

SEASONAL INCIDENCE OF PEST COMPLEX ON POMEGRANATE

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ABSTRACT

Seasonal incidence study was conducted at AICRP on Arid zone fruit, MPKV, Rahuri during 2011-2016 to investigate the seasonal fluctuations of pests complex which were taken at an meteorological weekly interval from 1 to 52 meteorological week on bhagwa variety of Pomegranate. The results revealed from the pooled data, that the sucking pest complex (viz. aphids, thrips, whiteflies) & natural enemies (lady bird beetle, crysoperla) and fruit borer, fruit sucking moth & root- knot nematode showed their survival existence with the specific time with all the weather parameter. It was the evident from the data presented that, the peak activity aphids was noticed during the first fortnight of January, which reached maximum of 137.8/ twigs of 5 cm tender shoot on 1-2 meteorological week and showed negative correlation with minimum temperature. Whereas, the highest infestation of survived thrips population was found during 7-8 meteorological week with average of 20.1 per 3 fruiting bodies/ tender twigs. The maximum incidence of fruit borer was recorded with an average of 11.3 per cent on 37-38 meteorological weeks showed positive correlation with relative humidity. The incidence of fruit sucking moth was noticed in the range of 0.67 to 22.5 per cent damaged (punctured) fruit at 31-44 meteorological weeks, respectively, which showed positive significant correlation with the maximum temperature and morning & evening relative humidity. The peak activity of root knot nematode galls was noticed on 1-2 meteorological week, which reached maximum of 21.3 / 5 g of roots. However, the incidence of mealy bug, whitefly and shot hole borer was found negligible.

KEY WORDS: *Correlation, pomegranate, pests, weather parameters*

INTRODUCTION

Pomegranate has become one of the important fruit crops in the state of Maharashtra. The area under this pomegranate fruit crop which was barely few hundred acres in 1960-69 has shot up roughly to 1,31,000 ha with annual production 13.46 lakh ton and productivity of 10.27 ton/ha in 2014-15 in India, which is contributing 70% of the total area from Maharashtra (Anonymous, 2015). It also performs better in Marathwada and part of Vidarbha region under varying degree of environments. There are three main

fruiting seasons in the year which are locally known as Mrig (July-Oct), Hasta (November- February) and Ambia bahar (March-June). Now a days, cultivation of pomegranate is undertaken throughout the year particularly of high yielding “*Bhagwa*” variety with intensive care and management under high tech fertigation with early stage exploitation of plant has led to certain severe pest problems. Such important fruit crop is attacked by several insect and non-insect pests as well as diseases. Among the pest complex, incidence of sucking pests (viz., aphids,

thrips, whiteflies, mites, mealy bugs and scale insect) and fruit borer, fruit sucking moth, stem borer, root knot nematode are the major concerns with seasonal change in weather parameters. Therefore, investigation was undertaken on seasonal incidence of pest complex and their correlations with weather parameters on long term basis so as to formulate the fore warning model.

MATERIAL AND METHODS

Seasonal incidence studies were conducted at AICRP on Arid zone fruit, Mahatma Phule Krishi Vidhyapeeth, Rahuri during 2011-2016 to investigate the seasonal fluctuations. The observations of pest complex (aphids, thrips, whitefly, mites, fruit borer, shot hole borer, mealy bugs and root-knot nematode) were taken at an meteorological weekly interval from 1st MW to 52nd MW on ten fixed plant of pomegranate variety Bhagwa. The daily weather parameters were also recorded from 1st MW to 52nd MW. The observation of survived aphid's population (nymphs and adults) was counted on 5 cm tender shoot at top, middle & bottom from terminal shoots per plant with natural enemies and average was worked out, whereas the thrips population were taken by counting initially on tender shoot followed by fruiting bodies from three shoots per plant by shaking the shoot on colored paper sheet to easy count and finally average was worked out. With regards to fruit borer damage, the observation were taken on infested fruits over healthy fruit per plant on 100 fruits from four side of plant at weekly interval and per cent damage was worked out. The fruit sucking moth damage was also taken on the basis of punctured fruit over healthy fruit per plant and per cent damage was worked out.

