Incidence of Aphid and Whitefly on Different Planting Dates in Relation to Abiotic Factors in Potato Variety *Kufri jyoti*

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Abstract

A Study on the population of aphid and whitefly was carried out during 2005-06 and 2006-07 in potato crop (var. *Kufri jyoti*) planted at three different dates, viz. 15th September (D_1), 1st October (D_2) and 15th October (D_3). The highest peak population of both aphid (2.97 leaf^{-1}) and whitefly (2.20 leaf^{-1}) was recorded on 43rd and 45th standard week of 15th September planting. The lowest count of both the pests with 0.43 leaf^{-1} was recorded on 1st standard week of 15th October planting and 39th standard week of 15th September planting. Correlation of aphid population with maximum and minimum temperature, relative humidity and rainfall were all positively non-significant except the rainfall on 15th October planting which showed a negative non-significant correlation. In case of whitefly population, the maximum temperature and relative humidity showed positive as well as negative non-significant correlation whereas, both minimum temperature and rainfall showed negative non-significant correlation.

1. Introduction

The green peach aphid, *Myzus persicae* (Sulzer) and whitefly, *Bemisia tabaci* Gennadius are considered serious and found prevailing throughout the season of potato cultivation. The primary concern with aphid is usually their indirect role as virus vectors in potato crop. The whitefly is a highly polyphagus pest, its population is highly diverse and may also act as vector. In India due to these viruses, the potato yield is reduced to as much as 40-85% (Kishore and Verma, 1990). Planting dates are known to alter the incidence of these pests and help the crop to escape their attack by avoiding the critical period when their activity would be maximum. The present investigation was therefore aimed to know the effect of planting dates on the incidence of these important pests on potato crop.

2. Materials and Methods

The experiment was conducted at the Instructional cum Research Farm, School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, Medziphema, Nagaland during 2005-06 and 2006-07. The experiment was laid out in a randomized block design with 3 planting dates, viz. 15th September (D_1), 1st October (D_2) and 15th October (D_3) as treatments with three replications and the variety used was *Kufri jyoti*. Meteorological data such as maximum and minimum temperature, relative humidity and rainfall were recorded during the cropped period. The insect population count started from 15 days after each planting at weekly interval and continued till the crop persisted (Table 1). For the population count, five randomly selected plants plot^{-1} were marked and the numbers of insects were recorded on six leaves plant^{-1} (two from each bottom, middle and top leaves). The mean number of the insect population in each planting date was correlated with the abiotic factors to study the relationship between them.

3. Results and Discussion

The highest peak with a mean number of 2.97 aphid leaf^{-1} was recorded on 43rd standard week of 15th September planting during which the minimum and maximum temperature, relative humidity and rainfall ranged from 20.50 to 23.95°C, 74.75% and 5.80 cm, respectively (Table 1). The highest mean aphid count on 1st October and 15th October planting being recorded on 45th and 46th standard week was 2.80 and 2.53 leaf^{-1}, respectively. The lowest population (0.43 leaf^{-1}) was observed on 1st standard week of 15th October planting during which the minimum and maximum temperature, relative humidity and rainfall were recorded with 9.50-22.05°C, 73.20% and 0.00 cm, respectively. In the correlation study (Table 2), all the abiotic

Table 1: Incidence of aphid and whitefly on different planting dates in relation to abiotic factors on potato variety *Kufri jyoti* (pooled over 2005-06 and 2006-07)

Standard week	Mean aphid population leaf^{-1}			Mean whitefly population leaf^{-1}			Temperature (˚C)		Relative humidity (%)	Rainfall (cm)
	D_1	D_2	D_3	D_1	D_2	D_3	Minimum	Maximum		
39	1.53			0.43			23.40	30.80	73.45	8.10
40	2.10			0.80			22.85	30.65	74.25	2.85
41	2.50	1.46		1.10	0.50		22.00	29.75	71.25	5.75
42	2.83	2.00		1.40	0.90		21.70	29.55	71.20	1.75
43	2.97	2.40	1.40	1.73	1.07	0.56	20.50	23.95	74.75	5.80
44	2.70	2.73	1.80	1.96	1.25	0.73	18.75	25.70	69.00	0.00
45	2.30	2.80	2.20	2.20	1.50	1.00	17.80	25.15	73.60	0.20
46	1.97	2.36	2.53	1.83	1.76	1.30	16.65	26.60	75.75	0.10
47	1.70	2.00	2.33	1.40	2.07	1.53	14.85	26.10	77.05	0.70
48	1.27	1.70	2.03	1.01	1.73	1.73	12.85	24.50	59.75	0.00
49	0.80	1.30	1.66	0.57	1.40	1.73	10.25	23.80	61.85	0.00
50		0.97	1.33		1.03	1.43	10.45	23.15	63.45	0.25
51		0.70	1.03		0.50	1.06	10.65	23.70	64.35	0.35
52			0.90			0.80	10.10	22.85	62.25	1.15
01			0.43			0.43	9.50	22.05	73.20	0.00

