

Northern Stripe Rust Management: An Evaluation of Seed Treatment Efficacy and Benefits

Background

In recent years stripe rust has re-emerged as a disease of significance across all Australian grain growing areas. Plant breeding incorporating resistant germplasm represents the most effective method of long term disease management. However fungicides are an additional tool that will enable disease management in varieties without effective genetic resistance.

Currently there are no varieties with effective stripe rust resistance combined with useful tolerance to crown rot. Until such varieties are released, northern growers and advisers need to select varieties firstly on the basis of crown rot risk and then manage for stripe rust accordingly.

Why look at seed treatments?

Research conducted in 2005 by Steven Simpfendorfer, NSW DPI Tamworth, demonstrated significant yield benefits from the use of 'at planting' treatments for stripe rust management on susceptible wheat varieties (ratings 1-4). Two planting options provided greatest benefit; Jockey - a long acting seed treatment and Impact[®] - a fertilizer treatment. Although disease onset did not occur until GS49 (awn peep), yield benefits of 17%-27% were obtained from the use of Jockey (at 300-450 mL/100 kg seed) and 19% from Impact. The level of yield benefit was similar to the 23% obtained from a single high rate fungicide application at GS49.

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Jockey® is a registered trademark of Bayer

2006 aims

1. Validate the crop safety of Jockey and the length of efficacy seen by NSW DPI
2. Evaluate the impact on grain yield
3. Generate regional commercial data to indicate the benefits available to growers

Trial design

Five commercial replicated trials were established in 2006 in the Wyaga, Billa Billa, Boomi, Garah and Edgeroi districts. All trials were established on a large plot basis – planted, managed and harvested with commercial equipment. Trial co-operators were selected who were growing moderately susceptible varieties (ratings 4-5) and intended to treat with Jockey. Jockey was evaluated in all trials at the 300 mL/100 kg seed application rate. In each situation a small amount of the same seed batch was left untreated. Varieties evaluated were Sunco and Lang (both rating 5) and EGA Wylie (rating 4). There were 4 replicates of each treatment at 4 sites and 3 replicates at the remaining site.

Trials were assessed for plant establishment, stripe rust efficacy and taken through to commercial harvest for grain yield and quality. Weigh bin yields were taken at 4 of the 5 sites. The Wyaga site was not harvested due to extremely low yields (<200 kg/ha) and high site variability from non-treatment effects.

Results in a nutshell

Crop safety: *Jockey[®] provided good plant establishment and crop safety in all trials.*

Disease efficacy: *Jockey provided good levels suppression of stripe rust for over 100 days. NB stripe rust was still present but at significantly lower levels of incidence and severity.*

Grain yield: *No impact on yield from Jockey under zero or low stripe rust situations.*

Economic benefit: *Use of Jockey under nil or low disease conditions resulted in a net cost of \$13/ha over 4 trials at \$200/t grain prices.*

Overall: *The results from these trials confirmed that Jockey is a seed treatment that has good levels of crop safety and provides extended suppression of stripe rust. The length of disease activity supports the findings from the NSW DPI 2005 Tamworth trials.*

Seed treatments are likely to provide greatest benefit on susceptible varieties when disease onset is early. Seed treatments may also provide a management benefit where farming logistics prevent timely foliar application.

In crops planted under marginal conditions, where disease onset is late or where disease risk is expected to be low, foliar application may provide a more flexible management alternative.

Assessments

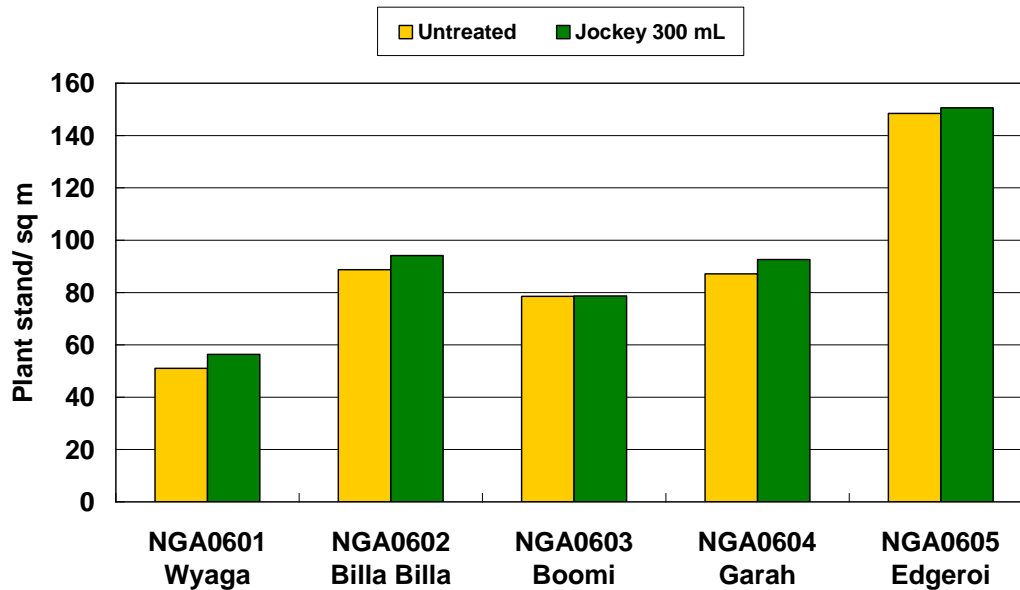
1. **Plant establishment:** Counts of established plants in 10 x 1m rows per replicate were taken between 17 and 34 days after planting.
2. **Disease efficacy:** All trials were monitored for stripe rust. Disease assessments conducted on the top 2-4 leaves on 15-30 random tillers per replicate.
3. **Grain yield:** Yield comparisons by weigh-bin in all trials except NGA0601. NGA0601 not harvested due to variability and yield below 200 kg/ha.



