NSW Agriculture results for Sclerotinia trials in 2003

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Summary

- Carefully consider the costs, possible yield and likelihood of Sclerotinia in canola before applying fungicides.
- In 2003 many fungicide treatments reduced disease development. However, at most sites there was no significant difference in yield as the disease levels were too low.
- The interaction between yield and the development of Sclerotinia stem rot is not fully understood and more work is being conducted in this area by NSW Agriculture.

Introduction

Sclerotinia stem rot is a disease that attacks many species of broadleaf plants, including canola, peas, beans, sunflowers and lupins. The disease is sporadic occurring when environmental conditions are favourable. It is mainly caused by the fungus *Sclerotinia sclerotiorum.* Prolonged humid (wet) conditions during flowering of canola favour disease development and yield losses as high as 24% (2001) have been recorded under Australian conditions.

The frequency and severity of Sclerotinia on canola is poorly understood. The last 2 seasons (2002 and 2003) were not favourable for disease development. However, prior to this from 1998 to 2001 Sclerotinia was an important canola disease in the high rainfall zones of southern NSW.

Disease cycle

Sclerotia remain viable for many years in the soil. When weather conditions are favourable, the sclerotia germinate producing small stick-shaped structures called stipes. Then small mushroom-shaped structures (apothecia) are produced on the stipes. Apothecia produce thousands of air-borne spores that can be carried several kilometres by the wind.

Spores land on canola petals and when the petals fall at the end of flowering, they lodge in the lower canopy of the crop. The spores germinate, and using the petal as a source of nutrient, the fungal mycelium grows and invades the canola plant. The canola flowering period is therefore the critical time for Sclerotinia infection. Germination of the spores and infection is enhanced by wet weather at flowering.

Fungicides

Yield losses in crops overseas are reduced by the timely application of fungicides during flowering. In Australia, Rovral® Liquid fungicide is currently registered for control of Sclerotinia in canola at 2 litres/ha. Other fungicides are currently being considered for registration.

Due to the sporadic nature of stem rot it is important to determine the economic feasibility of any fungicide application. It has been considered uneconomical to apply fungicides routinely, and to be effective they need to be applied before the plant becomes infected.

Current label recommendations for the control of *S. sclerotiorum* in canola are to apply fungicide at between 20 and 50% flowering. The best timing for protection is during flowering when the petals have just begun to senesce. Before applying a fungicide, consider the current price of both chemical and canola to determine the viability of Sclerotinia control.

Results from Sclerotinia fungicide trials for 2003

In order to better define the most effective stage of flowering for fungicide application 10 small plot trials were conducted in 2003 (Table 1). Each trial had two varieties of canola (Hyola 60 and Rainbow) and four fungicide treatments using 2L/ha of Rovral liquid fungicide. The treatments were a control, early fungicide application (at 20 – 30 % flowering), late fungicide application (2 weeks after early application) and an early + late fungicide application.

In all locations except Tamworth high percent petal infestations were recorded before the early fungicide application. Very little stem rot was recorded in the plots before harvest. Disease development of *S. sclerotiorum* is favouroured by wet, humid conditions. After the early fungicide treatments, weather conditions became unfavorable for disease development (Table 1).

Fungicide treatments at Rutherglen, Gerogery, Henty, Wallendbeen, Wombat, Greenethorpe and Tamworth reduced disease development. In 2003, the early application of fungicide was usually the most effective for reduction in disease development. When both of the varieties were combined at the Temora site a reduction in disease development was also observed (see below for extra details on each site). However, disease levels in most locations were too low to affect yield.

There was no significant yield difference between any of the fungicide treatments conducted in 2003 when both varieties were combined. However, at Rutherglen and Gerogery a significant yield difference was observed when the varieties were separated. In Rutherglen the early fungicide application significantly increased the yield in Rainbow over the control by 0.44 t/ha and in Gerogery the late fungicide application significantly increased the yield of Hyola 60 over the control by 0.46 t/ha.

There was very little economic benefit from applying fungicides in 2003 because the percent of stem rot was extremely low. One point nine percent stem rot was the highest recording in any control plot (Table 1). Thus, carefully consider the costs, possible yield and likelihood of Sclerotinia in canola before applying fungicides.

