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Population dynamics of green apple aphid (*Aphis pomi* De Geer) of apple (*Malus Sylvestris* mill.) in mid hills of Meghalaya

D. Biswas . N.S. Azad Thakur

College of Post Graduate studies in Agricultural Sciences (CPGS-AS), Central Agricultural University, Umiam (Barapani), Ri-Bhoi, Meghalaya-793103

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ABSTRACT

The study was conducted at the experimental farm of College of Post Graduate Studies in Agricultural Sciences, CAU, Umiam (Barapani), Meghalaya during the year, 2018. Green apple aphids were first detected on 13th SMW (last week of March, 2018) and attained its peak on 25th SMW (3rd week of June, 2018) with mean population of 34.75 aphids/ 10cm apical length of twig/shoot/plant. Correlation studies revealed that the mean population of green apple aphid showed significantly positive correlation (r = 0.389*) with maximum temperature.

1. Introduction

Apple (*Malus sylvestris* Mill.) originated in Central Asia as a temperate fruit crop which requires about 800-1600 hours of chilling below 70C. Apple belongs to the family Rosaceae and it is widely grown species throughout the world. Apple being a temperate fruit crop grows well in temperate climatic zones and fulfils their requirement of chilling temperature. Apple production Worldwide in 2017 was about 83.1 million tonnes, of which China accounts for 50% of the total production. India ranks fifth in terms of apple production with an average of 2.2 million tonnes, yield of 7.4 t/ha and land area of 3.0 lakhs ha (FAOSTAT, 2019). In India, it is mostly grown in Jammu & Kashmir, Himachal Pradesh, Uttaranchal, Arunachal Pradesh, Sikkim and Nagaland. North Eastern Hills region of India is very rich in biodiversity, fertile soil and conducive agro-climatic conditions that make them ideal for the production of horticultural crops. Wild relatives of apple and other temperate fruits are found growing in its natural form in NE forests. Temperate fruits *viz.* apple, plum, peach, pear are grown semi commercially in North East Hill states particularly in Arunachal Pradesh, Sikkim, Nagaland and Meghalaya. In North East Region, large parts of Arunachal Pradesh, Sikkim and some part of Nagaland and Meghalaya fall under the sub-temperate zone. Whereas, low hills of Assam, Meghalaya, lower hills of Arunachal Pradesh and Sikkim fall under sub-tropical zone. Arunachal Pradesh is the only leading state in the North East region suitable for apple production (Jindal and Sharma, 2016). Low productivity of apple in these regions may be due to the biotic and abiotic stresses like weather parameters, climatic conditions, insect pests, diseases and other unfavourable factors. Around 400 species of insects are associated directly or indirectly with the apple cultivation. Approximately 100 species feed on the apple tree or fruit. More than 40 species are economically important and 10 species are considered as serious pest of apple (Teparkum, 2000). Aphid species *viz.* green apple aphid, (*Aphis pomi* De Geer), Spirea aphid, (*Aphis spiraecola*), rosy apple aphid, (*Dysaphis pyri*) and woolly apple aphid, (*Eriosoma lanigerum Hausmann*) are considered as most serious pests in apple orchard worldwide (Perdikis *et al.,* 2008), Meteorological conditions of an area heavily influence the

*Corresponding author: debu732@gmail.com

life cycle of the insect pests hence studies on the seasonal incidence of major pests are useful for development of management programmes.

2. Materials and Methods

The study was conducted at the experimental farm of College of Post Graduate Studies in Agricultural Sciences, CAU, Umiam (Barapani), Meghalaya during the year 2018. Low chilling varieties of apple *viz.* Gale gala, Red chief, Red scarlet, Tide's men Worchester and Anna Dorset were brought from Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Solan, Himachal Pradesh and planted in the experimental farm of CPGSAS, CAU (Imphal), Umiam, Meghalaya during January' 2017. Observations on aphid population were done on weekly basis from January to December' 2018. Nine plants of low chilling apple variety Gale Gala were randomly selected from the apple trees planted in January' 2017 with row spacing of 4m and 4m between the plants and tagged. Weekly observations of insect pests were recorded from these tagged plants during the year 2018. Selected plants were kept free from insecticidal treatments. Aphid population was observed by counting the total number of aphids on 10cm apical length of the twig/ shoot/ plant on all the nine apple plants and data for the year, 2018 was recorded. The weekly meteorological data [maximum and minimum temperature (°C), relative humidity (RH per cent), rainfall (mm)] during the crop growing period in pre-*kharif* 2018 was collected from the Division of Agricultural Engineering, ICAR Research Complex for NEH region, Umiam, Meghalaya and the correlation analysis was done by finding out the correlation coefficient, which was calculated by using method given by Pearson, 1973.

3. Results and Discussion

The incidence of Aphis pomi was first detected on 13th standard meteorological week (SMW) *i.e.* last week of March, 2018 with the mean population of 1.74 aphids/10 cm apical length of twig/shoot/plant. Afterwards, its population increased slowly and attained its peak on 25th SMW (3rd week of June, 2018) with mean population of 34.75 aphids/ 10cm apical length of twig/shoot/plant and then declined to its lowest population of 1.68 aphids/ 10 cm apical length of twig/ shoot/ plant on 38th SMW (3rd week of September).

