GRDC DRIVING AGRONOMY

Value of new varieties

Consultant Bob Freebairn makes the case for supporting new wheat varieties in well-managed rotations, with this look at the way one northern New South Wales property is progressing

PHOTO: BOB FREEBAIRN

KEY POINTS

- National Variety Trials verify newer varieties' improved yields
- *Pratylenchus thornei* (*Pt*) is becoming a greater cause of wheat yield loss than crown rot
- Rotations are an important part of *Pt* management

Kristy Hobson has genetic material in her program with good resistance to *Pt*.

Faba beans are also susceptible to *Pt* and should be used carefully in the rotation.

RUSTS

Stem, leaf and stripe rust are important diseases and, where possible, the Yates choose varieties with at least adequate resistance to them. Bill, a strong supporter of plant breeders' efforts, likes to remind people just how risky wheat growing was in northern NSW and Queensland until plant breeders developed initially stem rust and then leaf-rust resistant varieties.

Stripe rust, a later Australian arrival, has also challenged breeders, but varieties are now being released with durable resistance.

While fungicides can be used to guard against rusts, especially stem and leaf rust, this can be costly and

Bill and Andrew Yates checking their Sunguard® wheat, which yielded more than four tonnes per hectare despite a dry, late-winter spring. In north-west NSW and Queensland root lesion nematodes (*Pt*) are a common and yield-devastating problem. Sunguard® has tolerance equal to the best available in Australia bread wheats.

By Bob Freebairn

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Higher yields, less risk of severe yield loss from root lesion nematodes and protection against the three rusts, crown rot and root lesion nematodes are the main reasons north-west New South Wales farmers Bill and Andrew Yates are keen to switch to newly released wheat varieties.

However, the Yates stress that improved varieties is only one part of maximising cropping profitability on the property, 'Delvin', near Garah.

Planned rotations involving pulses, canola and grain sorghum, to reduce risk from crown rot and root lesion nematode, is equally important as a high level of fallow efficiency.

The Yates also strive to sow early within a given variety's optimum sowing window. While frost is always a risk, they believe yield loss from late sowing is a greater threat.

VARIETIES

Sunguard® and Livingston®, relatively new wheat varieties, are making a big impression on the Yates' farming program. They are also assessing and are likely to incorporate the new high-yielding Australian Prime Hard (APH) variety Suntop® into their program.

Bill and Andrew Yates also grow EGA Gregory®, because of its suitability to earlier sowing, high-yield and APH quality (Australian Hard (AH) in central and southern NSW).

They will likely trial Elmore CL Plus®, which is the first high-performing 'two-gene' imidazolinone (Clearfield® system) tolerant variety suitable for central NSW, northern NSW and Queensland. The two-gene attribute lifts the crop's protection against herbicides that may not have sufficiently degraded after previous crops or fallows.

PRATYLENCHUS THORNEI

The Yates are particularly mindful of protecting their wheat crops, as far as possible, from the often devastating root lesion nematode *Pratylenchus thornei* (*Pt*).

An extensive NSW Department of Primary Industries (DPI) study surveyed 248 random cropping paddocks across central and northern NSW and found that *Pt* was present in 70 percent. In areas such as Moree and Narrabri, paddocks almost always contained *Pt*, and at damaging levels (above 5000 per kilogram of soil). Other surveys have also noted widespread *Pt* infestation levels across Queensland wheat areas.

Research by groups such as NSW DPI, Queensland Department of Agriculture, Fisheries and Forestry (DAFF) and the GRDC-funded Northern Grower Alliance (NGA), has shown that *Pt* can reduce bread wheat yields by more than 50 per cent.

In a NSW DPI Mungindi trial, where *Pt* levels were high (15,000 per kilogram of soil), a tolerant to moderately-tolerant (T-MT) durum variety yielded three tonnes per hectare. By comparison, an intolerant to very-intolerant (I-VI) bread-wheat variety yielded 1t/ha – a loss to *Pt* of 2.0t/ha.

For Bill and Andrew Yates, choosing varieties on their level of tolerance and resistance to *Pt* has become a critical consideration. Sunguard®, Suntop® and EGA Gregory® rate highly among Australian bread wheats for *Pt* tolerance.

Root lesion nematode species *P. neglectus* (*Pn*) is also common in wheat-growing areas, particularly central and southern NSW, and sometimes in northern NSW and Queensland. It also is capable of causing significant yield loss.

Bill stresses the importance of using soil tests to identify the species and level of infestation present. Different crops and different varieties within crops vary in their resistance and/or tolerance to each of the nematode species. In the Yates' case, *Pt* is their only nematode problem.

CROWN ROT

Crown rot is regarded as a major wheat disease threat in NSW and Queensland. However, recent NSW DPI, Queensland DAFF and NGA research suggests that while crown rot is a serious threat, *Pt* is likely to cause a greater yield loss.

Andrew says that the best way to minimise crown rot impact is through appropriate rotations, because wheat varieties with the best levels of crown-rot tolerance can still suffer major yield loss in the absence rotations.

On the other hand, if *Pt* is the main issue (crown rot and *Pt* are often present together in potentially damaging levels) appropriate variety selection can offer the best protection.

ROTATIONS AND CROP MANAGEMENT

Andrew says ongoing research is documenting which crops and varieties are most resistant and tolerant to *Pt*. Grain sorghum, for example, is resistant and growing it as part of their rotation helps keep *Pt* numbers within reasonable levels. However, periodic floods can carry in *Pt* and undo the gains.

The Yates are also experimenting with canola, another *Pt*-resistant crop. Barley is also grown on 'Delvin'. Most barley varieties are rated moderately susceptible moderately resistant (MS-MR); enough to help keep *Pt* numbers down.

Chickpeas, however, are susceptible to *Pt* and will increase *Pt* levels. While still a few years off, Bill is hopeful that varieties will be released with improved resistance; a goal of the GRDC-funded Australian chickpea breeding program. Tamworth NSW DPI national chickpea breeder Dr Kevin Moore and leaf rust, this can be costly and difficult. The Yates prefer to 'deter' these diseases by using resistant varieties.

YIELD QUALITY AND AGRONOMY

The Yates rely heavily on data from the National Variety Trials when choosing varieties, confident that any claims of yield improvement by new releases can be rigorously assessed.

And while they prefer APH quality, they are happy to plant a good portion of their crop to AH varieties if they meet high-yield, good agronomic type and good disease and nematode resistance standards.

Their nitrogen management is also in tune with an increasing need to match higher yield ability with relative soil nitrogen availability to maintain high grain protein.

Bill is involved in the Australian Climate Champion program and believes as average temperatures rise the window for growing a cool-season crop shortens. He believes shorter-maturing varieties will increasingly be required and the penalty for late sowing will become more severe. This year, for example, Mungindi recorded the first 30°C day on 23 August.

VARIETY WISH LIST

Andrew lists improved tolerance to yellow leaf spot (YLS) as one of their biggest needs.

A few varieties have good YLS tolerance, but these tend to have other problems such as *Pt* susceptibility and/or intolerance, lower yield and/or susceptibility to some of the rusts.

Varieties with high levels of sprouting tolerance are also high on the Yates' required characteristics. Higher levels of pre-harvest sprouting tolerance than Ellison® and Sunelg are known to be in the wheat breeding pipelines.

Greater coleoptile length is another attribute sought to improve their ability to establish crops on time. This is also now an important wheat breeding priority. □

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