mean incidence data (2.20-4.31%).

The varietal evaluation of sapota varieties (Table 1) indicated that none of the variety was found completely free from the damage of chiku moth during the year 2014-15. There was no much difference among varieties of sapota. However, the average lowest bud infestation was recorded on variety CO-3 (4.94%) comparable with PKM-1 (5.95%) and PKM-4 (6.36%). The variety DHS-2 had the highest mean damage (7.39%) and comparable to Kalipatti (7.25%). Rest of varieties *viz.*, DHS-1, Cricket ball and PKM-3 were recorded 6.42, 6.56 and 6.60 per cent average bud damage, respectively.

The correlation data of average chiku moth damage in sapota (Table 3) indicated highly significant positive association with maximum temperature (r = 0.696), minimum temperature (r = 0.470) and evaporation rate (r = 0.903), but significant negative association with morning relative humidity (r = -0.664). The similar type of trend was observed in all varieties with more or less relationship except in PKM-1, PKM-4 and Kalipatti, wherein minimum temperature didn't have role in increasing chiku moth bud damage, but closely related.

Bud borer (*A. achrasella*):

The seasonal incidence of bud borer (Table 2) showed diverse degree of infestation throughout the year in the different varieties of sapota from

Table 1: Seasonal occurrence of chiku moth (*N. eugraphella*) in different varieties of sapota (2014-15)

Tr. No.	Per cent bud damage*											
	MARCH, 14		APRIL, 14		MAY, 14		JUNE, 14		JULY, 14		AUG., 14	
	I	II	I	II	I	II	I	II	I	II	I	II
T_1: PKM-1	5.72 (13.84)	7.62 (16.02)	6.97 (15.28)	11.97 (20.23)	10.49 (18.88)	10.46 (18.97)	8.83 (17.29)	6.09 (14.27)	5.86 (13.99)	4.05 (11.63)	4.36 (12.02)	5.17 (13.11)
T_2: PKM-3	9.37 (17.82)	10.95 (19.32)	8.06 (16.49)	10.07 (18.50)	10.79 (19.18)	11.98 (20.26)	10.37 (18.78)	8.08 (16.49)	6.90 (15.23)	4.76 (12.58)	3.78 (11.21)	3.92 (11.43)
T_3: PKM-4	7.64 (16.4)	8.86 (17.31)	8.41 (16.86)	10.93 (19.29)	10.51 (18.93)	10.59 (18.99)	9.86 (18.29)	8.23 (16.67)	5.23 (13.20)	4.58 (12.37)	3.20 (10.31)	4.56 (12.32)
T_4: DHS-1	8.52 (16.96)	10.17 (18.58)	7.44 (15.84)	9.02 (17.48)	9.63 (18.06)	11.67 (19.97)	10.57 (18.97)	9.49 (17.93)	8.98 (17.43)	4.61 (12.38)	5.93 (14.08)	6.67 (14.98)
T_5: DHS-2	10.90 (10.28)	11.31 (19.68)	9.33 (17.78)	10.44 (18.84)	10.60 (18.97)	10.93 (19.31)	9.98 (18.39)	8.77 (17.23)	8.57 (17.04)	7.77 (16.17)	6.04 (14.21)	4.44 (12.17)
T_6: Kalipatti	8.93 (17.37)	10.13 (18.54)	8.71 (17.16)	10.62 (19.01)	10.21 (18.64)	10.09 (18.51)	9.98 (15.82)	7.65 (16.06)	5.15 (13.11)	4.53 (12.28)	6.72 (15.01)	6.70 (15.01)
T_7: Cricket ball	6.38 (14.63)	7.78 (16.19)	8.31 (16.74)	9.27 (17.71)	9.56 (18.00)	11.68 (19.97)	10.37 (19.16)	9.90 (18.31)	6.82 (15.18)	5.96 (14.10)	5.28 (13.27)	4.76 (12.60)
T_8: CO-3	4.76 (12.59)	5.08 (13.03)	6.35 (14.57)	7.10 (15.34)	6.11 (14.30)	8.81 (17.24)	9.86 (16.97)	6.99 (15.32)	4.63 (12.41)	4.30 (11.96)	5.86 (14.00)	2.08 (8.31)
Avg.	7.78	8.99	7.95	9.93	9.74	10.78	10.57	8.15	6.52	5.07	5.15	4.79
S.E.m±	0.46	0.57	0.30	0.43	0.45	0.40	0.41	0.36	0.28	0.27	0.34	0.25
CD at 5%	0.60	1.08	0.91	1.29	1.36	1.22	1.25	1.09	0.84	0.81	1.04	0.77
CV%	6.15	5.57	3.18	4.03	4.28	3.64	3.99	3.76	8.25	7.55	4.54	3.52

* Figures in parentheses are arc sin transformed values.