Table 1. Locations and some treatment results from 10 trials conducted in 2003. Treatment results include: percent petal infestation taken at 20 – 30 % flowering; percent stem rot in the control plots; and average number of plants with stem rot in the control plots.

Location	Percent petal infestation (early)	Percent stem rot	number of plants with stem rot/plot
Rutherglen	58.5	0.4	4.5
Gerogery	61.9	0.4	2.8
Henty	98.8	1.9	18.2
Temora	68.5	0.4	1.3
Dirnaseer	86.5	0.02	0.2
Wallendbeen	77.5	0.1	1
Wombat	98.1	0.3	2.8
Thuddungra	87.1	0.3	0.9
Greenethorpe	97.9	0.2	0.5
Tamworth	1.8	0.8	9.3

Acknowledgements

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Individual Site Results

Rutherglen – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Rutherglen site was extremely low, with a maximum of 0.6 % stem rot for the Rainbow control (Fig. 1). The percent of stem rot in Rainbow was significantly reduced with all fungicide applications. Stem rot in Hyola 60 was not reduced with any fungicide application, with the late spray having significantly more Sclerotinia than the control.

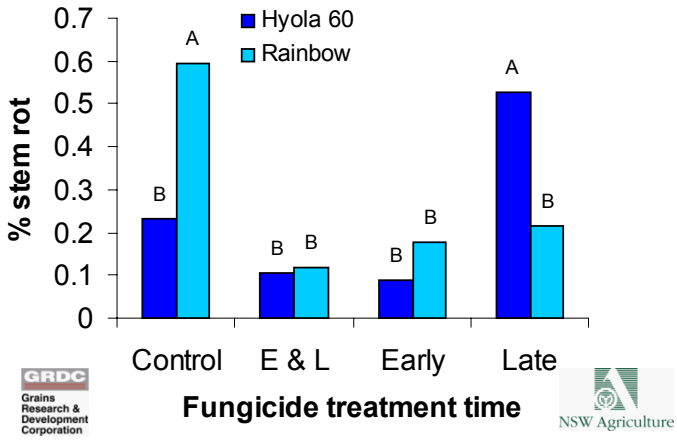

Figure 1. Percent stem rot at Rutherglen for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.2780

Yield

The low incidence of stem rot resulted in only one variety having a yield response for fungicide treatments at the Rutherglen site. Rainbow had a significantly higher yield than Hyola 60 (data not presented). For Hyola 60 there was no significant yield difference between any of the fungicide treatments. However, the early fungicide application significantly increased the yield in Rainbow over the control by 0.44 t/ha (Fig. 2). When data from both varieties were combined there was no significant yield difference between any of the fungicide treatments (data not presented).

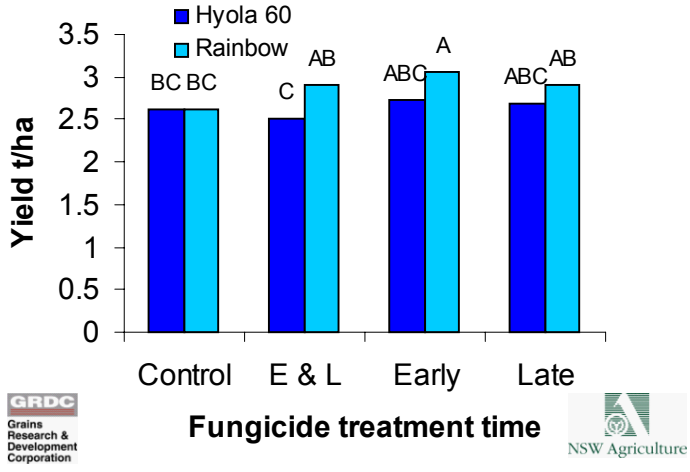

Figure 2. Yield at Rutherglen for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.3955

Gerogery – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Gerogery site was extremely low, with a maximum of 0.4 % stem rot for the Hyola 60 and Rainbow controls (Fig. 3). The percent of stem rot in Hyola 60 and Rainbow was significantly reduced with all fungicide applications.

