

Influence of meteorological parameters on the development of *Alternaria* blight and White rust of Mustard (*Brassica juncea* L.) crop in the south western region of Punjab



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INTRODUCTION

- ❑ Mustard (*Brassica juncea* L.) is an important oilseed crop grown both in tropical and sub tropical regions of the world
- ❑ The crop covers 41 thousand hectares area of the Punjab state with a production of 46 thousand tonnes (2006-07)
- ❑ White rust and *Alternaria* blight caused by *Albugo candida* (Pers.) and *Alternaria brassicae* (Berk.) respectively are important diseases on Indian mustard causing considerable yield losses
- ❑ White rust produced 37- 47 per cent fewer pods which leads to 17- 32 per cent less seed yield in mustard (Bains and Jhooty, 1980)
- ❑ *Alternaria* blight reduced 5-15% seed yield at harvest and it can reached upto 47% under high disease severity (Kolte *et al.*, 1987)
- ❑ Weather factors play a major role in infection and development of these diseases (Sinha, Rai and Sinha, 1992)
- ❑ Hence an attempt was made to study the role of various weather factors on infection and development of both the diseases.

MATERIAL AND METHODS

- ❑ The experiment was conducted at the Regional Station, Bathinda with cultivar - PBR 91 during *rabi* season 2006-07
- ❑ Different thermal environments were provided to the crop by sowing on three dates i.e. 20th October, 5th November and 20th November
- ❑ In each plot five plants were selected at random, labeled and disease incidence of White rust and *Alternaria* blight were recorded at seven days interval starting from the date of sowing on leaves using 0-5 scale
- ❑ Weather data with respect to maximum and minimum temperature, relative humidity I (morning), relative humidity II (afternoon) and rainfall were obtained and averaged for seven days except rainfall. Simple correlation was done between disease index and weather parameters.

The percentage disease index (PDI) was calculated using the formula :

$$\text{PDI} = \frac{\text{Sum of numerical grading}}{\text{No. of leaves examined} \times \text{Max. disease grade}} \times 100$$

Here, numerical grading refers to numbers in scale given by Wheeler (1969)