Cont. Table 1

Tr. No.	Per cent bud damage*												Avg.
	SEP., 14		OCT., 14		NOV., 14		DEC., 14		JAN., 15		FEB., 15		
	I	II	I	II	I	II	I	II	I	II	I	II	
T1: PKM-1	6.80 (15.07)	6.67 (14.96)	6.67 (14.96)	4.84 (12.71)	4.38 (12.07)	3.08 (10.06)	4.34 (12.01)	3.90 (11.39)	2.37 (8.87)	3.84 (11.28)	4.59 (12.36)	3.67 (11.04)	5.95
T2: PKM-3	4.78 (12.55)	6.33 (14.56)	6.52 (14.78)	4.78 (12.57)	6.14 (14.35)	4.85 (12.730)	5.61 (13.72)	4.58 (12.34)	3.22 (10.34)	3.07 (10.10)	4.91 (12.82)	4.60 (12.38)	6.60
T3: PKM-4	5.14 (13.07)	3.70 (11.08)	4.78 (12.58)	5.56 (13.63)	5.44 (13.50)	5.00 (12.92)	3.17 (10.24)	5.17 (13.15)	4.95 (12.81)	5.53 (13.59)	6.44 (14.69)	5.10 (13.04)	6.36
T4: DHS-1	6.33 (14.54)	4.76 (12.57)	3.33 (10.53)	4.28 (11.90)	3.84 (11.25)	2.78 (9.97)	4.19 (11.77)	5.27 (13.28)	4.57 (12.33)	3.49 (10.75)	4.20 (11.79)	4.23 (11.83)	6.42
T5: DHS-2	5.32 (13.34)	6.73 (15.04)	5.50 (13.51)	4.76 (12.60)	6.70 (15.00)	5.52 (13.60)	6.30 (14.52)	6.38 (14.64)	5.77 (13.89)	4.64 (12.41)	5.66 (13.75)	4.96 (12.84)	7.39
T6: Kalipatti	7.33 (15.71)	6.60 (14.87)	7.52 (15.92)	6.23 (14.46)	6.62 (14.92)	7.18 (15.52)	5.73 (13.83)	5.67 (13.75)	4.31 (11.93)	6.22 (14.43)	6.00 (14.18)	7.81 (16.23)	7.25
T7: Cricket ball	5.52 (13.57)	5.20 (13.17)	5.90 (14.01)	5.32 (13.32)	5.96 (14.12)	7.86 (16.27)	6.48 (14.73)	5.22 (13.21)	3.51 (10.79)	4.38 (12.07)	3.03 (9.99)	2.56 (9.23)	6.56
T8: CO-3	3.00 (9.97)	5.71 (13.82)	4.10 (11.70)	4.08 (11.65)	5.33 (13.36)	3.97 (11.47)	4.52 (12.27)	4.56 (12.33)	3.14 (10.22)	2.20 (8.53)	3.17 (10.18)	4.17 (11.78)	4.94
Avg.	5.53	5.71	5.54	4.98	5.55	5.03	5.04	5.09	3.98	4.17	4.75	4.64	6.43
S.E.m±	0.50	0.39	0.54	0.29	0.31	0.39	0.35	0.32	0.42	0.30	0.47	0.36	--
CD at 5%	1.52	1.19	1.63	0.88	0.94	1.19	1.06	0.98	1.27	0.91	1.42	1.10	--
CV%	6.42	4.95	6.89	3.90	3.94	5.33	4.72	4.31	6.38	4.45	6.52	5.13	--

* Figures in parentheses are arc sin transformed values.

Table 2: Seasonal occurrence of bud borer (*A. achrasella*) in different varieties of sapota (2014-15)

