



A new broad spectrum fungicide for wheat & barley

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- A new fungicide has been developed which has the potential to offer both fast acting and long lasting control and protection from foliar diseases in wheat and barley.
- In trials in southern Australia, the new product has shown control of stripe rust, leaf rust, stem rust, yellow leaf spot and septoria nodorum in wheat; and net form net blotch, spot form net blotch, powdery mildew, leaf scald and leaf rust in barley.
- Development trials continue in 2009 and an application for registration has been made.

A new protective and curative fungicide that offers a very broad spectrum of disease control in wheat and barley could soon be available to cereal growers. The new product, Prosaro® 420 SC, is the result of several years of research and development, internationally, and a recent series of field trials within Australia.

The product is a combination of two triazole fungicides:

- tebuconazole (the active ingredient of Folicur®)
- prothioconazole, a new triazole fungicide.

Individual triazole fungicides have different systemic properties and vary in the spectrum of disease they control. A product containing a combination of two triazoles tends to provide a two phase effect, with the more mobile compound spreading through the plant at a faster rate than the less mobile compound.

Different triazoles also give a different duration of control. In Prosaro, tebuconazole gives a pronounced initial and fast acting effect and prothioconazole is responsible for the long lasting or residual activity. The combination of tebuconazole with prothioconazole leads to improved disease control over the single ingredient fungicides.

Twenty years in the making

The azole class of fungicides was first discovered in the late 1960s and various sub-classes were developed including products such as Bayleton® (triadimefon) and Bayfidan® (triadimenol). New chemical sub-classes were then discovered, which included propiconazole and prochloraz. More effective and better broad-spectrum azole fungicides came with the discovery of a new group in the 1980s that included the products flutriafol (Impact®) and tebuconazole in 1988 (Folicur®). In the following years several new azole fungicides were launched including epoxiconazole (Opus®) in 1992.

Bayer continued research into this group of fungicides, to optimise efficacy, systemicity and ecotoxicology and environmental properties. Prothioconazole is a result of this research and is a novel triazole fungicide discovered by Bayer CropScience in

the late 1990s. Prothioconazole is the first representative of the new chemical class triazolinthiones.

Diseases controlled

One of the key success factors of Prosaro is the extremely broad spectrum disease control. Due to the strong curative and protective properties Prosaro provides long-lasting control of a wide range of major leaf and ear diseases in wheat and barley.

Trials conducted across the cereal growing regions of southern Australia have shown Prosaro controls the following diseases:

- wheat – stripe rust, leaf rust, stem rust, yellow leaf spot and septoria nodorum
- barley – net form net blotch, spot form net blotch, powdery mildew, leaf scald and leaf rust.

Trials in Australia demonstrate that Prosaro applied at 300 mL/ha provides equal or better control of these diseases compared with currently registered fungicides. In overseas trials, Prosaro has also shown good efficacy on other cereal diseases which are emerging as important diseases in Australia. Further trials are being conducted in Australia to gather the necessary data to add these diseases to the Prosaro label.

Application timing

Application timing of Prosaro is extremely flexible from early tillering stage right through to ear emergence of the crop. This enables growers to target the application of Prosaro to effectively manage disease whenever crop monitoring indicates it to be necessary.

Application method

In the development of a new fungicide, apart from determining the efficacy of the product on the target diseases, a significant proportion of trial work is also conducted on other factors that are important to the eventual commercial use of the product.

Trials were conducted to evaluate efficacy when Prosaro was applied at different spray volumes using different nozzles,

