Wheat blast disease detected in Southern Africa

The recent detection of wheat blast in Zambia requires increased awareness among all stakeholders in the wheat industry in the Southern African Development Community. From international reports it is evident that once established in a country, the disease is difficult to control. The ARC's surveillance programme for rust races may assist in the early detection of wheat blast. It is also important for wheat producers and researchers to be on the lookout for symptoms of wheat blast in commercial wheat fields as well as on experimental plots.

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Blast signs on wheat heads (Source: Compendium of wheat diseases and pests, 2010).

WHEAT BLAST WAS REPORTED for the first time on wheat in 1985 in Brazil and has subsequently spread across most wheat producing areas of the country. This disease has the potential to cause yield loss of up to 100% on susceptible cultivars.

Wheat blast, caused by the fungus *Magnaporthe oryzae* pathotype *Triticum* (MoT) (synonym *Pyricularia oryzae*), can infect both leaves and heads of wheat. However, the canopy of the crop often remains green with typical signs of the disease on the heads of infected wheat. Infection starts as brown to black spots and gradually the entire spike, above the infection points, will dry and become straw-coloured or bleached (**Photo 1**). Infected wheat heads may completely fail to produce any grain or may produce poor quality, shrivelled grains.

Wheat blast symptoms on the head resemble that of Fusarium head blight (FHB), however, the former lacks the characteristic pinkish discolourations which often develop on wheat heads infected by FHB. Instead, greyish fungal growth might be visible on the rachis between spikelets on the head infected by wheat blast.

Some grass species may also serve as an alternative host for the wheat blast pathogen, contributing as a source of inoculum as well as to the survival of the fungus.

Wheat blast poses a serious threat to global wheat production and food security, because the fungus produces airborne spores which can be dispersed by wind within and between wheat fields in a short period of time, resulting in severe yield loss. Furthermore, the fungus is seed-borne and can be transmitted from infected seed to seedlings after planting.

This may facilitate long-distance

dispersal across the major wheat producing countries of the world through infected seeds. Following the first detection in Brazil in 1985, wheat blast was confirmed in other South American countries, including Bolivia, Paraguay and Argentina between 1996 and 2007, indicating its ability to spread between countries. In addition, the disease was detected for the first time in Bangladesh on the Asian continent in 2016, affecting over 15 000 hectares of wheat and resulting in yield losses of up to 100% in several fields.

Southern Africa

Wheat blast had not been detected in Africa until the 2017/18 season, when the disease was found in the Mpika district of the Muchinga Province in Zambia, on wheat in several experimental plots and farmers' fields. The disease incidence and severity, measured as head infection, ranged from 50% to 100% (Tembo *et al.*, 2020).

This is alarming news for Southern Africa, because previous studies have shown the occurrence of similar diseases in Zambia, Zimbabwe and South Africa, indicating the possibility of inoculum exchange between these countries. Therefore, the wheat blast observed in Zambia could spread to neighbouring countries, thereby threatening wheat production and food security in the region. Wheat blast could potentially spread from Zambia to Zimbabwe and then to South Africa.

It is therefore important for wheat producing countries in the region to conduct intensive surveillance of wheat blast and share information on further developments. South Africa has an ongoing rust surveillance programme, whereby the major wheat producing regions are regularly monitored by ARC-Small Grain for the occurrence of new rust races.

Should wheat blast find its way to South Africa, the ARC's surveillance programme may assist in the early detection of the disease. It is also important for South African wheat producers and researchers to be on the lookout for symptoms of wheat blast in commercial wheat fields as well as on experimental plots.

Wheat blast disease development is favoured by warm, wet and humid conditions. Long periods of leaf wetness are considered important for optimal disease development. Areas that may be at higher risk in South Africa include the cooler and warmer irrigation areas, since temperature and humidity play a big role in the occurrence of wheat blast.

From a control point of view, previous studies indicate the possibility of controlling wheat blast using resistant cultivars and fungicides. However, only a limited number of resistance sources have been identified over the past three decades and such sources provide only moderate levels of resistance.

Fungicides provide only partial protection from this disease. Furthermore, fungicide resistance has been detected within the populations of the wheat blast pathogen in Brazil.

Therefore, an integrated disease management approach involving crop rotation, planting of certified disease-free seed, fungicide seed treatment as well as foliar and head applications and breeding for genetic resistance, have been proposed.

The few useful sources of resistance identified in South America should be considered for use in local wheat blast resistance breeding. The evaluation of local wheat cultivars to determine their response to the wheat blast pathogen through an international collaborative project may be worthwhile, considering the threat of the disease.

References

Ceresini *et al.*, 2018. Wheat blast: from its origins in South America to its emergence as a global threat. Molecular Plant Pathology 20: 155-172. https://doi.org/10.1111/mpp.12747

Cruz and Valent 2019. Wheat blast disease: danger on the move. Tropical Plant Pathology 42: 210-222. https://doi.org/10.1007/s40858-017-0159-z

Tembo *et al.*, 2020. Detection and characterization of fungus (*Magnaporthe oryzae pathotype Triticum*) causing wheat blast disease on rain-fed grown wheat (*Triticum aestivum* L.) in Zambia. PLoS ONE 15(9): e0238724. https://doi.org/10.1371/journal.pone.0238724

Agri SA kies nuwe direksie

Die inperking weens die koronavirus het aan die landbousektor en -waardetting 'n geleentheid gebied om te presteer en om voedsel aan Suid-Afrikaners te voorsien. Terwyl COVID-19 vernietigend was, was landbou die enigste sektor wat gegroei het, het Pierre Vercueil ná sy verkiesing as voorsitter van Agri SA gesê.

GEORGANISEERDE LANDBOU HANDEL volgens mnr Vercueil oor uitdagings wat bestuur moet word, maar wat buite die produsente se beheer is. "Ons moet na mekaar luister, maar dit is moeilik en gaan groot leierskap vereis." Met verwysing na grondhervorming het hy gesê private eiendomsreg is 'n bousteen van landbou en van die ekonomie.

Saam met mnr Vercueil is Phenias Gumede en Jaco Minnaar tydens Agri SA se 2020-kongres as ondervoorsitters verkies. Mnr Vercueil, 'n graan- en veeboer van Noordwes, het gesê verskeie sake wat vir boere van belang is sal saam met Agri SA se nuutverkose direksielede aangepak word.

Die ander direksielede is: Douglas Stern (sakekamer), Nicol Jansen (sakekamer), Piet Engelbrecht (sakekamer), SK Makinana (bedryfskamer), Niël Joubert (bedryfskamer), Derek Mathews (bedryfskamer), Gerhard Diedericks (korporatiewe kamer) en Nic Bronkhorst (korporatiewe kamer).

Twee onafhanklike direkteure dien in die direksie. Hulle is dr Charlotte Nkuna en dr Kathy Hurley.