D_1: 15th September; D_2: 1st October; D_3: 15th October

factors exhibited a positive but non-significant influence on the aphid population except on 15th October planting where the rainfall showed a negative non-significant effect. In all the three different planting dates, the highest peak population of aphid was recorded when the plant was 35-45 days old after planting. During the present investigation, the highest population of aphid was recorded during the 4th week of October and 2nd week of November. This finding is in conformity to the findings of Saxena and Misra (1983) from Shillong, Meghalaya, India who reported that *M. persicae* reached the critical level during the 4th week of October to 1st week of November in the autumn crop.

It is evident from the data of table 1 that whitefly population gradually increased till a highest mean count of 2.20 leaf^{-1} was observed on the 45th standard week of 15th September planting. The minimum and maximum temperature during this study was recorded 17.80 and 25.15˚C, while relative humidity and rainfall were 73.60% and 0.20 cm, respectively. The lowest population (0.43 leaf^{-1}) of whitefly was recorded on 39th and 1st standard week of 15th September and 15th October planting during which the minimum-maximum temperature, relative humidity and rainfall were recorded with 9.50-22.05˚C, 73.20% and 0.00 cm; 23.40- 30.80˚C, 73.45% and 8.10 cm, respectively. The relationship between the whitefly population and the minimum temperature and rainfall on different planting dates exhibited a negative non-significant influence, whereas the maximum temperature and relative humidity exhibited both negative as well as positive non-significant influence (Table 2). All the three planting dates showed the highest peak population when the plant was 45-55 days old after planting. The findings on the incidence of whitefly population and the effect of abiotic factors on different plantings dates indicated the highest population (2.20 leaf^{-1}) during 45th standard week (2nd week of November) of 15th September planting, while the lowest population count (0.43 leaf^{-1}) was recorded on 39th standard week (4th week of October) and 1st standard week (1st week of January) of 15th September and 15th October plantings, respectively. Similar to the present finding, Kishore et al. (2005) also reported that the whitefly population was signifi-

Table 2: Correlation coefficient (r) between insect population and abiotic factors

Pest	Factor	Temperature (˚C)		RH (%)	Rainfall (cm)
		Maximum	Minimum		
Aphid	D_1	0.196^{NS}	0.667^{NS}	0.514^{NS}	0.237^{NS}
	D_2	0.243^{NS}	0.635^{NS}	0.647^{NS}	0.054^{NS}
	D_3	0.426^{NS}	0.576^{NS}	0.316^{NS}	-0.138^{NS}
Whitefly	D_1	-0.412^{NS}	-0.003^{NS}	0.366^{NS}	-0.406^{NS}
	D_2	-0.193^{NS}	-0.201^{NS}	0.225^{NS}	-0.488^{NS}
	D_3	0.336^{NS}	-0.254^{NS}	-0.388^{NS}	-0.417^{NS}

D_1: 15th September; D_2: 1st October; D_3: 15th October; ^{NS}: Non-significant

cantly high during October and 1st fortnight of November which later declined and remained low till 4th week of January.

4. Conclusion

The management strategies against potato pests are mostly confined with the application of pesticides which is hazardous. Manipulation of planting time is one of the simplest and oldest methods of traditional practices among the farmers in the region. This allows the crop to a shorter period of susceptibility to insect attack. The findings of the present study indicates the most suitable time of planting to escape the most vulnerable period from the attack of important pests of potato which is also farmer's oriented approach and ecologically sound.

5. References

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