

Research Note**INCIDENCE OF INSECT PESTS ON CHAYOTE, *Sechium edule* (Swartz.) IN NEPAL****F. P. Neupane, M. D. Sharma and K. R. Neupane**

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ABSTRACT

The insect pests recorded during 1993-96 on chayote in Chitwan, Lalitpur and Parbat districts were as follows: white grubs (*Phyllophaga* spp.), mole cricket (*Gryllotalpa fuscator* Fab.), field cricket (*Brachytrypes portentosus* Licht.), red pumpkin beetle (*Aulacophora foveicollis* Lucas), blue pumpkin beetle (*Aulacophora lewisii* Baly), flea beetle (*Monolepta signata* Oliv.), tobacco caterpillar (*Spodoptera litura* Fab.), stink bug (*Coridius janus* Fab.), spotted beetle (*Epilachna pusilanima* Mulsant), banded blister beetle (*Mylabris phalerata* Pallas), brown bug (*Agonoscelis nubila* Fab.), cotton aphid (*Aphis gossypii* Glov.), pumpkin fruit fly (*Bacterocera cucurbitae* Coq.), and three unidentified insect pests- brown weevil, hairy caterpillars and stem boring beetle. Of them, the fruit fly and cotton aphid were the serious ones. Nepalese and Mexican accessions of chayotes varied for their susceptibility to both the above insects. The chayote fruits with tough fruit skin and dense and long spines were less susceptible to fruit fly, while the spineless and smooth fruits were the most susceptible.

Key words: Chayote germplasm, insect pests, aphid and fruit fly

INTRODUCTION

Chayote, *Sechium edule* (Jacq.) Sw. is one of the popular vegetable crops in the hilly region of Nepal (Sharma and Neupane, 1994). It is cultivated as perennial crop mainly for tender fruits in the home garden. The young shoots and tuberous roots are also used as vegetable. Neupane (1989, 1993) reported that the same insect pests attack all the cucurbitaceous crops but some of them seriously damage, particularly one or more number of crops in Nepal. Patnaik (1967) noticed that aphids, mites, green bugs and brown scales were the common insect pests on chayote in Koraput hills of Orissa, India. The insect pests of this crop are little known in Nepal and this study aimed at recording insect pests in this crop including level of infestation of important ones.

MATERIALS AND METHODS

Insect pests on chayotes were observed during 1993-96, 1994-95 and 1994-96 in Rampur (228m asl), Chitwan; Khurkot (1000m asl), Parbat and Godamchaur (1300m asl), Lalitpur. The chayote germplasms collected from different agro-ecological regions of Nepal, Mexico and Costa Rica were included in this study. Observations on the damage of insect pests were recorded at 15 days interval during January through September 1993 and September to April 1995 in Rampur, Chitwan, during March through December, 1994-1996 in Godamchaur, Lalitpur and during two years 1994 and 1995 in Khurkot, Parbat. The infestation of aphid and fruit fly was quantified in 70 Nepalese and 12 Mexican chayotes. Number of heavily aphid infected shoots per plant was counted in 1-4 plants of each germplasm. Similarly, in case of fruit fly, the number of fruit fly punctures on ten growing fruits of each accession was recorded. The number of spines per cm² fruit surface was also recorded in five fruits of each germplasm.

RESULTS AND DISCUSSION**Minor insect pests**

Various minor insect pests were recorded on this crop. All or some of the minor insect pests were noticed in all the research sites. Of them, white grubs (*Phyllophaga* spp.), mole cricket (*Gryllotalpa fuscator* Fab.) and field cricket (*Brachytrypes portentosus* Licht.) were the root feeders. White grubs were found more frequently in the soil around the roots of chayote in Chitwan site. A lot of surface burrowing of mole cricket was also found in chayote field. Field cricket was seen in chayote fields of Chitwan and Parbat sites during April-May. It cut young shoots of chayote plants and dragged them into their burrows. Of leaf and stem feeding insect pests, red pumpkin beetle (*Aulacophora foveicollis* Lucas.), blue pumpkin beetle (*Aulacophora lewisii* Baly), flea beetle (*Monolepta signata* Oliv.), tobacco caterpillar (*Spodoptera litura* Fab.), brown weevil (unidentified), stink bug [*Coridius* (*Aspongopus*)

janus Fab.], spotted beetle (*Epilachna pusilanima* Mulsant.), banded blister beetle (*Mylabris phalerata* Pallas), hairy caterpillar (unidentified), brown bug (*Agonoscelis nubila* Fab.) and stem boring beetle (unidentified) were recorded (Table 1). The occurrence of red pumpkin beetle was seen mostly during March-April and September. Compared to other cucurbits, this pest did negligible damage on chayote. The adult flea beetles were seen feeding on chayote leaves during spring and summer seasons. The infestation level of tobacco caterpillars was very low. The pest brown weevil fed on the tender shoots of chayote during spring. The stink bug was recorded during rainy season. Few adult spotted beetles were seen on chayote plants in Lalitpur research site. A few adult banded blister beetles fed on the flowers of chayote. A few larvae of hairy caterpillars were seen feeding on the leaves. Brown bug was seen very low in number on chayote. The small, dark brown stem boring beetle larvae were recorded inside the old stems of chayote plants. The larvae made long tunnels in the stem where they pupated. Hence, the major insect pests of the cucurbitaceous crops were also considered the minor on chayotes.

