Science for Agriculture and Allied Sector: A Monthly e Newsletter
Volume 3 – Issue 12
Online ISSN: 2582-368X
www.agriallis.com

BLAST OF WHEAT- AN OVERVIEW

Article Id: AL202200

[1]Sourik Poddar* and [2]Nillahit Payra

[1]Dept. of Genetics and Plant Breeding, Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur-741252, Nadia, West Bengal, India
[2]Dept of Genetics and Plant Breeding,Ramakrishna Mission Vivekananda Educational and Research Institute, Kolkata-700103, West Bengal, India

Email: sourikpoddar1997@gmail.com

Wheat is grown all over the world, under a variety of climatic settings ranging from subtropical to temperate. However, extensive wheat production has always attracted a variety of restrictions, resulting in the establishment of biotic and abiotic limits. Among them, blast is one of the most deadly wheat diseases. The fungus *Magnoporthe oryzae* pathotype Triticum causes wheat blast (WB), commonly known as 'Bruson' (Portuguese meaning 'burnt'). Brazil, Bolivia, Paraguay, Argentina, and Uruguay are the only nations in South America where wheat blast is restricted (Kohli *et al.,* 2011). However, it was discovered in Bangladesh in April of 2016. (Calloway*et al.,* 2016; Malaker *et al.,* 2016). It has already been discovered in 15% of Bangladesh's wheat-growing region. Wheat blast absolute from Bangladesh was determined to be comparable to that of Brazil based on molecular features (Malaker *et al.*, 2016).

Symptoms

Wheat blast attacks all portions of the plant that are above ground.Head/spike infection is the most noticeable symptom (Fig 1). It's easy to mix up with *Fusarium* head blight. There has also been rachis blackening, lower nodes, grain shrivelling, and low-test weight (Malaker *et al.*, 2016). The pathogen is known to generate pyricularin, a non-host specific toxin (Agrios*et al.*, 2005). Depending on the timing of infection, symptoms on the head might range from elliptic lesions with bleached centres to spike bleaching, sterility, and empty grains. Depending on the stage of the plant, lesions on leaves vary in shape and size. Lesions become less common as plants age. Infection on seedlings can be extremely harmful in high-temperature, high-humidity environments and can even result in plant death (Igarashi*et al.*, 1990).

Science for Agriculture and Allied Sector: A Monthly e Newsletter
Volume 3 – Issue 12
Online ISSN: 2582-368X
www.agriallis.com

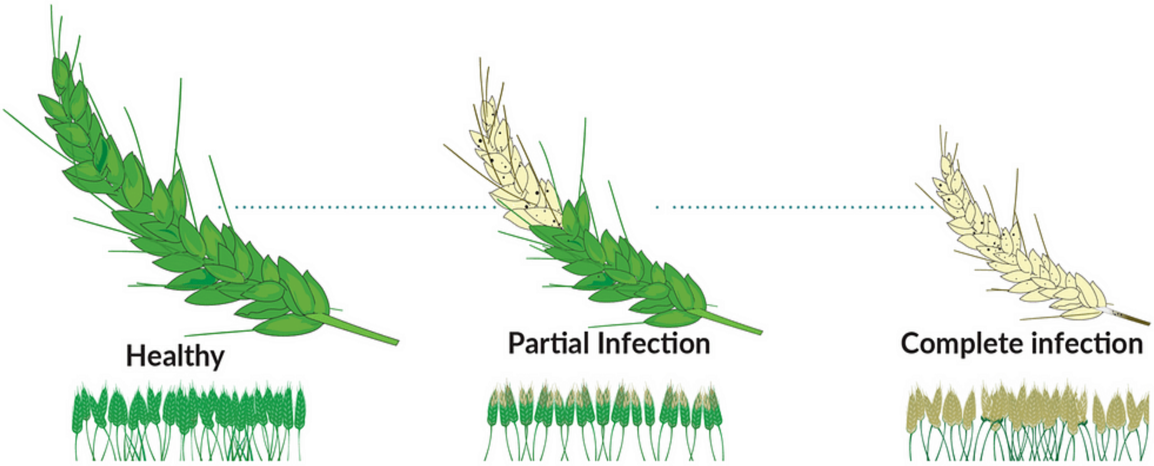

Fig 1: Wheat blast infecting the spike (Source: cimmyt.org)