Correlation studies of weather parameters with the pest population indicated that A. pomi showed significantly positive correlation (r = 0.389*) with maximum temperature. However, all the remaining weather parameters showed non-significant correlation with pest population. Present findings are also in agreement with Gupta and Tara, 2015 who also concluded that the pest population in apple reached peak during late June. The present findings are also in agreement with Khan and Shah, 2018 who revealed that relative humidity and maximum temperature had positive and rainfall had negative influence on aphid population.

4. Conclusion

Mean population of Green apple aphid was maximum during the month of June and showed significant positive correlation (r = 0.389*) with maximum temperature.

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Table 1. Seasonal incidence of Green apple aphid (*Aphis pomi* De Geer) in apple variety Gale Gala during the year, 2018.

Date of Observation	SMW	Mean no. of Green apple aphid/10cm twig/shoot	Relative humidity (%)		Temperature(°C)		Rainfall (mm)
			Evening	Morning	Maximum	Minimum	
28-Mar	13	1.74	50	86	25	14.7	1.4
04-Apr	14	9.13	58	86	28.4	13.3	24.3
11-Apr	15	12.72	91	87	25.3	14.2	0
18-Apr	16	14.11	65	87	27	15.4	0
25-Apr	17	15.53	42	80	28.4	15.3	0
02-May	18	13.58	94	92	23.9	15	20.6
09-May	19	19.72	89	88	27.2	19.2	8.6
16-May	20	15.99	66	88	25	15.7	15.5
23-May	21	23.75	79	82	27.1	17.9	0
30-May	22	28.86	70	90	28.8	17.9	0
06-Jun	23	26.78	62	94	28.8	17.5	43.7
13-Jun	24	23.92	77	93	28	20.3	75.1
20-Jun	25	34.75	87	87	28.9	19.3	0
27-Jun	26	24.96	71	91	27.9	20.5	3.8
04-Jul	27	23.11	95	93	27	21.2	22.2
11-Jul	28	25.02	77	88	28.8	21.8	0
18-Jul	29	28.73	71	92	29.4	20.7	5.3
25-Jul	30	21.77	74	86	28.3	20.6	2
01-Aug	31	19.73	79	88	26.8	21	17.4
08-Aug	32	25.11	78	95	30.4	20	33.3
15-Aug	33	22.11	70	88	29.7	21.4	11.6
22-Aug	34	17.96	69	83	29.8	22.4	0
29-Aug	35	15.94	93	83	30	21.5	7.9
05-Sep	36	8.79	68	90	28.4	20.3	47
12-Sep	37	6.79	84	90	23.5	18.8	22.2
19-Sep	38	1.68	69	91	30.3	21.8	9.3

Total no. of plants taken for observation (n) = 9

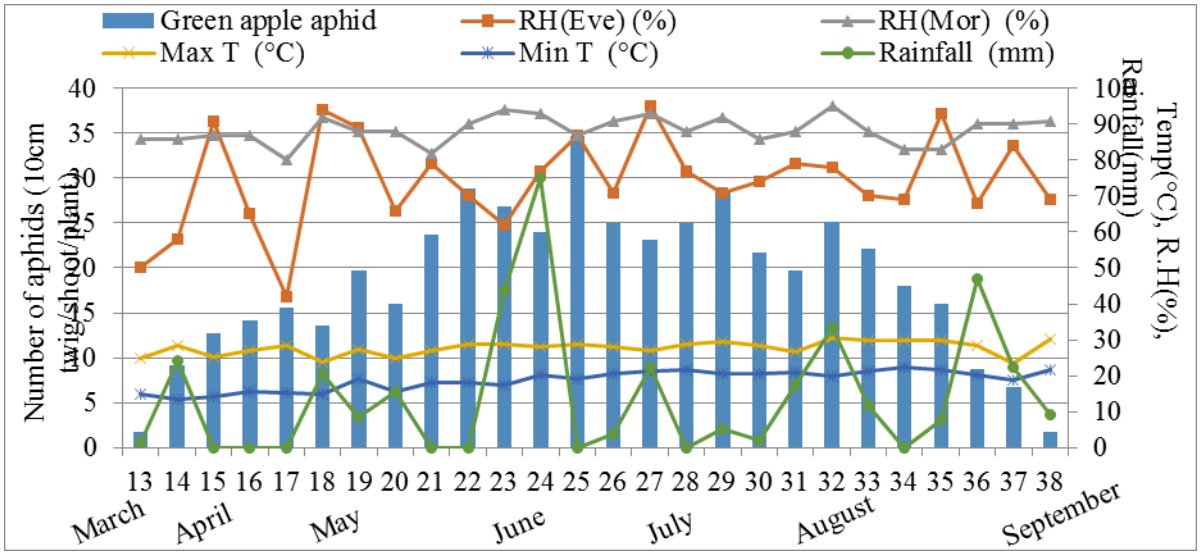

Figure 1. Seasonal incidence of Green apple aphid (*Aphis pomi* De Geer) in apple variety Gale Gala during the year, 2018.

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