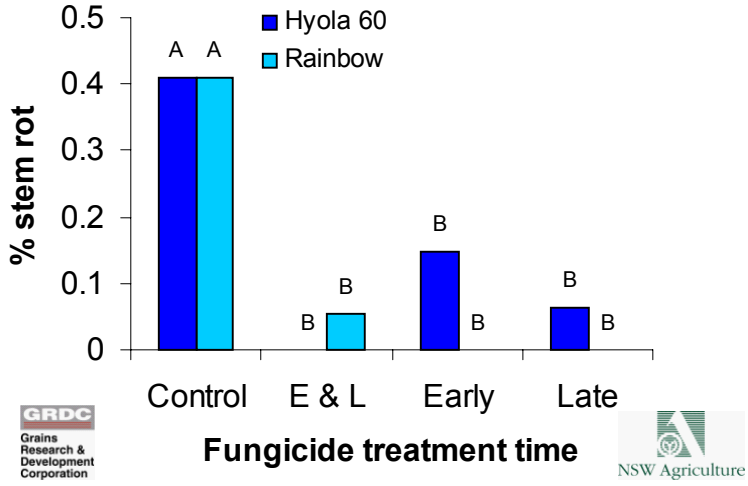

Figure 3. Percent stem rot at Gerogery for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.3918

Yield

The low incidence of stem rot resulted in only one variety having a yield response for fungicide treatments at the Gerogery site. Hyola 60 had a significantly higher yield than Rainbow (data not presented). For Rainbow there was no significant yield difference between any of the fungicide treatments. However, the late fungicide application significantly increased the yield of Hyola 60 over the control by 0.46 t/ha (Fig. 4). When the data from both varieties were combined there was no significant yield difference between any of the fungicide treatments (data not presented).

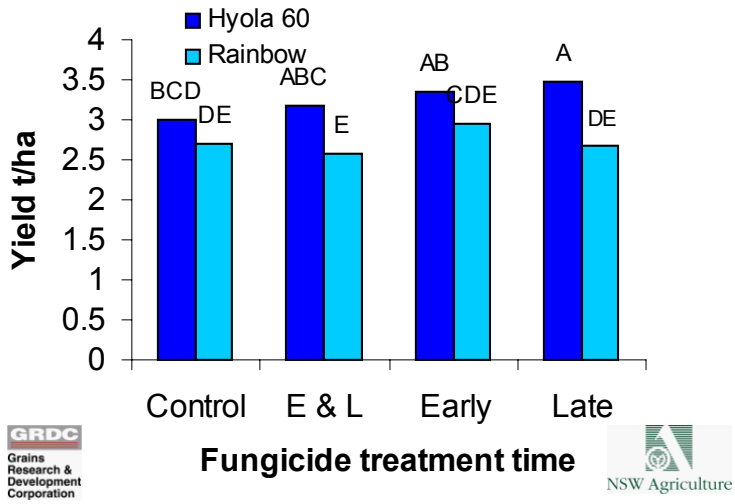

Figure 4. Yield at Gerogery for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.3811

Henty – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Henty site was very low with a maximum of 1.97 % (Fig. 5). The early application of fungicide significantly reduced the percent of stem rot in Hyola 60 and Rainbow. Stem rot in Hyola 60 was also significantly reduced by the early & late fungicide application.

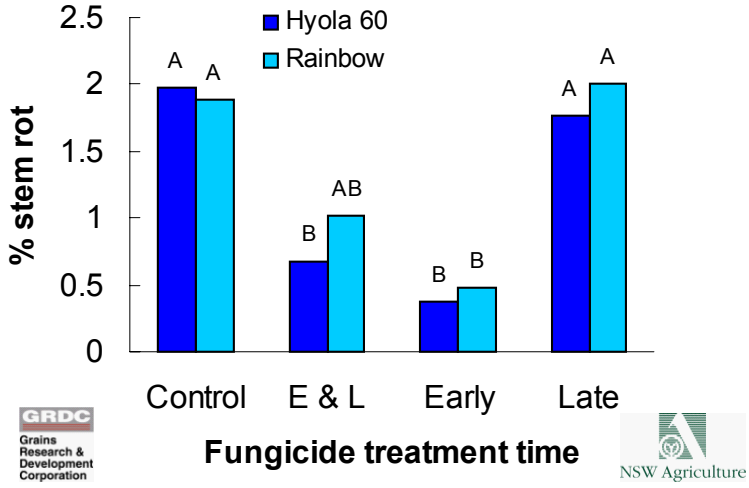

Figure 5. Percent stem rot at Henty for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 1.047

Yield

The low incidence of stem rot resulted in no significant yield difference between the fungicide treatments at the Henty site (Fig. 6). Hyola 60 had a significantly higher yield than Rainbow (data not presented).

