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Short communication

Effect of weather variability on crop growth and aphid infestation in Mustard crop

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Mustard is a major oilseed crop grown during *rabi* season. Weather variability causes substantial fluctuations in any crop production. Even under optimum conditions, variation in temperature influences the growth and development of the crop because most of the biological and physiological processes are known to be markedly affected by temperatures (Prasad, 1989). The time of sowing plays a key role in modifying the length of vegetative and reproductive phase in this crop (Krishnamurthy and Bhatnagar, 1998). To mitigate the effects of weather variability, modification in sowing dates could be one option for optimizing the growth and seed yield.

Field experiments were conducted during 2007-08 and 2008-09 *rabi* season at research farm of IARI, New Delhi, India. Three varieties of Mustard viz., Pusa Gold, Pusa Jaikisan and BIO 169-96 were sown on 15th, 30th October and 15th November. All growth parameters like leaf area index (LAI), biomass, chlorophyll content index (CCI), aphid infestation and weather parameters were taken. Number of days required to attain different phenological stages like field emergence, first flowering, 50 % flowering, pod formation, maturity and harvesting were recorded. The leaf area was measured using leaf area meter (model LICOR-3100). Cumulative stress degree days were calculated by canopy air temperature difference measured by infrared thermometer.

The data was analysed using the software SPSS 10.0. The significant level of difference of all measured parameters was calculated. One way analysis of variance was carried out following a randomized complete block. .

The weekly average maximum and minimum temperature during germination for 1st sowing was 31.7 and 14.8°C, for 2nd sowing it was 30.2 and 11.8°C and for 3rd sowing it was 28.2 and 10.6°C. Due to the less maximum, minimum and average temperature, the germination rate was lower in 3rd sowing as compared to 1st and 2nd sowing. During flowering the weekly average maximum and minimum temperature for 1st sowing was 26.3 and 9.7°C, for 2nd sowing it was 20.2 and 7.0°C and for 3rd sowing it was 20.0 and 3.4°C. During pod formation the weekly average maximum and minimum temperature for 1st sowing was 22.2 and 6.0°C, for 2nd sowing it was 21.9 and 4.9°C and for 3rd sowing it was 20.6 and 3.5°C. During maturity the weekly average maximum and minimum temperature for 1st sowing was 26.3 and 9.1°C, for 2nd sowing it was 32.8 and 14.0°C and for 3rd sowing it was 32.3 and 16.5°C (Table 1). Due to the more maximum, minimum and average temperature during flowering and pod formation and less maximum, minimum and average temperature during maturity the yield was more in 1st sowing as compared to 2nd and 3rd sowing. Reduction in seed yield of *Brassica* species under late sown conditions might be attributed to increase in temperatures at the time of pod growth and seed filling stage, which reduced the dry matter accumulation into the seed and shortened the seed filling period (Nanda , 1994).

Cumulative stress degree days in three cultivars of mustard was found to be higher in Pusa Gold followed by BIO 169-96 and Pusa Jaikisan (Fig 1). This is because Pusa Gold had more aphid infestation as compared to other two varieties.

Aphid population was found to be more in Pusa Gold followed by BIO 169-96 and Pusa Jaikisan (Fig. 2). Also

Table 1: Weekly average maximum temperature during different phenological stages of mustard sown at different dates of sowing

Date of sowing	Germination		Flowering		Pod Formation		Maturity	
	T_{max}	T_{min}	T_{max}	T_{min}	T_{max}	T_{min}	T_{max}	T_{min}
1st Sowing	31.7	14.8	26.3	9.7	22.2	6.0	26.3	9.1
2nd Sowing	30.2	11.8	20.2	7.0	21.9	4.9	32.8	14.0
3rd Sowing	28.2	10.6	20.2	3.0	20.6	3.5	32.3	16.5

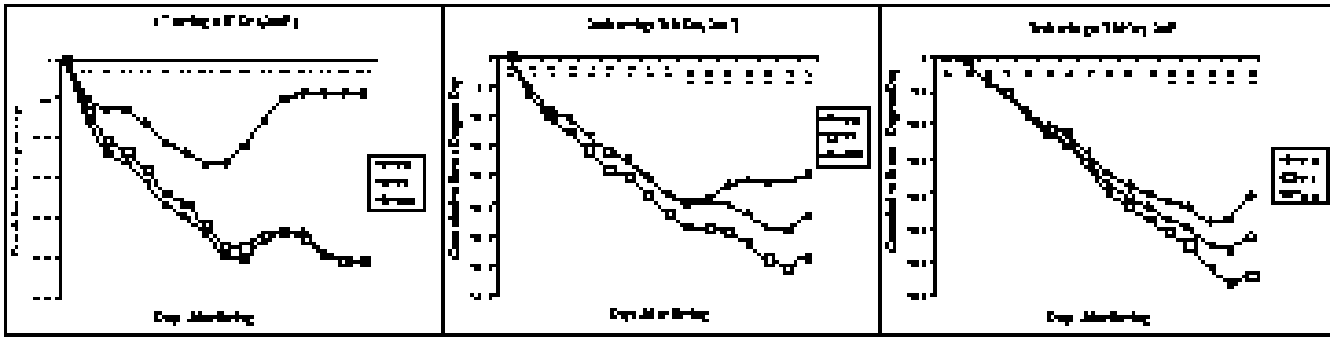

Fig. 1: Cumulative stress degree days of mustard sown at different dates

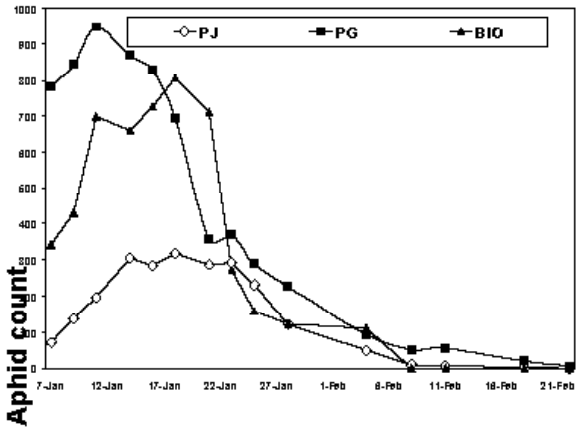

Fig. 2: Aphid population in different varieties of mustard

aphid infestation was more in late sowing. The critical period of mustard exposure to aphids was found to be the 3rd week after aphid appearance when the crop was in flowering stage and hence the control measures have to be initiated before flowering. In present study the higher yield in first sown crop might be attributed to comparatively lower aphid population during crop growth and maximum time taken by the crop for its growth and development (Verma *et al,* 1993). From field studies conducted (Rohilla, 1996) in Haryana, it was observed that the pest incidence increased with an average temperature of about 13.7°C and a relative humidity 65 percent and decreased with temperature above 35°C.

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