Navigating the maize

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Technical
Maize agronomy

June is the month when maize growers will be considering their options for the application of fungicides and foliar feeds. *CPM* finds out a breeder’s view on best practice for the crop.

By Lucy de la Pasture and Paul Spackman

Maize is one of those crops that goes in the ground, starts off a bit slowly and then roars into biomass production, almost growing as you look at it. It has an unstoppable feel as it motors through the summer but it’s still a crop that benefits from some TLC, believes John Burgess, KWS product manager for maize and hybrid rye.

Two main fungal infections have the potential to threaten maize productivity in early summer, with northern corn leaf blight (NCLB) more prevalent in warm, humid conditions and eyespot favouring cool, wet weather, he explains.

John estimates that this year’s maize acreage is up by an average of 10%, largely because of the decrease in autumn cereal cropping this season. But there’s another contributing factor to maize’s surge in popularity, with an increased interest in grain maize due to the decline in oilseed rape sowings, he points out.

Together these factors are likely to increase the incidence of fungal disease because a larger acreage creates more disease inoculum, he says. “Both diseases will have the most significant effect on yields in later season, although there is a limited window of application for remedial spray treatments.

Physical damage

“Eyespot can lead to very high yield losses of up to 40%. It tends to strike in late Aug or early Sept, but June is usually the best month to treat the crop. If a fungicide is applied later, there’s a risk that the sprayer will cause physical damage to the plant and I wouldn’t recommend treatment after the crop has 6-8 leaves.

“For maize that’s sown late in June, for example, it will normally have reached this stage by mid-summer. Infection can occur from the 8-leaf stage onward, but symptoms may only appear in the more advanced, vegetative period,” he explains.

“The last couple of years have been low risk for eyespot because Sept has been a relatively warm month. We’ll have to wait and see whether this year follows suit. Eyespot levels across the country also have close links with geographical location, with crops at the greatest risk in the South West, West Midlands and into Wales, due to their trend for higher rainfall figures.”

Northern corn leaf blight (NCLB) was first identified in theUK in 2008 but with climatic conditions favourable to its development and an increase in maize cropping, its incidence has been increasing. It appears as pale grey or tan cigar-shaped lesions and under moist conditions produces dark grey spores, typically on the lower leaf surface, to give a dirty appearance.

John Burgess says fungal diseases of maize are on the increase as its area continues to grow.

Early hybrids are often more affected by NCLB (*Setosphaeria turcica*) compared with later types because their early-tasselling date exposes their leaf area to infection over a greater period of time.

NCLB commonly uses the plant’s own ▸

Maize fungicide update

Two maize fungicides are currently available, one of which is due for withdrawal in 2022, says Iain Ford of BASF. Opera (epoxiconazole+ pyraclostrobin) can be sold until 31 Oct 2020, with 31 Oct 2021 the last date for disposal, storage and use.

“The loss of Opera is disappointing, but growers will still have access to Comet 200 (pyraclostrobin), which is currently the most popular option of the two for maize,” he notes.

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CULTURAL CONTROL GUIDE

Starting next season ahead of combining

Positive management of OSR and cereals harvesting will pay dividends in making combining the most efficient 'first cultivation' for the cleanest, best and most-timely winter crop establishment.

Make Time for Stubble Management

Prompt, efficient combining is vital to make time for the most effective weed and soil management ahead of autumn drilling

Treat Challenging Crops Carefully

Heavily-waxed and uneven OSR, backward wheats, and thin, weedy spring crops will benefit most from careful treatment

Get Treatment Timing Right

Spraying too early risks compromising yields and grain quality and will not bring combining forward

Avoid Less Reliable Glyphosate Formulations

Modern Roundup formulations ensure the most reliable performance under challenging crop conditions and variable summer weather