The weekly observation on all pest complex and weather parameters (maximum and minimum temperature, morning and evening relative humidity, wind velocity, sunshine hours and rainfall) were averaged fortnightly and correlated

with simple correlation regression for their significance.

RESULTS AND DISCUSSION

It is revealed from the pooled data (2011-2016) presented in Table 1, that the sucking pest complex and natural enemies and fruit borer, fruit sucking moth and root- knot nematode showed their survival existence with the specific time with all the weather parameters (maximum and minimum temperature, morning and evening relative humidity and rainfall) throughout the year of 52 meteorological week with the crop growth stage.

Aphids & natural enemies

It was the evident from the data presented in Table 1, the peak activity aphids was noticed during the first fortnight of January, which reached maximum of 137.8 / twigs of 5 cm tender shoot on 1-2 MW. As regards the survival of both nymphs / adults of aphids was recorded in the range of 6.3 to 137.8 / twigs / fruiting bodies. The natural enemies (i.e. lady bird beetle, *crysoperla*) were found in the range of 1.6 to 15.65 / 3 shoot / plant during 45 to 52 and 1 to 10 meteorological week, which was found highly negative significant correlation with the minimum temperature at coefficient value ($r=0.38$) at 5 per cent level of significance. These results are in confirmative with the earlier worker by Shewale (2002), who noticed the peak activity in winter season.

Thrips

It was the evident from the data presented in Table 1 that, the highest infestation of survived thrips population was found during 7-8 meteorological week with average of 20.1 per 3 fruiting bodies/ tender twigs. The incidence of thrips was observed throughout the fruiting season immediately after pruning on vegetative tender growth followed by flowering and fruiting stage with varying degree of intensity in Hasta /ambia bahar. The population was recorded in the range of 1.6 to 15.63 and 0.7 to 13.1 per shoot / flower& fruiting bodies at 1 to 14 & 31 to

40 meteorological week, respectively. The survived population showed positive significant correlation with the maximum temperature and morning relative humidity at coefficient value ($r=0.38$) at 5 per cent level of significance. These results are in confirmative with the earlier worker who noticed the peak activity in winter season. Moderate incidence is noticed in hasta bahar, while the peak population the infestation was noticed in *Ambia* bahar as reported by Kabre and Moholkar (1991). The incidence is more pronounced in rainy season from July-Sept when temperature is moderate coupled with high humidity.

Fruit borer and fruit sucking moth

The maximum incidence of fruit borer was recorded with an average of 11.3 per cent on 37-38 MW with the range of 1.67 to 9.67 per cent during 19 to 42 meteorological week, whereas the incidence of fruit sucking moth was noticed in the range of 0.67 to 22.5 per cent punctured fruit at 31-44 meteorological week, respectively, which are found positive significant correlation with the maximum temperature and morning relative humidity and rainfall at coefficient value ($r=0.32$) at 5 per cent level of significance. These results are in confirmative with the earlier workers of Kabre and Moholkar (1991) and Shewale and Khaire (1998), who noticed the peak activity in winter season.

Root knot nematode

It was the evident from the data presented in Table 1 that, the peak activity of root knot nematode galls was noticed on 1-2 meteorological week, which reached maximum of 21.3/ 5 g of roots. As regards the survival of root galls / 5g roots due to

root knot nematode was recorded in the range of 5.2 to 21.3 / 5 g roots during 1 to 18 and 0.5 to 18.80 / 5g roots during 27 to 52 meteorological weeks. The highly significant negative correlation coefficient ($r=0.32$) was observed between number of root galls and air and soil maximum and minimum temperatures of air and morning and evening temperatures of soil. With decrease in decreasing temperature, there was corresponding increase in root-knot nematode population, number of root galls and egg masses. The maximum root-knot nematodes intensity was noticed in 52nd, while minimum in 21st Meteorological week, which are confirmative with results as reported by Walunj and Mhase, (2015).