Tr. No.	Per cent bud damage*											
	MARCH, 14		APRIL, 14		MAY, 14		JUNE, 14		JULY, 14		AUG., 14	
	I	II	I	II	I	II	I	II	I	II	I	II
T1: PKM-1	4.22 (11.87)	6.64 (14.95)	7.81 (16.21)	8.22 (16.65)	8.09 (16.50)	7.93 (16.35)	8.17 (16.61)	5.60 (13.69)	3.81 (11.26)	4.28 (11.94)	1.38 (6.750	1.10 (6.03)
T2: PKM-3	2.06 (8.28)	3.86 (11.31)	5.33 (13.33)	7.87 (16.29)	10.17 (18.57)	10.43 (18.84)	7.78 (16.19)	6.25 (14.48)	4.15 (11.76)	5.24 (13.23)	3.94 (11.43)	5.29 (13.28)
T3: PKM-4	6.67 (14.97)	5.56 (13.65)	7.79 (16.19)	8.37 (16.80)	11.37 (19.70)	11.11 (19.47)	8.28 (16.72)	5.87 (14.02)	3.33 (10.51)	4.49 (12.23)	4.81 (12.66)	2.00 (8.13)
T4: DHS-1	7.41 (15.80)	6.24 (14.47)	7.17 (15.54)	8.17 (16.58)	11.25 (19.60)	11.25 (19.60)	8.89 (17.34)	6.53 (14.80)	4.26 (11.92)	4.67 (12.48)	2.11 (8.35)	1.30 (6.58)
T5: DHS-2	4.78 (12.62)	6.02 (14.20)	5.56 (13.65)	6.50 (14.77)	7.70 (16.11)	7.14 (15.50)	9.66 (18.11)	7.71 (16.12)	5.79 (13.91)	3.47 (10.72)	3.56 (10.84)	2.27 (8.65)
T6: Kalipatti	5.60 (13.68)	6.39 (14.63)	7.63 (16.02)	8.04 (16.45)	10.32 (18.75)	10.42 (18.83)	7.44 (15.83)	9.71 (18.16)	7.95 (16.37)	4.42 (12.15)	2.21 (8.57)	1.80 (7.71)
T7: Cricket ball	3.50 (10.81)	4.10 (11.68)	6.72 (15.04)	7.79 (16.19)	8.33 (16.77)	9.75 (18.19)	7.38 (15.76)	5.86 (14.00)	3.65 (11.00)	5.33 (13.36)	5.66 (13.77)	1.05 (5.87)
T8: CO-3	2.40 (6.90)	3.20 (10.30)	6.03 (14.21)	4.76 (12.61)	5.00 (12.92)	7.75 (16.16)	7.94 (16.36)	6.08 (14.28)	4.42 (12.14)	5.80 (13.94)	3.69 (11.08)	1.42 (6.80)
Avg.	4.58	5.25	6.76	7.47	9.03	9.47	8.19	6.70	4.67	4.71	3.42	2.03
S.E.m±	0.46	0.52	0.35	0.44	0.74	0.89	0.55	0.82	0.47	0.68	0.79	0.60
CD at 5%	0.51	0.50	0.61	1.33	0.96	1.24	0.66	0.65	0.99	0.79	1.38	1.24
CV%	5.38	7.17	6.32	4.82	3.14	6.09	7.51	5.46	6.89	6.57	8.42	9.76

* Figures in parentheses are arc sin transformed values.