Take Sufficient Spraying Care

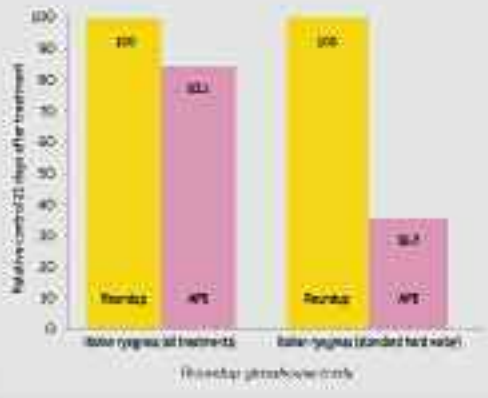
Particular care with glyphosate rates, nozzle choice, boom height and spraying speed is essential for the best results

Top Treatment Tips

- Only spray when rapeseed & grain moisture levels fall below 30%
- Assess ripeness carefully across the whole field
- Match application rates to crop & weed burdens
- Employ medium-coarse sprays to maximise canopy penetration and minimise drift
- Spray early in the morning to improve glyphosate uptake and translocation
- Leave OSR for at least 14 days and cereals for 7 days before combining

PERFORMANCE WARNING

Lower levels of performance can be expected from Alkyl Phosphate Ester (APE) based generic formulations compared to modern Roundups with patented surfactant systems, especially under challenging conditions.



STEWARDSHIP

Seed crops should never be treated.

Statutory minimum intervals minimum spraying to combining intervals must must be observed.

Pre-harvest and stubble treatments should be carefully integrated with best practice cultivations to support resistance management.

▸ pollen to help spread spores on to the leaf surface, explains John. "The disease will thrive at ambient temperatures of 18-27°C and also when humidity exceeds 95% — a common situation when there's a heavy dew or mist. Crops can also be affected by the contaminated stubble of previous plantings.

"It's difficult to determine whether the crop has NCLB with one check and effective control requires continuous monitoring. Losses of 20-30% can be expected in cases of serious infection, but they may be even higher if the disease emerges three to four weeks before maturity because it will cause plants to finish the starch synthesis process prematurely."

One of the most important considerations for maize crops requiring a fungicide treatment is to avoid spraying in high temperatures, when plants will be prone to leaf scorch, highlights John. In prolonged warm weather, he suggests crops are best treated either in early morning or late afternoon/evening.

"Maize has a large canopy and for fungicide applications the water volume shouldn't dip below about 200 l/ha," he adds.

A maize fungicide will produce the greatest benefit when it's applied as late in the season as possible because it has the highest efficacy during the first four weeks after spraying. "It would be convenient if it were practical to apply a fungicide with a foliar feed in one tank mix, but unfortunately the timings do not tally.

Foliar feeds should be used at vegetative growth stages, V4-V6 (when collars of leaf 4-6 is visible), while the optimum timing for fungicides in the growing season is

The importance of good soil strategy

Charles Wright notes that soil condition is crucial to get the maize crop up and away in spring.

The first eight weeks after sowing are a crucial period for any maize crop, whether it's destined for a biogas plant or a cow's stomach, says Farmacy business development manager and Lincolnshire agronomist, Charles Wright. "All too often, conditions can go against growers, as the very dry conditions in many areas this spring, on the back of one of the wettest winters on record, clearly demonstrate. It will be several months before we know what impact any underlying soil damage, sub-optimal seedbeds or lack of water will have on yields of crops in the ground now, but potential may well have been dented.

"Maize has dictated its final yield potential by around eight weeks after drilling, therefore the margin for error is narrow," he adds.

Last season, Charles conducted a series of farm trials at Flawborough Farms in Nottinghamshire, examining ways to maximise yield potential during these first two months. The business grows 400-600ha of maize for anaerobic digestion, as a replacement break crop for oilseed rape in the rotation.

Although the trials focussed on nutritional strategies, variety selection (varieties with lower FAO's due to the need for early harvest on heavy soil), seed rates and seed placement, the overriding importance of good soil condition ahead of drilling shone through, he says.

Healthy, well-structured soils are more resilient to extreme weather variations, which is crucial when growing any spring crop on heavier land that can sit cold and wet in spring then bake dry in summer. There is no quick win though, he says, so creating the conditions for a successful maize crop requires a year-round strategy, beginning as soon as the preceding crop is harvested.