Major insect pests

The important insect pests such as aphid and fruit fly were recorded at all three sites. But the quantification of their damage was assessed in Rampur, Chitwan site only.

Cotton aphid (*Aphis gossypii* Glov.)

This insect became serious on chayote during spring. Both the adults and nymphs sucked sap from the tender shoots and young leaves of the plants. The heavily infested plants became stunted. This aphid is serious on cucurbits and other plants (Neupane, 1989, 1993; Patnail, 1967). The Nepalese chayote germplasms such as N13, N24, N30, N33, N37, N38, N39, N41, N45, N46, N50, N51, N53, N56, N59, N60, N61, N70, N73 and N74 had the highest infestation of this aphid during April 1993.

The level of this aphid infestation was assessed on 18 February, 11 March and 17 April, 1993 in 199 plants of 70 Nepalese accessions (Table 1). The numbers of heavily infested vines with stunted growth were counted on 1-4 plants of each germplasm. The number of such vines per plant ranged from 0 (N6, N13, N22, N35, N42, N54 and N62) to 2.5 (N33) on 18 February, while it was 0 (N13, N22, N24, N26, N56, N62 and N 68) to 3.0 (N64 and N66) and 0 (N2, N6, N8, N10, N11, N14, N17 N18, N21, N25, N27, N35, N43, N48, N51, N52, N54 N62, N63, N64, N65) to 19.0 (N74) on 11 March and 17 April, respectively. Germplasms having the average number of heavily aphid damaged vines less than 1.0, between 1 and 2 and more than 2.0 were grouped into tolerant, susceptible and highly susceptible, respectively. The chayote germplasms varied in aphid susceptibility. Of the 70 germplasms, 46, 20 and 14 belonged to tolerant, susceptible and highly susceptible groups, respectively. The aphid infestation was relatively low in February and March than that in April. The chayotes collected from far western and western regions were relatively less infested than those from central and eastern regions of Nepal. In February and March, most germplasms were infested but the level of damage was low. It may be associated with the slow growing young shoots and low population of aphid. In April, relatively more number of germplasms was free from aphid but some were heavily infested. It indicates the variation of chayote germplasms in aphid incidence. Generally, the slow growing and multiple branched germplasms were severely infested in April. Similar results were observed in the Mexican and Costa Rican chayotes in the same and other research location too.

Pumpkin fruit fly [*Bactrocera (Dacus) cucurbitae* Coquillett]

The fruit fly attacked the young fruits of chayote and the infested fruits dropped off the plants. To know the extent of infestation by this insect, the number of punctures made by the female flies on ten tender fruits per plant was counted in twelve Mexican germplasm (Table 2). The highest number of punctures (3.2/fruit) was recorded on M92 followed by M85 (2.8/fruit) and M74 (2.6/fruit). The number was the smallest in M46 (0.2/fruit) followed by M53 (0.5/fruit) and M11 (1.0/fruit). The low susceptibility of chayote fruits to fruit fly was associated with dense and long spines on the fruits. The spineless smooth fruits were the most susceptible to fruit fly attack. The attack was severe during early spring to summer in Chitwan and Parbat, while summer to early monsoon in Lalitpur. The period of fruit fly attack was relatively short in Lalitpur and Parbat. The fruitfly attack was severe as reported by Neupane (1993) in summer season.

Table 1. Aphid infested shoots for plants of Nepalese chayotes recorded during spring in Chitwan