Cont. Table 2

Tr. No.	Per cent bud damage*												Avg.
	SEP., 14		OCT., 14		NOV., 14		DEC., 14		JAN., 15		FEB., 15		
	I	II	I	II	I	II	I	II	I	II	I	II	
T1: PKM-1	1.40 (6.76)	1.50 (7.00)	2.42 (8.95)	3.17 (10.24)	5.07 (13.03)	3.20 (10.29)	4.30 (11.97)	5.63 (13.72)	5.42 (13.42)	4.38 (12.06)	4.86 (12.72)	5.68 (13.79)	4.76
T2: PKM-3	2.00 (8.13)	2.06 (8.26)	2.80 (9.61)	3.20 (10.30)	4.62 (12.43)	4.30 (11.97)	4.70 (12.46)	5.21 (13.21)	5.73 (13.77)	5.80 (13.93)	6.66 (14.97)	6.90 (15.25)	5.26
T3: PKM-4	3.05 (10.07)	3.30 (10.47)	3.80 (11.22)	3.70 (11.10)	3.42 (10.65)	2.60 (9.29)	1.96 (8.02)	2.33 (8.62)	3.64 (10.97)	4.11 (11.66)	3.06 (10.10)	4.17 (11.80)	4.95
T4: DHS-1	1.75 (7.62)	1.40 (6.78)	2.00 (8.13)	4.55 (12.31)	4.71 (12.52)	3.06 (10.11)	2.78 (9.58)	3.23 (10.38)	4.79 (12.61)	5.66 (13.77)	5.08 (13.02)	5.56 (13.64)	5.16
T5: DHS-2	1.96 (8.01)	1.60 (7.25)	2.90 (9.80)	3.67 (11.04)	2.67 (9.42)	2.04 (8.21)	2.08 (8.12)	3.63 (10.93)	3.02 (9.96)	4.09 (11.65)	5.09 (13.03)	5.53 (13.61)	4.52
T6: Kalipatti	2.17 (8.49)	2.06 (8.24)	2.10 (8.35)	2.76 (9.56)	3.78 (11.20)	5.95 (14.14)	4.66 (12.44)	3.06 (9.99)	4.21 (11.85)	5.93 (14.07)	5.76 (13.89)	7.06 (15.43)	5.48
T7: Cricket ball1.	39 (6.74)	1.20 (6.27)	1.30 (6.56)	2.14 (8.42)	3.25 (10.40)	2.28 (8.65)	2.40 (8.88)	3.86 (11.31)	4.23 (11.73)	4.23 (11.87)	5.55 (13.62)	4.39 (12.08)	4.39
T8: CO-3	1.10 (6.02)	1.60 (7.25)	1.40 (6.82)	2.35 (8.83)	3.33 (10.51)	1.19 (6.26)	2.33 (8.75)	3.63 (10.99)	3.70 (11.02)	4.49 (12.19)	2.44 (9.01)	4.32 (11.98)	3.77
Avg.	1.85	1.84	2.34	3.19	3.86	3.08	3.15	3.82	4.34	4.84	4.81	5.45	4.79
S.E.m±	0.72	0.53	0.48	0.58	0.74	0.62	0.50	0.55	0.90	0.50	0.70	0.32	--
CD at 5%	1.11	1.01	0.66	0.96	1.32	1.12	1.52	1.68	2.73	1.50	2.11	0.97	--
CV%	5.67	6.68	5.02	6.78	8.34	7.56	8.63	8.61	13.10	6.79	9.64	4.11	--

* Figures in parentheses are arc sin transformed values.

Table 3: Correlation of chiku moth (*N. eugraphella*) seasonal occurrence with ecological parameters (2014-15)

Tr. No. / Weather Parameter	Temperature (°C)		Relative Humidity (%)		Bright Sunshine hrs	Rainfall (mm)	Evaporation (mm/day)
	Tmax.	Tmin.	Mor. RH	Eve. RH			
T_1: PKM-1	0.546**	0.308	-0.608**	0.059	-0.102	-0.071	0.756**
T_2: PKM-3	0.753**	0.385**	-0.656**	-0.021	0.024	-0.254	0.882**
T_3: PKM-4	0.683**	0.247	-0.721**	-0.128	0.141	-0.296	0.897**
T_4: DSH-1	0.436*	0.501**	-0.545**	0.269	-0.182	-0.077	0.766**
T_5: DSH-2	0.673**	0.540**	-0.511**	0.169	0.087	-0.162	0.792**
T_6: Kalipatti	0.724**	0.314	-0.536**	-0.079	0.238	-0.392	0.888**
T_7: Cricket ball	0.635**	0.567**	-0.573**	0.173	-0.175	-0.116	0.755**
T_8: CO-3	0.582**	0.509**	-0.633**	0.099	-0.206	-0.177	0.777**
Avg.	0.696**	0.470*	-0.664**	0.081	-0.028	-0.208	0.903**

*Significant at 5% level and ** at 1% level.

Table 4: Correlation of bud borer (*A. achrasella*) seasonal occurrence with ecological parameters (2014-15)

Tr. No. / Weather Parameter	Temperature (°C)		Relative Humidity (%)		Bright Sunshine hrs	Rainfall (mm)	Evaporation (mm/day)
	Tmax.	Tmin.	Mor. RH	Eve. RH			
T_1: PKM-1	0.530**	-0.083	-0.639**	-0.395*	0.152	-0.301	0.719**
T_2: PKM-3	0.294	0.104	-0.411*	-0.165	-0.087	-0.165	0.542**
T_3: PKM-4	0.576**	0.372	-0.611**	0.022	-0.003	-0.158	0.850**
T_4: DSH-1	0.541**	0.118	-0.685**	-0.220	0.055	-0.239	0.799**
T_5: DSH-2	0.496**	0.299	-0.616**	-0.035	-0.100	-0.197	0.817**
T_6: Kalipatti	0.459*	0.159	-0.451*	-0.156	-0.005	-0.217	0.682**
T_7: Cricket ball	0.344	0.203	-0.547**	-0.033	-0.116	-0.055	0.670**
T_8: CO-3	0.224	0.309	-0.468*	0.100	-0.323	0.086	0.579**
Avg.	0.489*	0.203	-0.615**	-0.127	-0.048	-0.180	0.788**

*Significant at 5% level and ** at 1% level.

