

# Occurrence of aphids on various potato germplasms in eastern gangetic plains of West Bengal

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## ABSTRACT

A field investigation was conducted for two consecutive years of 2003-04 and 2004-05 at Adisaptagram Block Seed Farm, Hoogly, West Bengal to find out the incidence pattern and population dynamics of aphids on various potato germplasms. The common potato germplasms viz Kufri Chandramukhi, Kufri Jyoti, Kufri Jawhar along with three processing varieties like Kufri Chipsona-1, Kufri Chipsona-2 and Atlantic were screened against aphids. Potato seed tuber was planted by end of November following all standard agronomic practices except insecticide application. The aphid species viz. *Myzus persicae* (Sulzur) and *Aphis gossypii* Glover were recorded first during third week of December and crossed the threshold limit (20 aphids/100 compound leaves) during first to second week of January in Kufri Chandramukhi whereas in Kufri Jyoti and Kufri Joawhar, the pest was observed first by fourth week of December and attained the critical level during second to third week of January. The pest initially occurred during early to mid January in K. Chipsona-1, K. Chipsona-2 and Atlantic and reached the threshold limit between end January to early February. Maximum population of aphid was found during mid to the end of February in Kufri Chandramukhi, K. Jyoti and K. Jawahar whereas it was recorded between end of February to early March in Kufri Chipsona-1, Kufri Chipsona-2 and Atlantic. Thereafter the population of aphid species declined due to age of the crop and increasing effect of temperature. It is also concluded that K. Chandramukhi was susceptible to aphid, and K. Jyoti and K. Jawahar were tolerant to aphids while K. Chipsona-1, K. Chipsona-2 and Atlantic germplasms of potato were quite resistant. Therefore, it may be inferred that Kufri Chipsona-1, Kufri Chopsona-2 and Atlantic needed only one or two insecticide application at 15 days interval during late January to protect the crop against the aphids while other varieties will require insecticide spraying during early January onwards to manage the crop from the infestation of aphids..

**Keywords:** Aphid, potato, gangetic plains, West Bengal, germplasm

## Introduction

Potato is an important crop in West Bengal due to its high production potential. This crop occupies a significant position in this region due to its favorable weather parameters and soil texture. But the yield of potato tubers is reduced due to the attack of various insects and other pests. Aphid is one of the most important pest of this crop. The aphids species, *Myzus persicae* (Sulzer) and *Aphis gossypii* Glover (Homoptera: Aphididae) are widely distributed all over the world and on a large number of host plant (Konar 1998). The aphids, no doubts, are soft-bodied minute insects but are globally the most notorious so far as the cultivation of healthy (virus free) crop of seed potato is concerned. They are mainly responsible for transmitting viruses (Mild mosaic, severe mosaic and potato leaf roll virus) in potato crop that cause 40-85% reduction in tuber yield (Khurana, 1999; Khurana *et al* 2000; Konar and Basu, 1999; Chandla and Verma 2000; and Konar *et al* 2001). So, a huge amount of pesticide is used by the farmers to protect

their crop from the attack of aphid species and other pests. The highly residual chemicals again pose a problem due to pollution of the ecosystem, health hazards and adverse effects on beneficial living creatures. Therefore, the best method to manage the insect pests on potato is to use a resistant or a tolerant variety, which fits very well in the integrated pest management program without any extra cost to the farmers. Therefore, the present field investigation was undertaken to study the reaction of some potato germplasm against aphid species in West Bengal.

## Material and Methods

A field investigation was conducted during *rabi* season of 2003-04 and 2004-05 at Adisaptagram Block Seed Farm, Hoogly, West Bengal to study the incidence pattern and population dynamics of aphid species on various potato germplasm. The common potato germplasm such as Kufri Chandramukhi and Kufri Jyoti as well as one high yielding

variety viz. Kufri Jawahar and three high yielding processing varieties namely Kufri Chipsona-1, Kufri Chipsona-2 and Atlantic were screened against aphids. Potato seed tubers were planted by end November in 6x4 m plots with 60x20 cm spacing and each germplasm was replicated five times in a randomized block design. All recommended agronomic practices were followed except insecticide application. The incidence pattern and population build-up of aphids were recorded from randomly selected 100 compound leaves of 34 plants in each plot at 7 days interval after the emergence of the crop and before its dehaulming. Percentage of viral incidence was recorded in each plot at 7 days intervals. The weather parameters were also recorded from the Agro-meteorological station of the University.