*Edgeroi Trial NGA0605 30/09/2006
Stripe rust sporulation and leaf damage*

Multi-trial summary

Plant establishment

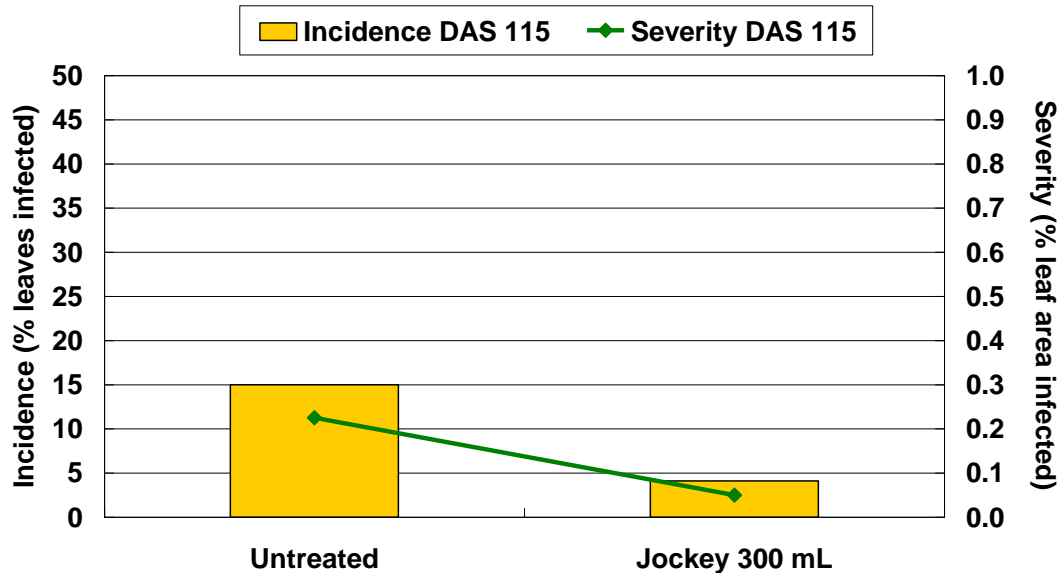


The graph above shows the plant establishment counts taken at all sites between 17 and 34 days after planting. Relatively deep planting occurred at both the Boomi and Garah sites (seed 7-10 cm below surface) with moderate moisture stress already evident at the Wyaga site. There was no significant difference in establishment counts at any location or over the entire series of trials

Key messages

1. Jockey treated seed had no impact on plant establishment compared to untreated seed
2. Jockey showed good levels of crop safety under a range of conditions including deep planting and moisture stress

Disease efficacy



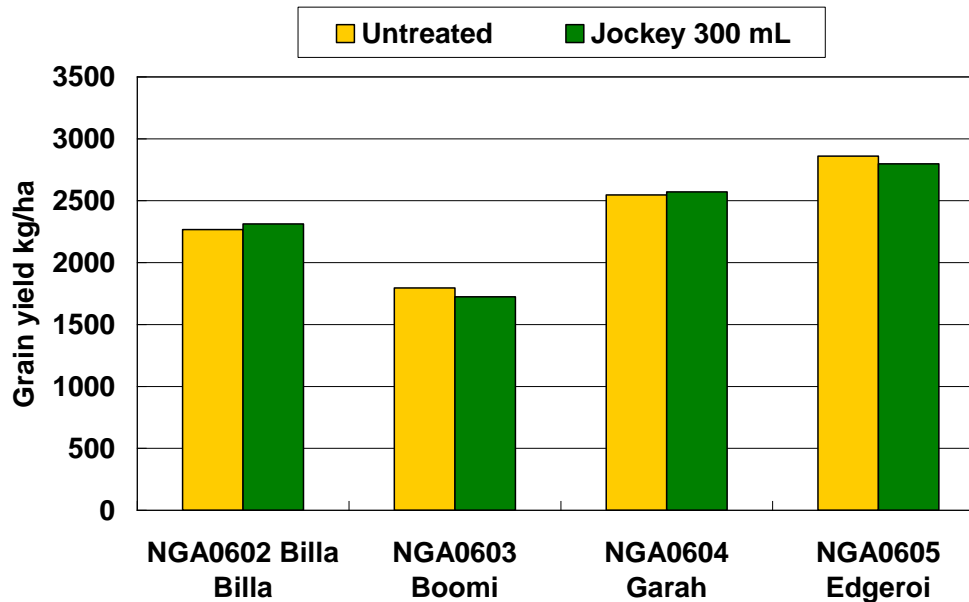
Least significant difference: Incidence = 7.3%
Least significant difference: Severity = 0.1%