Collection district		Plants*	Infested shoots/plant (No.)			Collection district		Plants*	Infested shoots/plant (No.)		
		(No.)	Feb 18	Mar 11	Apr 17			(No.)	Feb 18	Mar 11	Apr 17
Chayotes collected from far western and western regions of Nepal											
N1	Dadeldhura	4	0.5	0.25	0.25	N18	„	4	0.5	0.75	0.0
N2	„	4	0.5	0.5	0.0	N21	Myagdi	2	0.5	0.5	0.0
N3	„	4	1.0	0.5	1.0	N22	Parbat	3	0.0	0.0	0.33
N4	Doti	3	0.5	0.33	1.5	N23	Kaski	4	0.75	0.5	0.25
N5	„	4	1.25	1.75	1.5	N24	„	3	0.33	0.0	3.67
N6	„	4	0.0	1.0	0.0	N25	„	1	1.0	1.0	0.0
N7	„	4	0.75	0.75	0.5	N26	„	3	0.33	0.0	0.67
N8	Parbat	3	0.50	0.5	0.0	N27	„	2	1.0	0.5	0.0
N9	„	4	1.0	1.0	0.5	N28	„	4	1.25	0.75	1.0
N10	„	4	1.25	0.75	0.0	N29	Syangja	3	1.0	0.66	1.33
N11	„	3	1.0	1.0	0.0	N30	„	4	0.75	0.5	2.0
N12	„	4	0.25	0.25	1.0	N31	„	4	1.0	0.5	0.75
N13	„	2	0.0	0.0	2.0	N32	„	4	0.75	0.75	0.75
N14	„	2	1.0	0.25	0.0	N33	„	4	2.25	0.75	4.75
N15	„	1	1.0	1.0	1.0	N73	Parbat	4	0.75	0.25	2.25
N16	„	4	1.0	1.25	0.75	Mean		3.28	0.78	0.59	0.86
N17	Baglung	2	1.25	0.5	0.0	SD		0.94	0.45	0.39	1.11
Chayotes collected from central region of Nepal											
N35	Chitwan	1	0.0	1.0	0.0	N45	„	2	1.0	0.75	6.5
N36	„	4	1.5	1.25	1.5	N46	Kabre	3	1.0	1.0	2.67
N37	„	3	0.5	1.5	2.0	N47	„	2	0.5	1.0	0.5
N38	Dhading	2	1.0	1.0	3.5	N48	„	4	0.5	1.0	0.0
N39	„	3	1.33	1.0	3.66	N50	Kathmandu	2	0.5	0.5	2.0
N40	Makwanpur	4	1.25	0.75	1.5	N51	„	3	0.66	1.0	0.0
N41	„	4	0.75	0.5	3.25	N52	„	3	1.66	1.0	0.0
N42	„	3	0.0	0.25	1.33	N53	„	4	0.75	1.0	2.25
N43	„	4	0.25	0.75	0.0	Mean		3.05	0.74	0.90	1.71
N44	„	4	0.25	1.0	0.25	SD		0.91	0.48	0.28	1.75
Chayotes collected from eastern region of Nepal											
N54	Panchthar	4	0.0	0.5	0.0	N65	„	1	1.0	2.0	0.0
N55	„	4	0.75	1.0	1.0	N66	„	1	1.0	3.0	1.0
N56	„	1	0.0	0.0	5.0	N67	„	1	1.0	2.0	0.0
N57	„	4	0.5	0.75	0.75	N68	„	1	0.0	0.0	0.0
N58	„	3	1.0	1.0	0.33	N69	„	1	1.0	1.0	0.0
N59	Ilam	2	1.0	1.0	3.0	N70	„	3	0.0	0.33	3.67
N60	„	2	1.0	1.0	3.0	N71	„	1	2.0	1.0	0.5
N61	„	3	0.33	0.66	2.67	N72	„	2	1.0	1.33	1.0
N62	„	1	0.0	0.0	0.0	N74	Ilam	1	1.0	2.0	19.0
N63	„	2	1.0	1.33	0.0	Mean		1.95	0.72	1.14	2.04
N64	Dhankuta	1	1.0	3.0	0.0	SD		1.12	0.52	0.87	1.50

N= Nepalese landraces collected from different parts of Nepal * No. of plants studies of each germplasm

The thinly spined and thick skinned (M4 and M11), long spined (M53) or densely hair like spined fruited (M46) germplasms showed less attack of fruit fly. The aphid infestation was relatively low in Lalitpur and Parbat as compared to Chitwan. It may be associated with the low population as well as minimum activity of the insects in hills immediately after winter during early spring. The early fruiting or heat tolerance chayotes were heavily infested from fruit fly during late winter-early spring and summer - early rainy seasons in Chitwan and

Table 2. Number of fruit fly damage spots/fruit of some Mexican chayotes during spring in Chitwan

Germplasms	Collection state of Mexico	Number of spines/cm ² fruit surface	Number of fruit fly punctures/fruit (+SE) *	Range of punctures per fruit
M4	Tabasco	7.8+0.0	1.3+0.5	0-4
M11	„	8+0.6	1.0+0.3	0-2
M21	Chiapas	35+3.1	1.2+0.4	0-4
M27	„	Spineless	2.0+0.6	0-5
M46	„	39.6+2.5	0.2+0.2	0-2
M53	„	6.0+0.5	0.4+0.2	0-1
M62	„	Spineless	1.9+1.1	0-12
M65	„	4.4+0.2	2.0+0.6	0-5
M74	Veracruz	Spineless	2.6+0.8	0-8
M77	„	Spineless	1.3+0.5	0-5
M85	„	Spineless	2.8+0.5	1-5
M92	„	1.2+0.4	3.2+1.3	1-4

M= Mexican landraces collected in Mexico * (N=10 fruits)

hills, respectively. The densely spined, thick skinned or long spined fruited Mexican chayotes had low infestation of fruit flies. Mostly, the spineless late maturing Costa Rican chayotes avoided the peak period of fruit fly attack. The presence of spines reduces the marketability of the fruits. Hence, the germplasms with thick skinned fruits might be used for the breeding purposes.

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