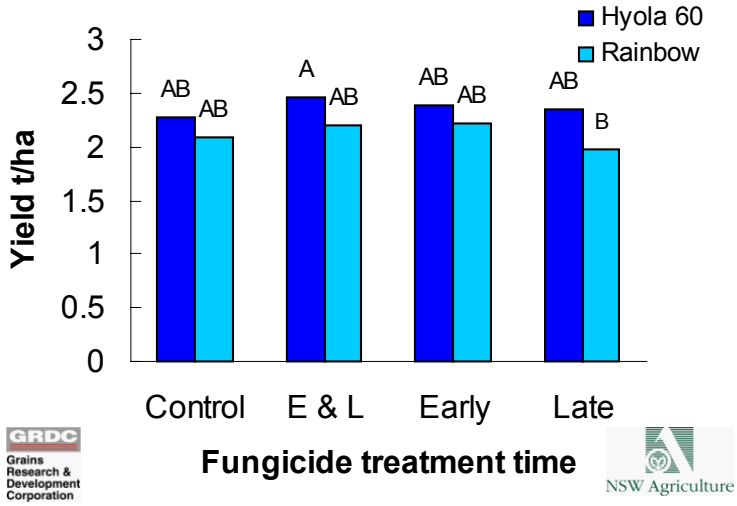

Figure 6. Yield at Henty for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.4261

Temora – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Temora site was extremely low with a maximum of 0.7 % (Fig 7). There was no significant effect of fungicide treatment on percent stem rot in each variety. However, when data from both varieties were combined the early and early & late treatments had significantly less stem rot than the control (data not presented).

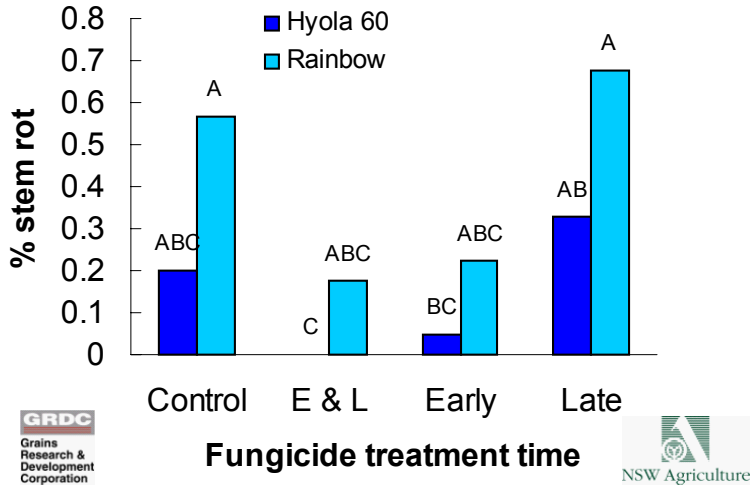

Figure 7. Percent stem rot at Temora for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). (lsd = 0.4424. Note: lsd taken from √ % stem rot data, data presented above are not square root data).

Yield

There are no yield data for the Temora site as it was damaged by a hailstorm before harvest.

Dirnaseer – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Dirnaseer site was extremely low, with a maximum of 0.08 % (Fig 8). There was no significant difference between treatments.