"I often think maize preparation is left too late as maize is the last crop to be sown, but it's probably the one crop where the start of its life is integrally linked to how well it will perform with regards to yield and quality."

The trials at Flawborough Farms were on predominantly heavy land, sown on 7 May 2019 using a Sly Horizon Agri Drill on 50cm row widths. Soil conditions were 'excellent', although spring 2019 was also a dry one, recalls Charles.

He believes it was the seedbed preparation in the previous autumn that was a key factor in getting the crop established well, especially as maize roots are very sensitive to compaction. Typical maize establishment at the farm is around 90% with the precision drill.

Maize generally follows winter or spring barley, with land cultivated to 125mm (5 inches) deep using one pass with a Horsch Terrano, explains the farm's Tom Hawthorn. This is then left to weather over winter and sprayed off with glyphosate before drilling. While the no-ploughing strategy works well and benefits natural soil structure and health, he acknowledges establishment has been lower this year after the difficult conditions.

Farmacy trials at Flawborough Farms showed that nitrogen inhibitors were associated with increased starch and protein content.

Tom Hawthorne explains there is a non-ploughing policy for any land destined for maize at Flawborough Farms.

"Seedbeds were not very good given the lack of winter frost and constant beating from heavy rain, followed by ground drying too quickly and becoming very hard," says Tom.

Ironically, there was no legacy of compaction or soil damage from the previous last season, as harvest was carried out in Sept and because the soil isn't ploughed, it carries machine weight well, he adds. Tom believes their non-ploughing policy for land destined to go into maize improves soil resilience and "makes life easier" for subsequent seedbed preparation and establishment. Strip tillage will also be key next season and catch/cover crops between harvest and spring drilling, which aren't currently used at Flawborough Farms, are also being considered.

Foliar feeds should be used at vegetative growth stages, V4-V6, while the optimum timing for fungicides in the growing season is V8-V10.

V8-V10," he says.

The most common foliar feed applied to maize in June is liquid phosphate, which may have zinc, manganese and boron added, says John.

"The aim is to correct any deficiency in soil nutrients which ▶

Farmacy maize trial findings

The trials found that good soil condition is central to strong establishment, so it's important to assess soils to identify and rectify issues well in advance, suggests Charles. "High fertility and good soil condition limited the impact of the nutritional strategies we looked at but there could be bigger differences on less fertile sites. Placing liquid fertiliser had no negative impact compared with DAP, but liquid placement is more precise, so this may allow less product to be used in future."

Accurate placement depth, consolidation and evenness of plant emergence are vital to maximise the potential of each seed — late emerging plants came to nothing, he highlights. "High amounts of starter fertiliser could be detrimental to crop establishment due to increased salt content in and around the seed.

"Nitrogen inhibitors showed a worthwhile benefit where highly available, nitrogen-rich organic manures (e.g. digestate) were used. Nitrogen inhibitors also were associated with increased starch and protein content in the trial, so offer a way to improve N-use efficiency when using highly available nitrogen manures."

No significant differences were seen between post-emergence nutritional treatments and Charles suggests any foliar nutrition is applied early for best effect and before herbicides, at around 3-4 true leaves.

"Avoid weed competition by tailoring post-em herbicides to individual situations because broadleaf weeds can be very damaging to yield. In the trial the higher seed rates looked better, but it was the 115,000 plants/ha rate that yielded the best," says Charles.

Of the six varieties tested — Movanna, P7236, RGT Duxxbury, Prospect, Autens KWS and P7526 — it was Movanna that produced the highest fresh weight yield, with Prospect a close second, he adds.

Accurate placement depth, consolidation and evenness of plant emergence are vital to maximise the potential of each seed.

The ideal is to apply fungicides as late as practically possible so that the fungicide remains effective during the high-risk period when tassels emerge.

▸ can occur as the summer gathers pace. Phosphate isn't highly mobile in the soil and that's why I would always recommend that a DAP fertiliser is placed next to the seed at sowing.