March 2014 to February 2015. The bud borer damage was increased from March onwards and reached maximum at peak flowering period in May (9.03-9.47%) and in first fortnight of June (8.19%). The bud infestation decline July onwards and observed minimum during monsoon period of September (1.84-1.85%). Among varietal differences in seasonal occurrence, higher bud damage was commenced from March in DHS-1, while in May in DHS-2 and CO-3 and other five varieties had similar higher damage from April. The minimum bud damage was also vary in different varieties like August in PKM-1 (1.10%); September in PKM-3 (2.00%), DHS-1 (1.40%), DHS-2 (1.60%), Kalipatti (2.06%), Cricket ball (1.20%) and CO-3 (1.10%) as well as December in PKM-4 (1.96%). From the data presented in Table 2 indicated that none of the variety was found

completely free from the attack of bud borer during the year 2014-15. However, the lowest average seasonal occurrence was recorded on variety CO-3 (3.77%), which was followed by Cricket ball (4.39%) and DHS-2 (4.52%). The variety Kalipatti had the highest mean seasonal occurrence (5.48%) and nearer to variety PKM-3 (5.26%). Rest of varieties *viz*., PKM-1, PKM-4 and DHS–1 were recorded 4.76, 4.95 and 5.16 per cent bud damage, respectively.

The correlation study on average incidence of bud borer on sapota (Table 4) indicated significant positive association with maximum temperature (r = 0.489) and evaporation rate (r = 0.788) as well as negative correlation with morning relative humidity (r = -0.615). This type of trend was also reported in five sapota varieties, but slightly differs in PKM-3, Cricket ball and CO-3, wherein the maximum temperature didn't have any influence on bud borer damage. In contrast, evening relative humidity had slight correlation with bud damage in PKM-1.

The current chiku moth bud infestation level is found similar with previous findings of South Gujarat condition (Anonymous, 2009) and Periyakulam (T.N.) locations (Anonymous, 2015a). In earlier few reports, chiku moth was reported highest during September onwards under South Gujarat (Patel *et al.*, 1993, Anonymous, 1998 and Deshmukh, 2001), while under middle Gujarat, its peak activity was reported in July (Patel, 1996) as well as during September in North Gujarat location (Hajare *et al.,* 2012). These data were recorded on Kalipatti variety and difference may be due to variability in ecological conditions. Susceptibility of Kalipatti to chiku moth corroborates with earlier reports (Anonymous, 1995 and 1998). Patel (1996) reported that cricket ball was more susceptible. The variety PKM 1 was reported as least susceptible (Anonymous, 2001). Chiku moth correlation findings in the present investigation are more or less contradicting with the findings of Patel *et al.* (1993), Patel (1996) and in earlier data recorded on Kalipatti variety in South Gujarat condition (Anonymous, 1995, 1998, 2009, 2014a, 2015b). The findings on the peak activity of bud borer damage in sapota cv. Kalipatti under South Gujarat condition corroborates with the results of Jhala *et al.* (1986) and the data recorded at same sapota orchard (Anonymous, 1998, 2001 and 2009). This trend showed there is much fluctuations in intensity of bud damage during last two decades. Similarly, the same trend of bud borer infestation was also reported at Periyakulam area of Tamil Nadu (Anonymous, 2013) and hill zone of Karnataka by Ravulapenta *et al.* (2014) as well as in Gujarat at Bharuch by Patel *et al.* (2014) and at Anand by Thumar *et al.* (2015) in different varieties of sapota. In earlier reports, Kalipatti and DSH-1 were found more prone to bud borer damage as compare to PKM-1 under South Gujarat condition (Anonymous, 1995, 1998, 2001, 2014a, 2015b). The present bud borer correlation findings are also supported by the results of Jayanthi *et al.* (2008) as well as previous research carried on Kalipatti at same locality with more or less relationship with ecological factors (Anonymous, 1998, 2009, 2014a, 2015b).

With respect to bud boring insect pests, the maximum abundance of chiku moth and bud borer was observed in May-June at peak flowering stage of sapota orchard. The results revealed increase maximum temperature and ultimately evaporation rate as well as decrease morning relative humidity caused higher bud borer damage in sapota. On evaluation of eight varieties, CO-3 had least bud damage due to chiku moth and bud borer, whereas Kalipatti, DHS-2 and PKM-3 were highly infested. However, the rest of the varieties viz., PKM-1, PKM-4, DHS-1 and Cricket ball were found moderately susceptible to both pests.

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