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ABUNDANCE OF MAJOR PESTS OF BANANA UNDER SOUTH GUJARAT AGRO-CLIMATIC CONDITIONS

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Banana (*Musa paradisica* L.) is the second important fruit crop grown in South Gujarat. This crop is attacked by different insect pests under South Gujarat conditions. The roving survey was conducted during 2007-08 and 2008-09 to know the status of insect pests of banana. The results showed that the infestation of banana aphid (*Pentalonia nigronervosa* Coq.) was observed during September to February. As high as 28.26 and 25.84 per cent pseudosuckers were infested by the pest during the month of February. Lace wing bug (*Stephanitis typcus*) was observed during May to October. Its population was highest in June-July in both the years of survey. The tobacco caterpillar, *Spodoptera litura* (Fab.) and semilooper (*Chrysodeixix acuta*) were confined to monsoon i.e. June to October, which was much conceding with the early crop stage. The infestation of scale insect remain negligible (below 1 per cent), while the infestation of mealybug was highest in February. The mite (*Roalia indica*) infestation recorded throughout the year with maximum i.e. 6.45 and 2.27 per cent leaves infested in the month of February.

Key words : Abundance, insect pests, banana.

INTRODUCTION

Fruits and vegetables provide three to four times more cash income than cereals per unit of land, in addition to acting as prime sources of vitamins and minerals. Major fruit crops grown in India are mango, banana, citrus, guava, pineapple, grape, pomegranate and *ber*. Banana (*Musa paradisica* L.) is grown throughout the year and is well within the reach of a common man, that's why this fruit is called as 'Poor man's apple'. Banana is internationaly important fruit. In terms of volume of export, banana stands first and ranks second after citrus in terms of value. It is a globally important fruit crop with 97.5 million tonnes of production. According to the Food and Agriculture Organisation (FAO) estimations, world total exports of banana accounted for 15.9 million tonnes in 2004. Banana is also a very important staple food for many developing countries for their food security. About 98 per cent of world's production is from developing countries, while India, Ecuador, Brazil and China contribute half of total banana production (2004). Developed countries are the usual importers. India ranks first in area and production of banana in the world. It supports livelihood of million people, with total annual production of 19.19 million tonnes from 565 thousand ha with national average of 34 tonnes per ha during 2008-09 (Anon., 2009). Maharashtra is the leading producer of banana followed by Tamil Nadu, Gujarat, Karnataka and Andhra Pradesh in the country. During 2005-06, area and production of banana in Gujarat were 52.61 thousand ha and 1,292.40 thousand tones respectively, with an average production of 24.60 tonnes per ha. There are many limitations in profitable cultivation of banana. Among them incidence of insect pests and diseases is very important. Simmonds (1966) has given an annotated list of 182 insect pests of banana from all over the world and nearly 30 species are known from India

(Wadhi & Batra, 1964). Considering the importance of the banana, there is a great need to know the major important insect pests infesting the crop under south Gujarat agro climate situations, therefore, the present study was undertaken..

MATERIALS AND METHODS

Roving Survey : Roving survey was carried out at random in various banana growing fields of Valsad, Navsari, Narmada, Bharuch and Surat districts at one month interval. From each field, randomly selected 30 plants were observed for the incidence of various pests. From these randomly selected plants number of leaves and leaves infested by various insect pests *viz.* lace wing bug, tobacco caterpillar, semilooper, scale insect, mealy bug, mite and number of pseudosuckers infested by aphid were recorded and per cent infestation was worked out.

Fixed Plot Survey : The fixed plot survey was carried out at Fruit Research Station, Navsari Agricultural University, Gandevi, Gujarat, India from 2007-08 and 2008-09. For this, randomly selected 30 banana plants were observed for incidence of above mentioned pests. The infestation was recorded according to method adopted for roving survey. The observations on insect pests were recorded at 15 days interval.

Correlation studies with abiotic factors : The data on pest incidence in fixed plot survey during 2007-08 to 2008-09 are correlated with various weather parameters viz. minimum, maximum and mean temperature and relative humidity. The value of correlation coefficient (r) is worked out separate for each pest or its infestation.

RESULTS AND DISCUSSION

The results of survey work carried out were presented under the following headings :

Roving Survey

The data on roving survey presented in Table I shows that the infestation of banana aphid, *Pentalonia nigronervos* was observed during September to February. As high as 28.87 per cent and 21.10 per cent pseudosuckers were infested by the aphid during the month of February in the years 2007-08 and 2008-09, respectively. Lace wing bug, *Stephanitis typcus* was observed during May to October. During both the years of survey it was maximum in July, 2007 (1.20 per cent) and June - July, 2008 (1.50 per cent). The infestation of tobacco caterpillar (*Spodoptera litura*) and semilooper (*Chrysodeixis acuta*) was confined to monsoon *i.e.* June to October which was much concede with the early crop stage. The infestation of scale insect remained negligible (below 1 per cent) while the infestation of mealy bug was highest in February. The mite (*Raolia indica*) infestation was recorded throughout the year with maximum *i.e.* 2.17 and 2.30 per cent leaves infested in February.

