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The occurrence of *Alternaria triticina* associated with infected *Triticum aestivum* L. from fields of the Madhepura, Bihar

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Abstract: Wheat (*Triticum aestivum)* is an important food crop of Asia and is grown on more land area than any other food crop. Yields can be negatively influenced by various factors, including disease, particularly those caused by fungi which create problems in both production and storage. Foliar diseases of wheat such as *Alternaria* leaf blight may cause significant yield losses, with reductions in plant health and seed quality. The disease is caused by a fungal pathogen and causes necrotic leaf lesions and in severe cases shriveled. The work reported here determined the incidence of *Alternaria* species infecting wheat seeds grown in the Madhepura, Bihar. This work confirms the identity of a major source of wheat leaf blight in Bihar which will aid in formulating effective disease management strategies.

Key words: *Triticum aestivum*, *Alternaria triticina*, yields, occurence, infection

INTRODUCTION

Wheat (*Triticum aestivum* L.) is one of the oldest and most important food crops, widely cultivated for its seed, a cereal grain which is a worldwide staple food. According to a survey it is the second most-produced cereals throughout the world after maize. World trade in wheat is greater than for all other crops combined.[1] Cultivation and repeated harvesting and sowing of the grains of wild grasses led to the creation of domestic demands, as mutant forms of wheat were preferentially chosen by farmers. In domesticated wheat, grains are larger, and the seeds remain attached to the ear by a toughened spine during harvesting.[2] In traditional agricultural systems wheat populations maintain high levels of morphological diversity. Major breeding objectives include high grain yield, good quality, disease and insect resistance and tolerance to abiotic stresses, including mineral, moisture and heat tolerance. The major diseases in temperate environments include the foliar diseases.

Numerous microorganisms, especially fungi, pose a challenge to both wheat production and storage. Wheat agriculture faces numerous disease problems, root rot, leaf blight, leaf spot etc. However, wheat is also susceptible to leaf blight caused by *Alternaria triticina*. Leaf diseases of wheat, such as leaf blight diseases caused by *Alternaria triticina* result in substantial loss in yield and deterioration in quality and vigor of seed. Leaf blight of wheat via *Alternaria triticina* is "one of the most important foliar diseases of wheat in India".[3]

Alternaria triticina is the causal agent of *Alternaria* leaf blight of wheat, initially described from India. It can cause major damage to susceptible wheat varieties under

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wet or humid conditions. This is one of several species in the genus that have been isolated from wheat leaves; it is demonstrated to be pathogenic, while others appear to be primarily saprophytes. The species have been reported from different hosts and different places also but its presence is mainly reported from south and southwestern Asia.[4,5]

Symptoms of Alternaria leaf blight include the formation of round to irregular spots of up to 10 mm diameter. Alternaria species are dispersed from region to region through various pathways. The aim of the work described in this paper was to determine the *Alternaria* species associated with wheat seeds grown in the Madhepura, Bihar as an example of the source of yield losses affecting production of this important crop in South Asia. To the best of our knowledge, no such studies have been carried out till date.

MATERIALS & METHODS

Symptoms like lesions (with either perithecia or without the dark pycnidia), burnt appearances occur on the leaf, leaf sheath, awns & glumes. These symptoms comprise of the initial stage of detection of the disease. When the fields are heavily infected, they can be spotted in form of burnt appearances from a distance (Prabhu & Prasada, 1966)[6]. For final confirmation in the seed, the agar plate is used (Mathur & kongsdal, 2003)[7].

Diagnosis

A. triticina is isolated by surface sterilization of infected plant parts like, stems, leaves or seeds using the methods & keys of Simmons (2007)[4] the isolates should be transferred into a carrot agar medium & then observed in alternating day & night cycle.

Differences in *A. triticina* & other *Alternaria* species residing in the leaves of infected can be done by PCR or other DNA sequencing methods. The culture filtrates of *A. triticina* were found to be toxic to wheat seedlings. The sequences of ITS region of rDNA of these isolates are preserved in Gen Bank.

Pathogenicity test

A standard nutrient agar was made using a mixture of 1.3g K_2HPO_4, 1.06g Na_2CO_3, 5g $MgSO_4.47H_2O$, 5g of dextrose, 1g asparagine & 20g agar in1 liter of distilled water. This mixture is thought to be best for sporulation (Prabhu & Prasada 1966), though its time is dependent on temperature & humidity. When temperature is high, conidiophores appear single or in bundles of 2-10.

For inoculation, plants are sprayed with water containing thick conidial suspension & are then covered with plastic bags to maintain high humidity for first 24 hours. These plants are then placed in a humid chamber for next 36 hours. After 7 days of inoculation, the symptoms appear. For the disease to appear a concentration of 40,000 spores/me is essential. Plants were observed for either the presence or absence of irregularly shaped spots from dark brown to gray in colour.

RESULT

The disease severity (D.S) was calculated using revised rating system.

0 = no symptoms
1 = 0-25 % infection of leaves
2 = 25-50 % infection of leaves
3 = 50-75 % infection of leaves
4 = 75-100 % infection of leaves (plant is dead)
Total no. of plants = 40

Zhao *et al*. rating	No. of Plants
0	2
1	12
2	5
3	15
4	6

CONCLUSION

It was found that only small specks occur in a resistant cultivar, pointing to the facts that increase in the age of plant; increase the susceptibility & density of the disease. Disease presents in the seeds of cultivar, can become a source of disease outbreak in the entire field, if the environment at that instant is favorable for it. An infected seed not only gives rise to an infected plant, but also infects the soil & the infection seeps through the entire cultivar. Such infection can lead to crop failure. By deciding the infection or disease severity rate, one can decide whether or not to keep the crops for the entire season.

If the disease severity is between 0-1, one can take appropriate measures to control the infection. However if the DS rate 2-4, the chances of crop failure are very high. In such circumstances process & get rid of the entire

infected crop by methods like burning. Early method of disease detection can always save money as well as man power.

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