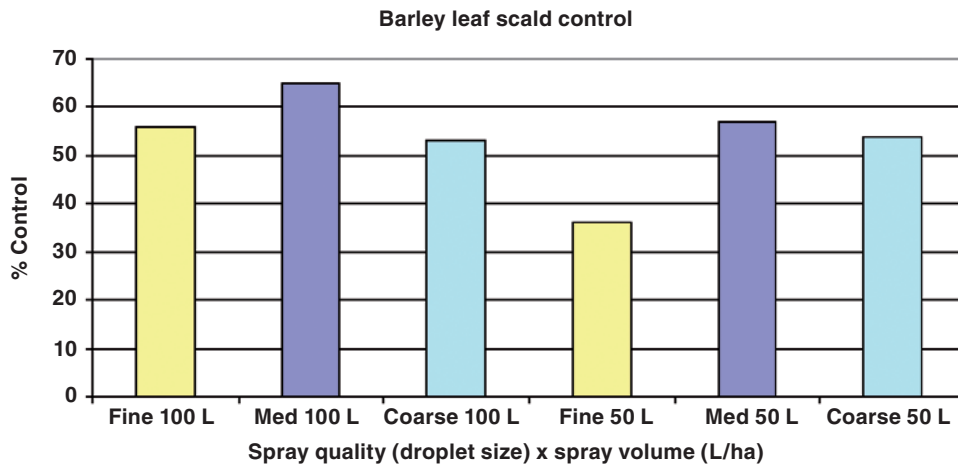


Figure 1. Control of barley leaf scald with Prosaro 420 SC at 150 mL/ha plus Hasten® 1% v/v, applied at total spray volumes of 100 L/ha and 50 L/ha, and at fine, medium or coarse spray quality. Results are from a single trial at Toodyay, Western Australia, in 2008.

generating either fine, medium or coarse droplets (as defined by the ASAE S572 Standard for spray quality). Typical results from this work are summarised in Figure 1. Generally the higher spray volume of 100 L/ha gave more reliable control of disease (barley leaf scald), and a medium spray quality was more reliable than the fine or coarse spray.

Surfactant use

The addition of surfactants (wetting agents or crop oils) to the spray solution when applying Prosaro was also evaluated in the development of the product. On some diseases the addition of a surfactant (Hasten at 1% v/v) to Prosaro has improved the reliability of control.

A range of surfactants were evaluated in a trial where Prosaro was applied for control of stem rust in wheat (Figure 2). There was a clear increase in control from Prosaro at 150 mL/ha when the surfactants were added to the spray mixture. Further trials are being conducted on alternative surfactants to determine the most suitable products for mixing with Prosaro.

Residual control

The aim of applying a foliar fungicide should be to protect the top leaves of the plant for as long as possible late in the season until the plant naturally matures and grain fill is complete.

Prosaro 420 SC will persist in the plant and give continual protection, or residual control, against further fungal infection. The length of this residual control is dependent on several factors, including the severity of the fungal attack, the growth rate of the crop, the coverage of the spray application and the rate of Prosaro applied.

An example of residual control and the influence of applying higher rates of product is shown in Figure 3. Although initially both 150 mL/ha and 300 mL/ha of Prosaro controlled a light infection of stripe rust in wheat, the higher rate gave a higher level of control when assessed out to 43 days after spraying. Opus 125 EC at 500 mL/ha also gave good residual control (this is the higher rate recommended for this product to control stripe rust in wheat).

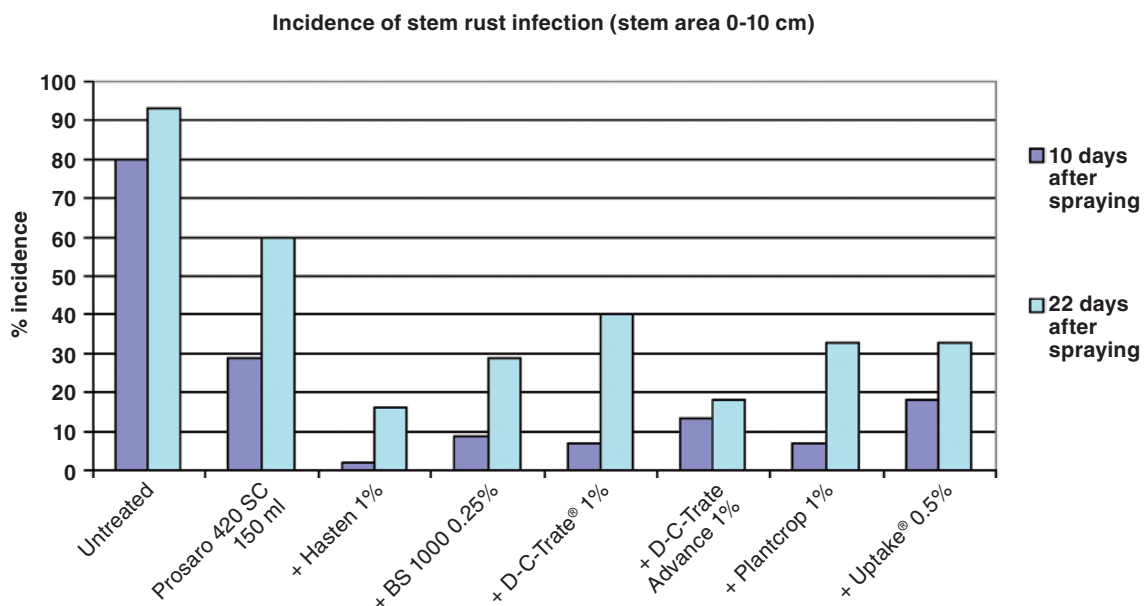


Figure 2. The incidence of infection in wheat of stem rust following a single application of Prosaro 420 SC at 150 mL/ha, applied alone and with the addition of various surfactants. Results are from a single trial at Warralakin, Western Australia in 2008.