Table 1. Scale/Description of the symptom for *Alternaria* blight

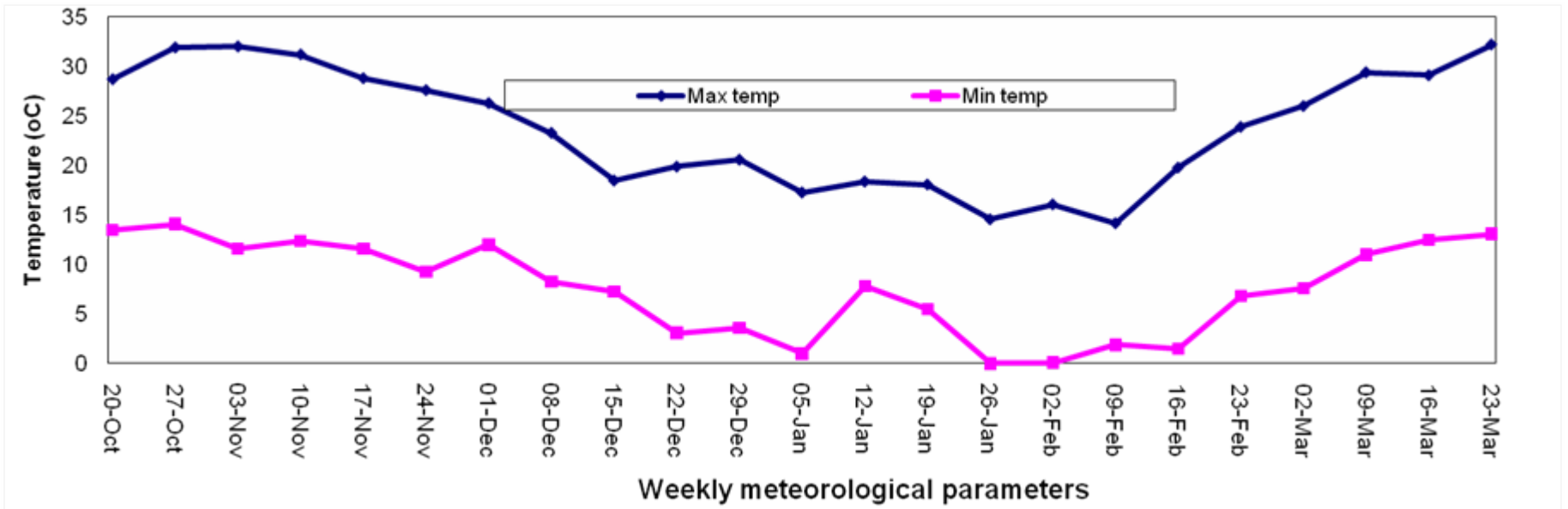
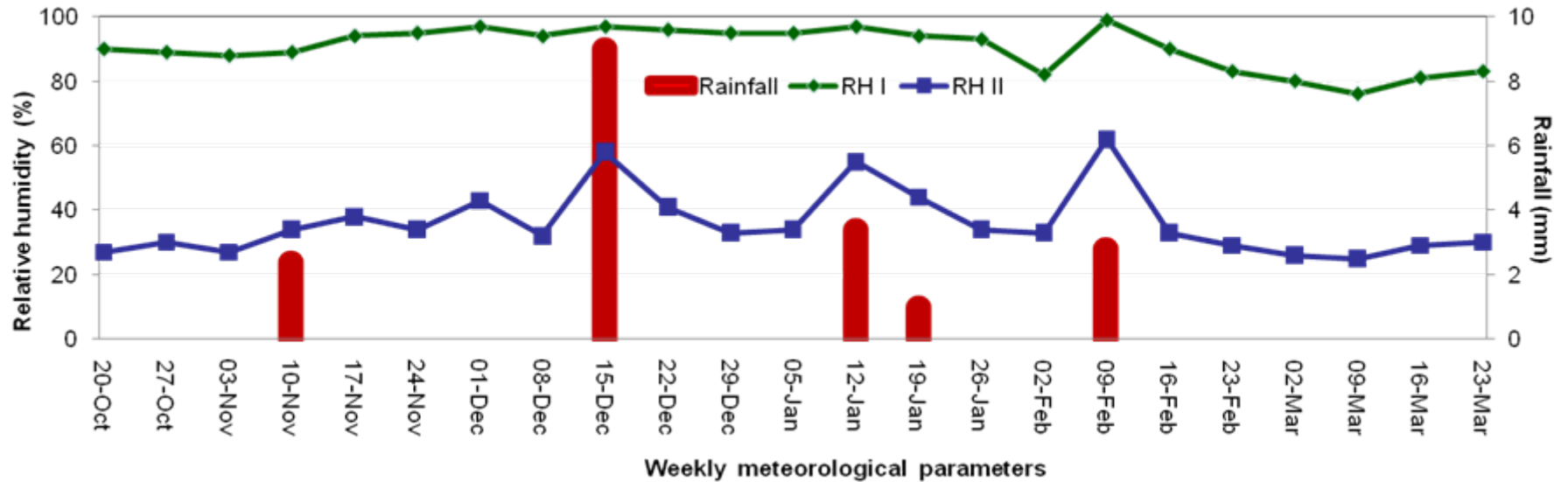
Scale	Description of the symptom for <i>Alternaria</i> blight.
0	Leaves free from infection
1	Small irregular spots covering <5% leaf area
2	Small irregular brown spots with concentric rings covering 5.1-10% leaf area
3	Lesions enlarging, irregular brown with concentric rings covering 10.1-25% leaf area
4	Lesions merge to form irregular and appears as a typical blight symptom covering 25.1-50% leaf area
5	Lesions merge to form irregular and appears as a typical blight symptom covering >50% leaf area