Fixed plot survey

The data on fixed plot survey are discussed under the following sub headings and the observations were presented in Table II.

Table I : Percentage infestation of banana pest complex at different location.

Month	No. of field visited	Aphid		Lace-wing bug		Percent infested leaves by				
		% infested pseudo.	Av.popu/ Infested pseudo.	% infested Leaves	Av.pop/ Infested leaves	Spodoptera litura	Semi-Looper	Scale insect	Mealy bug	Mite
April-08	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
May-08	7	0.00	0.00	1.00	7.00	0.00	1.00	0.00	0.00	0.00
June-08	7	0.00	0.00	1.20	6.80	0.00	1.00	0.00	0.00	0.00
July-08	7	0.00	0.00	1.20	8.10	0.00	1.70	0.00	0.00	0.87
Aug.-08	7	0.00	0.00	0.98	11.00	0.50	1.70	0.00	0.52	1.24
Sept.-08	7	0.00	0.00	0.78	9.25	0.50	2.27	0.00	0.71	2.11
Oct.-08	7	6.00	2.00	0.80	7.70	0.82	0.57	0.57	0.70	1.17
Nov.-08	7	6.00	8.25	0.20	4.71	0.00	0.00	0.83	0.85	0.85
Dec.-08	7	10.79	9.20	0.00	0.00	0.00	0.00	0.25	0.25	0.38
Jan.-09	7	19.40	11.00	0.00	0.00	0.00	0.00	0.30	0.25	1.25
Feb.-09	7	25.87	8.60	0.00	0.00	0.00	0.00	0.00	1.00	2.17
Mar.-09	7	23.50	7.00	0.00	0.00	0.00	0.00	0.00	0.50	1.00
April-09	7	0.00	0.00	0.00	0.00	0.00	0.0	0.00	0.0	0.0
May-09	7	0.00	0.00	1.50	7.00	0.00	2.0	0.00	0.0	0.0
June-09	7	0.00	0.00	1.50	8.20	0.00	2.30	0.00	0.0	0.0
July-09	7	0.00	0.00	1.50	8.10	0.00	2.70	0.00	0.0	1.20
Aug.-09	7	0.00	0.00	1.00	10.25	2.00	2.70	0.00	1.52	1.24
Sept.-09	7	0.00	0.00	1.00	9.00	2.10	2.72	0.00	0.81	3.33
Oct.-09	7	8.00	4.00	1.00	8.00	2.82	1.00	1.00	0.80	2.17
Nov.-09	7	8.00	9.35	1.00	6.70	1.00	0.00	1.83	0.90	1.85
Dec.-09	7	12.70	10.20	1.00	3.00	0.00	0.00	0.53	0.35	0.85
Jan.-10	7	21.40	13.00	1.00	2.00	0.00	0.00	0.50	0.55	1.25
Feb. -10	7	20.10	14.6	1.00	2.30	0.00	0.00	0.50	0.40	2.30
Mar.-10	7	20.00	14.34	0.50	1.89	0.00	0.00	0.55	0.35	2.00

Banana aphid, Pentalonia nigronervosa (Coq.)

The activities of banana aphid, *P. nigronervosa* were recorded during both the years. As high as 5.96 and 4.38 per cent infested pseudosuckers were recorded in the month of May during both the year of survey. The average population of banana aphid per infested pseudosucker was recorded and the maximum aphid population were recorded in the month of April i.e., 7.50 and 9.35 aphids per pseudosucker during both the years of the survey.

Lace wing bug, *Stephanitis typcus*

The activities of lace wing bug, *S. typcus* were observed during both the years of investigation. The pest activities were recorded in the months of June to September in first year whereas in second year its activities were observed in June to October with 4.33 per cent infested leaves in the months of August in 2007-08 and 8.33 per cent infested leaves in the month of July 2008-09. The mean population of pest ranged

between 3.06 to 9.57 adults and nymphs per infested leaves during 2007-08 and 1.18 to 12.97 adults and nymphs per infested leaves during 2008-09 .

Leaf eating caterpillar, *Spodoptera liturs* (Fab.)

The activities of leaf eating caterpillar, *S. litura* were also observed in the study period. During 2007-08 the infestation ranged between 0.64 to 2.57 per cent whereas it was between 1.0 to 4.20 per cent. During both the years of fixed plot survey the activity of *S. litura* ere recorded in the months of July to September-October.