The graph above shows the incidence and severity of stripe rust at NGA0605 115 days after sowing (DAS 115 = 17 Oct). Jockey resulted in a significant reduction in both incidence and severity out to this assessment. At DAS 115 the crop was at the late milk stage (GS77). Stripe rust was found at trace levels at three other sites NGA0602, 0603 and 0604 but not at sufficient levels to perform an assessment. The stripe rust pathotype in all situations was confirmed as 134 E16 A+. This is referred to as the 'WA strain' and has been the dominant strain across the northern grain region in recent years.

Key messages

1. **Stripe rust was not evident in this trial until ~ early head emergence**
2. **Jockey provided extended suppression against stripe rust out to DAS 115**
3. **This trial represents a situation of late disease onset, combined with low stripe rust incidence and very low severity**

Grain yield

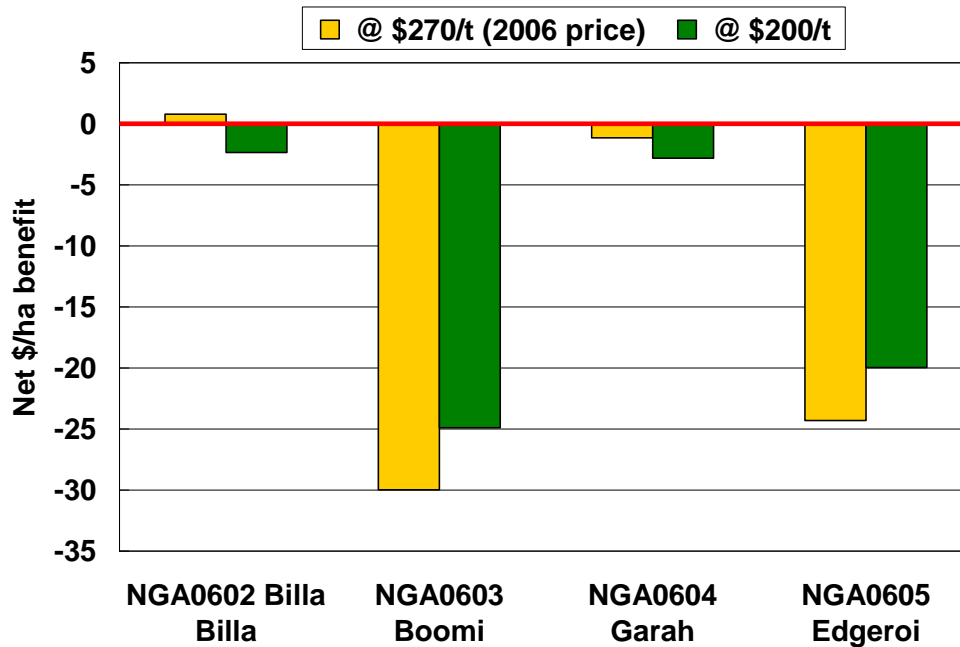


The graph above shows the harvested yields. There was no significant difference in yield between Jockey and untreated seed at any of the four locations. It must be stressed that stripe rust did not occur at a meaningful level in 3 of the 4 sites (NGA0602, 0603 and 0604). In the absence of disease there was no expectation of a yield advantage from the seed treatment. The absence of yield response at NGA0605 is likely due to the low incidence of disease and the rapid onset of moisture stress. Yield at this site was primarily limited by moisture stress not stripe rust.

Key messages

1. There was no yield impact from Jockey in the absence of stripe rust.
2. Under low disease and severe moisture stress, Jockey did NOT provide a yield benefit

Economic benefit



The graph above details the net economic benefit using Jockey in these trials. Assuming a \$200/t grain price, Jockey resulted in a **net cost of \$13/ha**. With 2006 grain prices, the cost on average was \$14/ha. The level of net cost is similar to the actual Jockey product cost.

Key messages

1. There was no economic benefit using Jockey in situations with low stripe rust pressure
2. Seed treatments provide 'insurance' against a range of diseases. No yield or economic benefit is likely in the absence of the disease