Table 2. Scale/Description of the symptom for White rust

Scale	Description of the symptom for white rust.
0	Leaves free from infection
1	Small white raised rust pustules covering <5% leaf area
2	Small white raised rust pustules covering 5.1-10% leaf area
3	Small white raised rust pustules join together covering 10.1-25% leaf area
4	Small white raised rust pustules join together to form irregular patches covering 25.1-50% leaf area
5	Small white raised rust pustules join together to form irregular large patches covering 25.1-50% leaf area

RESULTS

Weather parameters during the crop season 2006-07 at Bathinda

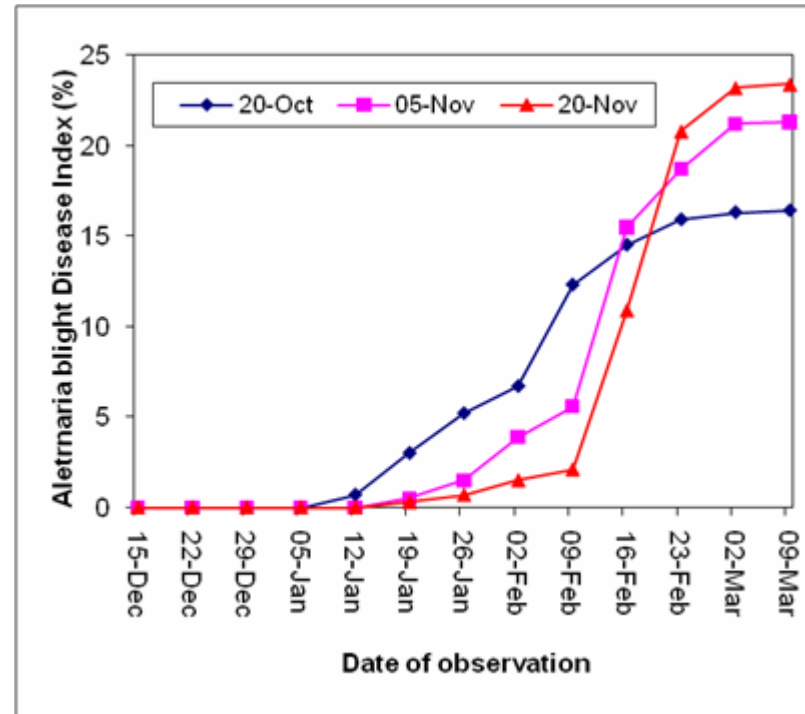


Correlation coefficients between disease index of White rust and *Alternaria* blight with the weather parameters

Weather factors	White rust			<i>Alternaria</i> blight		
	D ₁	D ₂	D ₃	D ₁	D ₂	D ₃
Maximum temperature	+0.64	+0.62	+0.83	+0.66	+0.76	+0.90
Minimum temperature	+0.32	+0.29	+0.61	+0.17	+0.30	+0.66
Relative humidity I	-0.49	-0.37	-0.21	-0.51	-0.25	-0.25
Relative humidity II	-0.11	-0.12	-0.17	-0.21	-0.11	-0.14
Rainfall	-0.11	-0.20	-0.17	-0.13	-0.28	-0.18

