Dealing with field fungus in maize

The field fungi *Fusarium verticillioides* and *F. graminearum* are a serious threat in South Africa. Apart from damaging grain, they produce mycotoxins, which can endanger people and animals.

Broadly speaking, two types of fungi produce mycotoxins in grain: those that invade before harvest (field fungi) and those that occur only after harvest (storage fungi).

After harvest, grains or seeds become dormant due to drying. At this stage, two physical factors, namely moisture content and grain temperature, dictate whether storage fungi will move in. *Aspergillus flavus* is a common and economically important storage fungi, but is not a problem in South Africa. Of far greater significance here are field fungi.

REMOVE MAIZE STUBBLE AND WEEDS ON WHICH THE FUNGI CAN OVERWINTER

Fungal infection and colonisation can lead to poor-quality grain, and mycotoxins can be dangerous to humans and animals.

For a fungal disease to occur pre-harvest, inoculum (fungal spores) must be present, the weather (humidity, temperature, rain and wind) must be favourable, and a host plant must be present.

Fusarium verticillioides and *F. graminearum* are two economically important field fungi in South Africa. *F. verticillioides* produces mycotoxins called fumonisins, and *F. graminaerum* produces the mycotoxins deoxynivalenol and nivalenol.

RESEARCH

The Agricultural Research Council has conducted extensive research into the occurrence of fumonisin-producing *Fusarium* spp and fumonisin contamination of maize in 29 maize production regions of South Africa. Higher fungal infection and fumonisin concentrations were associated with warmer production areas such as the Northern Cape, North West and some areas of the Free State, where the average temperature ranges from 29°C to 32°C.

In the cooler areas of Mpumalanga, KwaZulu-Natal, Gauteng and some parts of the Free State, where the mean maximum temperature ranged from 24°C to 27°C, fungal biomass and fumonisin levels were absent or low.

Further research showed that high temperature and low humidity at one to 14 days post-silking was most favourable for *F. verticillioides* infection.

Researchers have also found that colonisation of maize tissues during the early post-silking stage and the dough stage of grain fill favours fumonisin production.

A study by Dr Edson Ncube showed that Bt-technology decreased the risk of damage by the stem storer *Busseola fusca*.

This insect is the vector of *F. verticillioides*, as well as of ear rot and other mycotoxin-producing fungi. It spreads the fungi as it feeds on the stems and ears, and an integrated management control system is needed to reduce infection and resulting fumonisin production.

PREVENTION

Because *F. verticillioides* can infect any part of the plant, including the roots, crowns, stems and ears, it is important to keep inoculum levels low by adhering to the following principles:

- Remove maize stubble and weeds on which the fungi can overwinter;
- If farming in a warmer area, plant later in the season. Irrigate one to 14 days post-silking to reduce fungal infection;
- Use Bt-technology to decrease *B. fusca* damage;
- Choose cultivars adapted to local conditions;
- Do not plant at too high a density. *F. verticillioides* and fumonisin infection rates increase with planting density.

• *Source: Janse van Rensburg, B. 'Outsmart fungi from infecting and colonising your maize'. Retrieved from http://www.arc.agric.za/Agricultural%20Sector%20News/Outsmart%20fungi%20from%20infecting%20and%20colonising%20your%20maize.pdf.* ■ FW

BELOW: Photomicrograph of *Fusarium verticillioides*, the most commonly reported fungal species infecting maize. CENTERS FOR DISEASE CONTROL