Semilooper, *Chrysodeixis acuta*

The activities of semilooper, *C. acuta* were recorded in the month of July to October. During year 2007-08 the pest infestation ranged between 0.50 to 10.30 per cent with the maximum infestation of 10.30 per cent infested leavesin the month of September whereas, in year 2008-09, the pest infestation was ranged between 1.0 to 9.37 per cent with maximum per cent infestation (9.37) in the month of August. The activities of semilooper is confined to monsoon season only and it was disappeared after the monsoon.

Scale insect

Scale insect activities on banana were also observed but it is negligible and the infestation ranged between 0.20 to 1.18 per cent and 0.20 to 1.00 per cent during both the years of survey. The pest is active from June to September.

Mealy bugs

Practically the mealy bugs are active throughout the year, but negligible infestation was recorded. In 2007-08, maximum 1.64 per cent infestation was observed in December, while its highest per cent infestation was recorded in the month of January 2008-09 with 3.10 per cent infestation.

Mite

The mite, *Raolia indica* were observed throughout the year during the survey. Its infestation was highest (8.65 per cent) in the month of February in 2007-08, while during 2008-09, 15.30 per cent infestation was recorded in the month of February.

Correlation studies with abiotic factors:

The data on pest incidence recorded during 2007-08 and 2008-09 was computed with weather parameters and values of correlation matrix are presented in Table III indicates that the aphid infestation was significantly (positive) influenced by maximum temperature, while negatively, correlated with rainfall and relative humidity, while lace wing bug infestation was influenced by maximum temperature (negatively) and positively correlated with other parameters. The incidence of semilooper and banana mite also significantly correlated with weather parameters.

Table II : Fix plot survey of banana pests during 2007-08 and 2008-09.

Month	Aphid		Lace-wing bug		Per cent infested leaves by				
	% infested Pseudo suckers	Av. Popu. per infested Pseudo	% infest. leaves	Av. Popu./infe. Leaves	Tobacco caterpillar	Semi Looper	Scale insect	Mealy bug	Mite
April-07 I	3.78	5.96	0.00	0.00	0.00	0.00	0.00	0.34	0.00
II	4.67	7.50	0.00	0.00	0.00	0.00	0.00	0.47	0.00
May-07 I	5.96	7.43	0.00	0.00	0.00	0.00	0.00	0.78	0.00
II	2.65	5.87	0.00	0.00	0.00	0.00	0.00	1.35	0.00
June-07 I	1.42	3.35	1.90	5.00	0.00	0.00	0.00	0.97	0.00
II	0.90	1.50	2.39	7.95	0.00	0.50	0.20	1.23	0.00
July-07 I	0.00	0.00	2.64	5.04	0.00	3.33	1.05	0.76	0.00
II	0.00	0.00	3.59	5.39	0.80	4.79	0.95	0.00	0.00
Aug.-07 I	0.00	0.00	4.33	9.57	1.66	8.70	1.18	0.00	0.00
II	0.00	0.00	3.22	7.05	2.05	9.40	0.80	0.00	0.00
Sep.-07 I	0.00	0.00	1.70	3.06	2.57	10.30	0.98	0.00	0.00
II	0.70	0.95	0.00	0.00	1.48	9.05	0.60	0.00	0.00
Oct.-07 I	0.84	2.87	0.00	0.00	0.64	6.83	0.00	0.80	1.07
II	1.29	3.59	0.00	0.00	0.77	2.40	0.00	0.93	1.55
Nov.-07 I	0.68	2.84	0.00	0.00	0.00	2.95	0.00	0.79	2.45
II	0.19	0.98	0.00	0.00	0.00	3.24	0.00	1.35	3.06
Dec.-07 I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.64	2.83
II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	4.54
Jan.-08 I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.68	7.48
II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	6.89
Feb.-08 I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.42	8.65
II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.58	8.32
Mar.-08 I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	4.35
II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.90
April-08 I	3.35	8.73	0.00	0.00	0.00	0.00	0.00	0.00	0.00
II	4.00	9.35	0.00	0.00	0.00	0.00	0.00	0.20	0.00
May-08 I	4.38	8.75	0.00	0.00	0.00	0.00	0.00	0.20	0.00
II	3.33	5.79	0.00	0.00	0.00	0.00	0.00	1.00	0.00
June-08 I	0.58	2.30	0.00	0.00	0.00	0.00	0.00	0.98	0.00
II	0.50	2.00	3.07	8.97	0.00	1.50	0.20	0.00	0.00
July-08 I	0.00	0.00	6.92	7.38	1.00	4.87	0.20	0.00	0.00
II	0.00	0.00	8.33	12.97	2.00	8.39	0.50	0.00	0.00
Aug.-08 I	0.00	0.00	6.83	9.39	4.20	9.37	0.95	0.00	0.00
II	0.00	0.00	1.36	7.27	3.55	8.30	1.00	0.00	0.00
Sep.-08 I	0.00	0.00	1.37	5.19	1.00	6.91	0.80	0.00	0.00
II	0.00	0.00	1.00	3.00	1.00	5.30	0.60	0.00	0.00
Oct.-08 I	0.58	3.25	0.53	1.81	0.00	4.35	0.00	0.00	0.00
II	1.00	4.17	0.00	0.00	0.00	1.51	0.00	0.00	2.00
Nov.-08 I	0.50	3.25	0.00	0.00	0.00	1.00	0.00	0.50	3.53
II	1.75	5.23	0.00	0.00	0.00	0.00	0.00	0.25	4.65
Dec.-08 I	2.35	8.33	0.00	0.00	0.00	0.00	0.00	1.00	5.70
II	2.00	7.00	0.00	0.00	0.00	0.00	0.00	2.20	7.84
Jan.-09 I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.80	9.40
II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.10	11.40
Feb.-09 I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	13.00
II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.70	15.30
Mar.-09 I	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.80	8.50
II	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.27	3.25