Indian scenario

India is on track to become a wheat exporter by 2050, with a production target of 140 million tonnes. In South Asia, a large 7 million hectares of wheat acreage has been identified to be very sensitive to WB, with the majority of it in India but also in Bangladesh and Pakistan (Mottaleb *et al.*, 2018). Weather-based recasting has revealed the country's northeastern plain zone (NEPZ) and centre zone are extremely vulnerable, and if WB outbreaks occur in the major northwestern plain zone (NWPZ) during a hot and humid year, the results might be disastrous. However, the Government of India (GoI) has taken an unprecedented proactive approach to the issue of WB by establishing awareness, surveillance, and monitoring modules in the affected/vulnerable India–Bangladesh border areas. The 'wheat holiday,' which prohibits wheat growing in West Bengal's Murshidabad and Nadia districts, as well as a 'no wheat zone' within 5 kilometres of Bangladesh's border, are widely praised measures to prevent WB from entering the nation. The impact and success of the wheat holiday are still unknown. The wheat holiday in West Bengal, which produces 1.24 percent of the country's total wheat, should have little impact on the country's total wheat production, which has already topped 100 million tonnes. The 'wheat trap nurseries' have also been planted in the border regions to prevent disease migration in all seasons(Bishnoi*et al.*, 2021). Under the auspices of ICAR-Indian Institute of Wheat and Barley Research, Karnal, the All India Co-ordinated Wheat and Barley Improvement Project, which has a network of centres and co-operators all throughout India, is particularly watchful and equipped to deal with the problem (Saharan *et al.*, 2016).

Volume 3 – Issue 12
Online ISSN: 2582-368X
www.agriallis.com

Management

Avoidance- Sowing wheat seed from blast-affected regions is not recommended. When there is a lot of rain, it's important to keep an eye out for the blast. Sprinkler watering systems can predispose wheat to blast; hence they should be avoided (Saharan *et al.*, 2016).

Host resistance- Blast host resistance is unknown; however, Brazilian wheat cultivars BR18, IPR85, and CD113 have shown a modest level of resistance. CIMMYT line Milan derivative accessions have also been demonstrated to have a high level of resistance (Kohli *et al.*, 2011). There is a scarcity of data on the discovery of quantitative trait loci (QTL) and related markers connected to them. Having anti-blast properties, Pongsu Seribu 2, a moderately blast-resistant rice variety, was recently mapped using QTLs connected to resistance genes. It was discovered and cloned a QTL connected to blast resistance (Fatah *et al.*,2014).

Chemical application- There hasn't been any systematic and compelling study on the chemical control of wheat blast. However, suppressing seed inoculum using tricyclazole 75WP @2g/kg or carbendazim 50WP 1g/kg seed is well known in rice blast. Initial infections can be managed using need-based sprays of carbendazim 50WP @1g/L or tricyclazole 75WP 0.6g/L or Propiconazole 25EC/carpropamid 30SC 1ml/L or Isoprothiolane 40EC 2g/L during spike initiation or blooming, depending on the condition. Spray at flowering has been effective in controlling(Saharan *et al.*, 2016).

Conclusion

If total eradication is unattainable, the path forward for WB is to devise measures for limiting the illness to Bangladesh in Asia and the hotspot regions of Latin America. The inoculum load in Bangladesh must be reduced to reduce the susceptibility of the Indian wheat industry. Non-wheat seasons, non-poaceous crops in the offseason, disease-free resistant variety seeds, agronomic practices that favour disease non-development, development and implementation of integrated disease management practices, and continuous monitoring of disease movement and quarantine are all ways to achieve this. Early warning systems based on climate analogues must be developed, and the economic and quarantine importance of the blast pathogen must be fully understood, in addition to attracting investment in the rapid development of high-yielding, WB resistant wheat varieties using cutting-edge technologies such as speed breeding, genomic selection, and gene editing (Bishnoi*et al.*, 2021).

Reference

Agrios GN. (2005) *Plant Pathology*. Elsevier Academic Press.525 B Street, Suite 1900, San Diego, California 92101-4495, USA.952PP.

BishnoiS. K., Kumar S and SinghG. P. (2021) Wheat blast readiness of the Indian wheat sector. *Current Science* 120: 262-263.

Callaway E. 2016. Devastating wheat fungus appears in Asia for first time. *Nature* 532:421-422.

Fatah T, MY Rafii, HA Rahim, S Meon, M Azhar and MA Latif. (2014) Cloning and analysis of QTL linked to blast disease resistance in Malaysian rice variety Pongsu Seribu 2. *International Journal Agriculture Biology* 16: 395–400

Igarashi S. (1990) Update on wheat blast (*Pyricularia oryzae*) in Brazil. Pages 480-483 in: Proc. Int. Conf.- Wheat Non-traditional Warm Areas. D. Saunders, ed. Mexico, D.F.

Kohli, M, Y Mehta, E Guzman, L Viedma and L Cubilla. (2011) *Pyricularia* blast – A threat to wheat cultivation. *Czech J. Genet. Plant Breed*. 47:130-134.

Malaker P K, NCD Verma, TP Tiwari, WJ Collis, E Duveiller, PK Singh, AK Joshi, RP Singh, HJ Braun, GL Peterson, KF Pedley, ML Ferma, B Valent. (2016) First report of wheat blast caused by *Magnoportheoryzae* pathotype triticum in Bangladesh. *Plant Disease*http://dx.doi.org/10.1094/PDIS-05-16-0666-PDN

Mottaleb, K. A. *et al., PLoS ONE*, (2018) 13(5), e0197555; doi:10.1371/journal.pone. 0197555.

Saharan MS, SC Bhardwaj, R Chatrath, P Sharma, AK Choudhary and RK Gupta. (2016) Wheat blast disease - An overview.*Journal of Wheat Research* 8(1):1-5