## Results and Discussion

The pooled data of two years (2003-04 and 2004-05) on aphid population and viral incidence on different potato germplasms are shown in Table 1. Both species of aphids viz; *Myzus persicae* and *Aphis gossypii* were recorded in all the six potato germplasm but there was a distinct incidence pattern of the

pest on different germplasms. Incidence of aphid species i.e., *M. persicae* and *A. gossypii* was initiated first during third week of December in Kufri Chandramukhi (3) while in Kufri Jyoti(5) and Kufri Jawhar (2) the pest appeared first during end of December. The incidence of aphids on Atlantic (3) was found quite later during first week of January and on Kufri Chipsona-1 (2) and Kufri Chipsona-2 (1) during second week of January. In Kufri Chandramukhi the aphids crossed the critical level (20 aphids/100 compound leaves) earlier than other germplasm, i.e., during first week of January whereas in Kufri Jyoti and Kufri Jawahar the pest attained the threshold limit during second week of January. On the other hand, the pest reached the critical level between fourth week of January to first week of February in all the three processing varieties viz. Kufri Chipsona-1, Kufri Chipsona-2 and Atlantic germplasms of potato. During this period the maximum and minimum temperature ranged from 27.2°C to 9.5°C and minimum and maximum relative humidity varied from 46.3% to 99.7% with 2.9 mm average rainfall (Fig 1). Though there was slight difference in the appearance of the pest on Kufri Chandramukhi and Kufri Jyoti but the maximum population of the pest was recorded at the same time in these two

**Table 1**

Population dynamics of aphids (*M. persicae* and *A. gossypii*) and viral incidence on various potato germplasms (pooled data of 2003-04 and 2004-05)

Week/Month	KCM		K. Jyoti		K. Jawhar		K. Chipsona-1		K. Chopsona-2		Atlantic		
	1	2	1	2	1	2	1	2	1	2	1	2	
December	I	-	-	-	-	-	-	-	-	-	-	-	-
	II	-	-	-	-	-	-	-	-	-	-	-	-
	III	3	-	-	-	-	-	-	-	-	-	-	-
	IV	15	0.5	5	-	2	-	-	-	-	-	-	-
January	I	22	2.5	13	-	11	-	-	-	-	-	3	-
	II	43	3.0	24	1.0	21	-	2	-	1	-	7	-
	III	89	5.0	46	1.5	39	0.5	12	-	9	-	13	-
	IV	126	5.5	73	3.0	52	1.0	19	-	16	-	20	0.5
February	I	152	6.0	112	4.0	66	1.5	23	1.0	21	0.5	46	1.0
	II	185	7.0	151	4.5	94	2.5	50	1.5	36	1.0	92	2.0
	III	217	9.5	176	6.0	109	3.0	65	2.0	52	1.5	118	2.5
	IV	194	11.0	161	6.5	137	3.5	78	2.5	57	2.0	88	3.5
March	I	-	-	93	7.0	51	4.0	35	3.0	62	2.5	42	4.0
	II	-	-	-	-	23	5.0	16	3.5	12	3.0	19	4.5
	III	-	-	-	-	-	-	-	-	-	-	-	-

1. Aphid population (*M. Persicae* and *A. gossypii*)

2. Viral disease (%): Mild Mosaic, Severe Mosaic, and Potato leaf roll

KCM: Kufri chandramukhi

germplasm i.e, during third week of February, whereas in case of Kufri Jawhar, Kufri Chipsona-1, Kufri Chipsona-2 and Atlantic, it was observed between end of February and early March. During this period the minimum and maximum temperature varied from 15.8°C to 33.1°C and minimum and maximum relative humidity ranged from 37.2% to 97.1% with 27.3 mm average rainfall. There after, the population of aphid started to decline in all the six potato germplasm probably due to increasing temperature and age of the crop. The result of the present study regarding the incidence pattern of aphids in Kufri Chandramukhi and Kufri Jyoti are also more or less corroborated with findings of Lal and Verma (1998), Mohasin and De (1993), Misra and Agrawal (1998), Konar and Basu (1999), Paul and Konar (2003), Konar and Paul (2005). The viral incidence (Mild mosaic, severe mosaic and potato leaf roll virus) was initiated first during end December in Kufri Chandramukhi; during second week of January in Kufri Jyoti; during third week of January in Kufri Jawahar; during end January in Atlantic and during early February in Kufri Chipsona-1, Kufri Chipsona-2, respectively. Maximum virus incidence was recorded in Kufri Chandramukhi followed by Kufri Jyoti, Kufri Jawahar Atlantic, Kufri Chipsona-1 and Kufri Chipsona-2 respectively. The peak virus incidence was

recorded in between end February to early March when the minimum and maximum temperature ranged from 15.8°C to 33.1°C and minimum and maximum relative humidity varied from 37.2% to 94.1% with 27.1 mm average rainfall. The findings of the present investigation regarding the virus incidence in Kufri Chandramukhi and Kufri Jyoti is more or less similar with the results of Konar and Basu (1999), Paul and Konar (2003) and Konar and Paul (2005). However, the population density of aphids and viral incidence varied from germplasm to germplasm as well as from season to season. From the present investigation, it is also evident that Kufri Chandramukhi was more susceptible to the pest and viral disease, K. Jyoti and K. Jawahar were tolerant to aphid while Kufri Chipsona-1, Kufri Chipsona-2 and Atlantic were quite resistant against the pest as well as viral incidence. It may be due to coarse texture of the leaves. Therefore, it can be concluded that in case of all the three processing varieties viz. Kufri Chipsona-1, Kufri Chipsona-2 and Atlantic, only one or two pesticidal spraying at 15 days interval during end of January onwards will be sufficient to protect the crop against the pest but for other varieties, pesticidal spraying should be applied during early January onwards to control the pest.

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