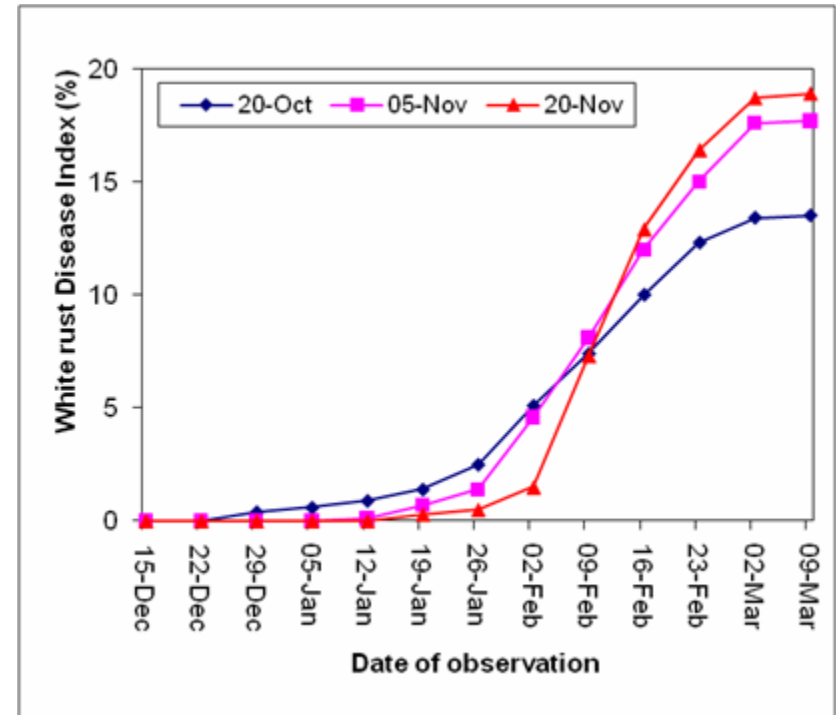
Alternaria blight

- ✓ The symptom of *Alternaria* blight was noticed on 56 DAS under different dates of sowing .
- ✓ Moderate but prolonged incidence of *Alternaria* blight was observed in October sown crop.
- ✓ In November sown crop, higher severity of *Alternaria* blight for short duration was observed
- ✓ With increases in maximum and minimum temperature and decrease in RH I, II favoured the development of *Alternaria* blight disease under all dates of sowing.
- ✓ Positive correlation was found between maximum, minimum temperature and disease index.
- ✓ Significant positive correlation was noticed between maximum temperature and disease index.
- ✓ Negative correlation was recorded between disease index and weather factors like relative humidity I, II and rainfall.
- ✓ The following weather parameters range were favourable for the development of *Alternaria* blight disease
 - Maximum temperature of 16–28 °C,
 - Minimum temperature of 4-11 °C
 - Average relative humidity > 60 %,
 - RH I (Morning) > 76 %
 - RH II (Afternoon) > 25 %.



White rust

- ✓ The symptom of white rust were noticed on 39 days after sowing under different dates of sowing. The development of the disease was slow during early stage of the crop and reached maximum at later stage of the crop
- ✓ The crop sown in 20th of October was observed moderate but prolonged incidence of White rust.
- ✓ In November sown crop, higher severity of White rust for short duration was recorded.
- ✓ With increases in maximum and minimum temperature and decrease in RH I, II favour the development of White rust under all dates of sowing.
- ✓ Positive correlation was found between temperatures and disease index.
- ✓ Significant positive correlation was noticed between maximum temperature and disease index.
- ✓ Negative correlation was recorded between disease index and weather factors like relative humidity I, II and rainfall.
- ✓ The maximum disease incidence was seen when favorable weather conditions i.e.
 - Maximum temperature of 15-29 °C
 - Minimum temperature of 4-12 °C,
 - Average relative humidity > 60 %
 - RH I (Morning) > 76 %
 - RH II (Afternoon) > 25 %.



CONCLUDING REMARKS

- ❑ The damage caused to a crop by *Alternaria* blight and white rust are likely to be related to sowing date, i. e., late sowing results in higher blight and rust severity.
- ❑ Thus, it would be appropriate to sow the crop at the earliest possible time to enable escape or non coincidence of the flowering stage with favourable temperature and humidity factors leading to higher blight severity on the leaves and pods, which affect yield.
- ❑ Accurate forecast for the incidence of these diseases would enable farmers to decide on optimum timing of fungicide sprays and to avoid unnecessary pesticide application.

THANK YOU