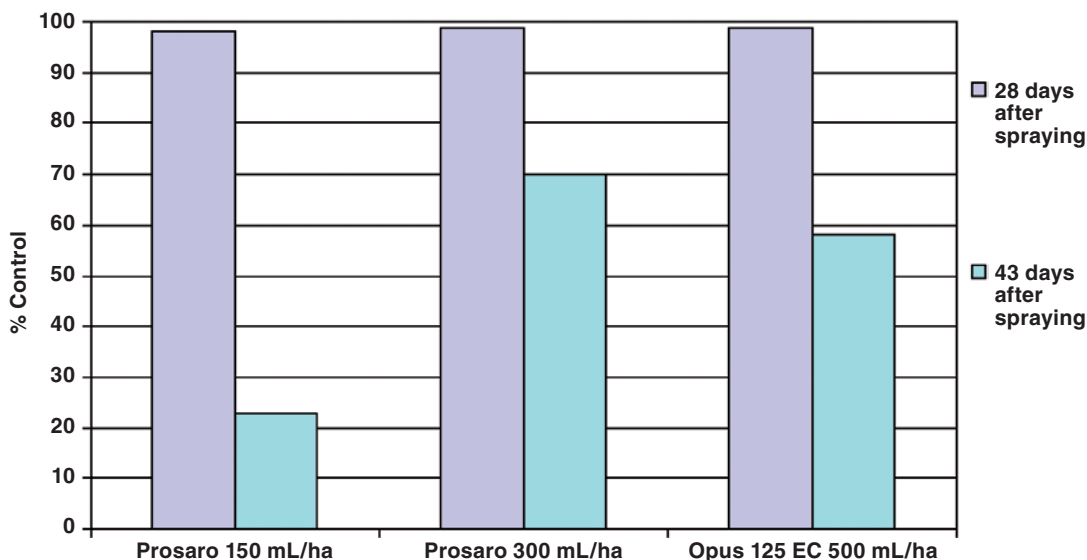


Figure 3. Percent control of stripe rust in wheat with Prosaro 420 SC applied at 150 or 300 mL/ha and Opus 125 EC applied at 500 mL/ha, when assessed 28 and 43 days after spraying. Results are from a single trial at Inverleigh, Victoria in 2007.

Compatibility with other foliar products

Crop safety and physical compatibility has been evaluated for Prosaro with a range of herbicides, insecticides and foliar applied fertiliser products. Initial trials have been conducted with the more commonly applied products and further trials are being conducted with additional mixtures. None of the products evaluated at this stage have indicated any problems with mixing with Prosaro. The surfactant recommendation for the product being mixed with Prosaro must be followed. A full list of mixtures that have been evaluated with Prosaro is available from Bayer CropScience.

Disease resistance

There is good evidence to suggest that the sensitivity of many diseases to triazole fungicides can change over time. For example, trials conducted in Europe indicate that higher rates of Folicur are now required to effectively control some cereal diseases. This suggests that the repeated use of Folicur has selected strains of fungi that are less sensitive to the fungicide. Scientists also note, however, that the disease control achieved by prothioconazole is not affected by the decreased sensitivity to Folicur. There is currently no evidence of reduced sensitivity to prothioconazole for any disease in cereals.

Future development

Prosaro is active on a wide range of diseases in cereals with registrations overseas on diseases relevant to Australia. Of particular interest is the activity on fusarium species in wheat (both head blight and crown rot). Further trials are being conducted on these diseases in 2009 to determine the level of control that can be obtained under Australian conditions.

Trials on the initial use pattern for Prosaro 420 SC are being followed up with additional trials on other important cereal diseases, some of which are not controlled with existing fungicides.

An application for registration of Prosaro 420 SC fungicide has been made. At the time of submission for publication, Prosaro is not yet registered.

Further information

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