"The other advantage is that a foliar feed will provide nutrients at the point when they have a strong influence on yield. It's not easy to accurately measure yield response to foliar phosphate in whole crop maize but it can be assessed when analysing grain maize. It's more difficult to measure when the crop is harvested for silage," he says.

"In a normal year, a foliar feed could be expected to lift production by at least a few percent and would almost certainly give a return on investment. This enhancement is mainly due to the foliar feed's ability to raise grain density levels." ■

The application of foliar nutrients can give yields a useful boost.

Fusarium always a risk

Although fusarium severity is highly variable from one season to another, the risk to milling wheat quality is always there, says Bayer's Jennie Watson. The key driver for infection is showery weather around flowering, she explains, and in many seasons the disease has been absent in the spring, only to erupt when humid and stormy weather strikes later. It means a potential yield hit, or worse, a possible mycotoxin contamination.

Any chink in the T3 armoury can lead to a possible infection, which is why application and product choice is important, says Jennie. With the support of Silsoe Spray Applications Unit (SSAU) and Fera, Bayer has been investigating nozzle and fungicide best practice, the importance of which is being recognised by an increasing number of growers.

The latest research findings from SSAU commissioned by Bayer reveal that low-drift Guardian Air nozzles can have a two-fold benefit in spray deposited on the ear compared with flat fan nozzles.

The risk of mycotoxins produced by fusarium pathogens means a T3 fungicide may be a good insurance measure.

Research undertaken by Fera also highlighted the importance of nozzle selection. They tested angled nozzles against vertical flat fans and saw a consistent improvement in fusarium control where angled nozzles were used with Proline (prothioconazole), Folicur (tebuconazole) or Prosaro (prothioconazole+ tebuconazole).

But another factor is the ear itself. The SSAU trial included the winter wheat variety Skyfall because its ear structure appears to be a more efficient collector of spray droplets. "The awns give it an increased surface area, and this had the highest total deposited volume of any variety," says Jennie.

"The architecture of wheat ears can vary dramatically depending on the variety, which is why it's worth considering effective coverage of the ear and anthers. Ultimately it's the anthers which provide the route to infection and it's these that need to be coated with the fungicide to help to reduce the level of infection."

One advocate for the Defy 3D nozzle or the Guardian Air set at an angle is Steve Gaiger of Collyer Farm Services, Hampshire. For him, it's common sense to attack vertical targets from sideways on. "Look down on the ear and it's a smaller target than most spray targets. Unlike a leaf, an ear isn't flat so it stands to reason that spray angled to come in on the side-axis will protect spikelets better," he comments.

Steve always sets nozzles in an alternating forward and rear-facing pattern. This ensures coverage of both sides of the ear but also creates less turbulence, reducing drift. Nozzles are centred 50cm apart, at a boom height of 50cm above the crop.

While he believes angled nozzles are best, he does point out that a similar result can be achieved without them. "When working with standard flat-fan nozzles, you can achieve a similar result by using a flat-fan tip in an angled cap. Another option is to alter the angle of air sleeves if fitted, or the boom tube itself. While both options won't match the performance of an angled nozzle, it's better than applying a fungicide from above," he says.

Angled nozzles ensure fungicides reaches its target at the T3 spray timing.

The T3 spray also 'puts the lid' on foliar protection but Steve queries whether thick crops may have an impact on fungicide efficacy. "As a result of YEN (Yield Enhancement Network), there's a drive to increase ears/m^2, which equates to a thicker crop. The question is whether this impedes late foliar protection in any way?"

He isn't making changes to water volume or his forward speed for crops upward of the 500 ear/m^2 mark but does believe it highlights the importance of a fine spray pattern. "The aim is effective coverage of the target and that's best achieved with a finer-tipped nozzle than a course one," he notes.

He also sees wider boom width as an opportunity to improve efficiency and efficacy. "The switch from a 24m to a 36m boom obviously allows you to cover more ground, but you can do this at slower speed, maintaining spray quality. It will also reduce boom deviation from the height of the crop. When this happens a drop-off in fungicide performance is inevitable," he concludes.