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Table 1: Seasonal incidence of major pest of pomegranate

MW	Aphids (No./ twigs)	NE / plant	Thrips /fl.bud/ fruit	% FSM/ plant	% FB inf. borer	Root galls/5g root	Temp. (Max.)	Temp. (Min.)	RH (Morn- ing)	RH (Even- ing)	Total Rain- fall (mm)
1-2	137.8	13.1	4.2	0	0	21.3	26	9.75	61.15	40.7	1.2
3-4	121.6	15.65	9.2	0	0	17	29	12.3	58.6	35.3	0
5-6	56	10.5	12.2	0	0	15.2	30.7	12.6	51.3	29.6	0
7-8	18.4	7.95	20.1	0	0	15.4	33.1	13.4	53.65	23.15	0
9- 10	6.3	3.95	12.2	0	0	12.8	30.4	13.95	58.55	38.15	38.2
11-2	2	1.6	1.4	0	0	11.1	33.2	18.0	56.2	31.2	11
13-14	0	1	0.4	0	0	7	36.15	17.55	52.35	20.3	0
15-16	0	0.3	0	0	0	4.9	35.55	20.45	56.55	29.4	7.2
17-18	0	0	0	0	0	5.2	39.75	20.75	38.15	14.95	0
19-20	0	0	0	0	2.8	0	39.15	23.95	44.7	23.4	0
11-22	0	0	0	0	5.05	0	39.7	23.5	52.65	23.95	0.3
23-24	0	0	0	0	5.25	0	34.15	23.0	70.15	58.3	13.4
25-26	0	0	0	0	3.6	0	32.75	23.85	68.6	52.6	4.8
27-28	0	0	0	0	3.165	0.5	34.05	23.65	66.95	41.9	0
29-30	0	0	0	0	1.67	1.84	31.47	23.61	72.5	58.5	3.55
31-32	0	0	2.6	0.67	2.67	2.45	30.5	22.0	76.5	61.0	0
33-34	0	0	4.4	3.25	4.67	1.9	32.5	22.5	70.0	49.0	33.14
35-36	0	0	13.1	17.4	8.69	2.95	33.0	22.0	76.0	51.0	3.17
37-38	0	0	3.9	18.3	11.3	7.5	30.5	22.5	79.0	58.5	9.42
39-40	0	0	0.7	22.5	8.66	10.6	33.0	20.0	72.0	46.5	2.94
41-42	0	0	0	19.5	9.65	10.6	34.5	20.0	64.5	34.5	0
43-44	0	0	0	4.84	1.0	14.95	33.5	19.5	58.5	37.0	0
45-46	14.50	4.3	0	0	0	15.5	32.7	15.95	54.35	33.95	0
47-48	18.75	5	0	0	0	16.9	30.9	17.85	70.4	51.7	9.4
49-50	33.16	4.8	0	0	0	19.2	31.95	14.9	53.35	32.75	0
51-52	44.25	9	0	0	0	18.80	31.50	15.60	54.00	32.60	0

Table2: Correlation coefficient (r) on seasonal incidence of pests

Pest/weather parameter	Aphids	NE	Thrips	FB	FSM	RKN
T max	-0.61571	-0.60326	-0.33913	-0.04071	0.109069	-0.56782
T min	-0.75996	-0.87831	-0.47611	0.234766	0.560874	-0.89668
RH1	-0.1632	-0.26699	0.008194	0.496276	0.61053	-0.25578
RH2	-0.10971	-0.21975	-0.07584	0.298189	0.46152	-0.25076
Rainfall	-0.20093	-0.15531	0.197976	-0.0323	0.055787	-0.12884
	r value 5% =0.38			1% = 0.32		

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