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Short Communication

Effect of weather parameters on population dynamics of mustard aphid *(Lipaphis erysimi Kalt)* in Tarai region of Uttarakhand

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Pest and diseases are foremost cause of reduction in crop yield. To reduce the yield loss timely application of remedial measures is essential which is feasible with prior knowledge of the time and severity of outbreak of the pests and diseases. Among different insect pests attacking mustard, the mustard aphid (*Lipaphis erysimi,* Kalt) is the most serious and destructive pest and a major limiting factor for its cultivation. The rate of reproduction varies from 5 to 9 youngs in a single day by a single female. The incidence and spread of aphid is largely influenced by weather conditions. The temperature range of 16.5 to 20.6 °C seems to have favoured the pest multiplication (Talpur and Khuhro, 2003). Weather information can provide a reliable forewarning of pests and diseases attack, therefore, suitable plant protection measures could be taken timely (Agrawal and Mehta, 2007).

The experiment was conducted at Crop Research Centre (CRC) of Govind Ballabh Pant University of Agriculture and Technology, Pantnagar (Lat. 29°N, Long. 79.3°E, Alt. 243.8 m above the m. s. l.) district Udham Singh Nagar, Uttarakhand. Eight varieties of mustard *BSH-1, YST-151*, *Euraca sativa* (Mill CV, T-27, Taramira), *Brassica alba* (White mustard), *Brassica napus* (Gobhi sarson,sheetal), *Brassica carinata* (Ethiopian mustard), *Brassica juncea* (Indian mustard, Varuna) and *B.nigra* (Banarasi rai) were sown on 5/11/2009 and 9/11/2010 in randomized block design (RBD) with three replications.

Observations were taken on ten plants selected randomly and tagged in each replication at weekly interval. The numbers of aphids were counted on a 10 cm apical central shoot of inflorescence. Correlation coefficients were worked out between aphid population between dependent variables under study with the respective weather parameter in different meteorological weeks obtained from Agrometeorological observatory located at the centre.

During 2009-10, the population of mustard aphid *(L.erysimi*) across all varieties started building up in 1st std. week (Table 1) and reached its peak (146.7 aphids) in 4th std week. Thereafter it decreased to 21.5 during 9th std week.

During 2010-11, the aphid attack was two week early and started in 51st week and reached to its peak value of 514.6 in std week 1st. During subsequent weeks its population remained high (>225) upto 7th std week. Thus between years aphid population was higher in 2010-11 than 2009-10.

A perusal of two years of weather data (Table 1) shows that the maximum temperature during 2009-10 (14.7 to 24.0 °C) was lower than that during 2010-11(16.5 to 25.5°C) while the aphid population was higher in 2010-11 than that during 2009-10. Thus higher maximum temperature (> 15 °C) favoured population build up of aphid in mustard. However, maximum temperature alone may not be the only criteria for aphid population as negative correlation was found with it. It seems that higher maximum temperature in association with higher morning relative humidity (> 90 %) seems to be most favourable for aphid population dynamics.

Similarly, the minimum temperature varied considerably during both the years 3.0 to 11.0 °C with mean value of 5.4 °C during 2009-10 and 4.2 to 10.4 °C with mean value of 6.6 °C during 2010-11. Thus higher minimum temperature also accelerated the aphid build up during 2010-11. Wind speed did not affect the aphid population during that year. Relative humidity showed a negative correlation with aphid population in most of the germplasm except the *B.napus* and *B.juncea.* The aphids disappeared after 1stweek of March which was due to unfavourable weather and host plant conditions. The observations are in confirmity with the studies of Singh and Malik (1998) and Ansari *et al* (2007). Correlation

Std Week	2009-10						2010-11					
	Temperature (°C)		RH (%)		Wind speed	Aphid population	Temperature (°C)		RH (%)		Wind speed	Aphid Population
	Max.	Min.	Max.	Min.	(Kmph	(No)	Max.	Min.	Max.	Min.	(Kmph	(No)
51st							23.5	5.5	97	48	2.8	6.2
52nd							22.6	4.5	93	57	3.2	173.3
1st	20.5	7.5	94	47	2.8	1.01	15.4	9.9	95	69	1.8	514.6
2nd	22.2	4.5	93	57	3.2	17.7	16.5	7.2	97	64	7.4	472.0
3rd	17.1	11.0	96	85	9.7	93.3	16.5	7.5	97	59	4.3	430.8
4th	14.7	6.4	97	41	0.8	146.6	19.1	6.1	97	88	3.7	482.2
5th	16.5	7.7	92	65	3.9	145.7	25.5	10.4	92	69	2.1	323.8
6th	19.6	3.0	97	61	4.8	53.8	25.0	7.1	86	36	1.9	322.9
7th	19.2	4.0	97	59	4.3	51.5	22.4	5.5	97	51	3.6	226.2
8th	23.4	7.0	89	40	2.7	56.5	20.2	4.3	90	34	1.1	55.0
9th	24.0	8.0	87	38	2.8	21.5	23.5	4.2	91	32	1.4	41.2
Correlation coefficient (r)	-0.813**	0.241	0.295	0.261	0.055		-0.622*	-0.697*	0.308	0.744*	0.485	

Table 1: Aphid population (pooled) vis-a-vis weather parameters.

and regression analysis indicated that the population was dependent on temperature and relative humidity. Population showed a negative relation with maximum temperature and minimum temperatures. The maximum relative humidity showed positive correlation with population. This revealed that the infestation of mustard aphid on different germplasm was largely governed by the temperature and relative humidity. The results reported are in conformity with earlier reports of Atwal *et al*. (1971) and Sinha *et al*. (1989).

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