Table III : Correlation values of banana pests (Pooled).

Abiotic factors	Correlation coefficient							Regression coefficient						
	Aphid population (A1)	Lace-wing bug (A2)	Spodo-ptera (A3)	Semi-looper (A4)	Scale (A5)	Mea-lybug (A6)	Mite (A7)	Aphid population (A1)	Lace-wing bug (A2)	Spodo-ptera (A3)	Semi-looper (A4)	Scale (A5)	Mealy bug (A6)	Mite (A7)
Max temp (X1)	0.3723*	-0.44*	-0.431*	-0.438*	-0.37*	-0.157	-0.242	0.2241	-0.197	0.0014	-0.0993	-0.0095	-	-
Min temp (X2)	0.0384	0.474*	0.4212*	0.4673*	0.33*	-0.37*	-0.85*	-	0.0851	-0.089	0.1373	-0.0166	0.1652	-0.3001
Av. Temp (X3)	0.1978	0.2017	0.1629	0.1983	0.110	-0.37*	-0.81*	-	-	-	-	-	-0.250	-0.4268
Mor. RH (X4)	-0.3859*	0.441*	0.4672*	0.6321*	0.34*	-0.098	0.150	-0.1721	0.0985	0.0209	0.3233	0.0016	-	-
Eve. RH (X5)	-0.2784	0.760*	0.7426*	0.7776*	0.58*	-0.37*	-0.60*	-	0.1053	0.1234	0.1945	0.0238	-0.034	-0.3073
Av. RH (X6)	-0.3372*	0.715*	0.7076*	0.7962*	0.54*	-0.279	-0.30*	0.0790	-0.130	-0.080	-0.1910	-0.0161	-	0.3706
Rainfall (X7)	-0.3729*	0.767*	0.6248*	0.6554*	0.46*	-0.227	-0.35*	-0.2338	0.2691	-0.052	0.0796	-0.0138	-	-0.0674
Rainydays (X8)	0.0000	0.0000	0.0000	0.0000	0.000	0.000	0.000	--	-	-	-	-	-	-
Sunshine (X9)	0.3591*	-0.74*	-0.728*	-0.684*	-0.56*	0.184	0.288	0.090	-0.654	-0.135	0.1023	-0.0138	-	-
Wind velocity (X10)	-0.0818	0.410*	0.2963	0.0693	0.293	-0.13	-0.56*	-	0.1623	-	-	-	-	0.3979
R^2	-	-	-	-	-	-	-	0.1103	0.5920	0.5456	0.6233	0.2741	0.2185	0.7625
% variation	-	-	-	-	-	-	-	11.03	59.20	54.56	62.33	27.41	21.85	76.25
Explained R	-	-	-	-	-	-	-	0.4624	0.8172	0.7871	0.8274	0.6263	0.5225	0.8920
A value (constant)	-	-	-	-	-	-	-	5.2005	0.8124	0.1495	-23.084	0.5170	5.6928	10.9802

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REFERENCES

ANON. 2009. www.gswan.gov.in

ABDEL MONIEM, A.S.H. 2003. Incidence of *Pentalonia nigronervosa* Coqueral (Hemiptera : Aphididae) and associated predators on banana plants in Egypt. *Archieves of Phytopathology and Plant Protection.* **36**(2) : 119-128.

REDDY, D.B. 1969. *Plant protection in India.* .Allied publishers, Calcutta, pp. 454.

SIMMONDS, N.W. 1966. *Banana.* 2nd edition. Longmans Green, Londen, pp. 512.

WADHI, S.R. & BATRA, H.N. 1964. Tropical and subtropical fruits. pp..225-260, In. Pant, N.C. (Ed.). *Entomology in India.* Entomological Society of India, New Delhi.

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