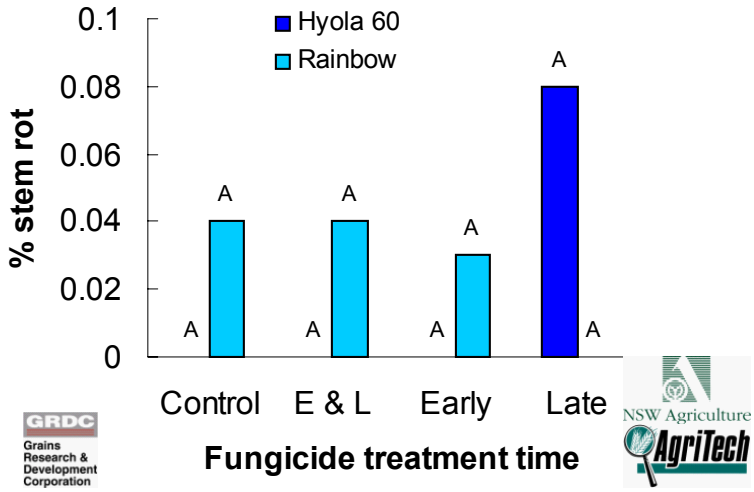

Figure 8. Percent stem rot at Dirnaseer for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.1121

Yield

At the Dirnaseer site Hyola 60 had a significantly higher yield than Rainbow (data not presented). The low incidence of stem rot resulted in no significant yield difference between fungicide treatments (Fig. 9).

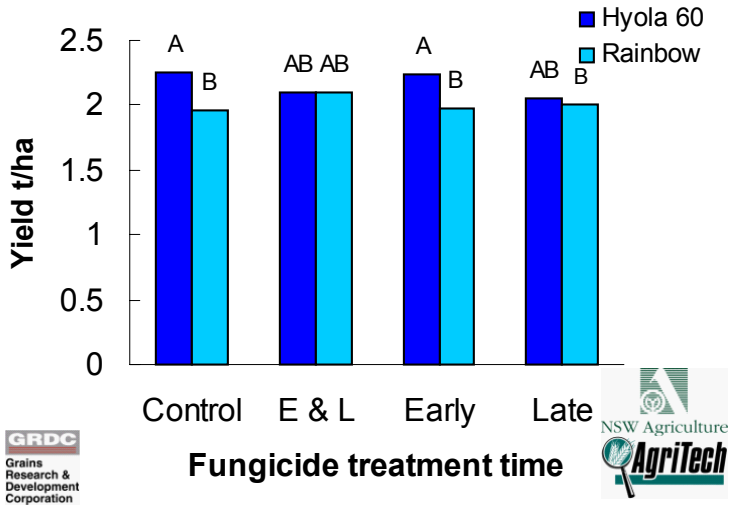

Figure 9. Yield at Dirnaseer for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.2014

Wallendbeen – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Wallendbeen site was extremely low, with a maximum of 0.18 % (Fig. 10). For Rainbow the early & late fungicide application significantly reduced the amount of stem rot. Stem rot in Hyola 60 was not reduced with any fungicide application.

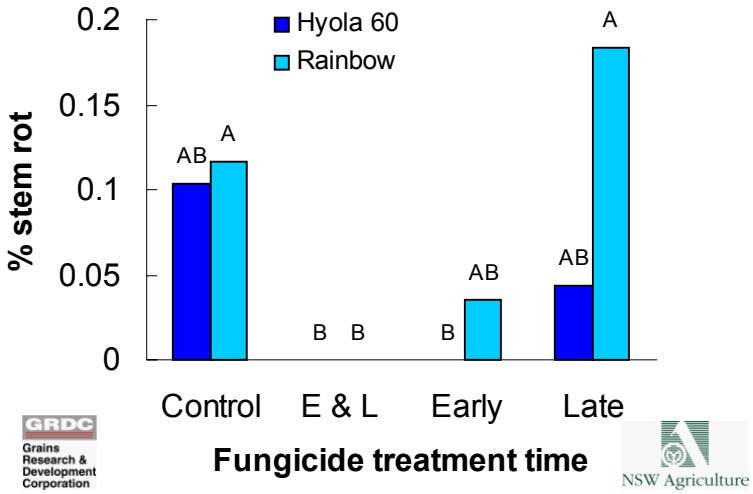

Figure 10. Percent stem rot at Wallendbeen for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). (lsd = 0.3105. Note: lsd taken from √ % stem rot data, data presented above are not square root data).

Yield

Hyola 60 had a significantly higher yield than Rainbow at the Wallendbeen site (data not presented). The low incidence of stem rot resulted in no significant yield difference between the fungicide treatments (Fig. 11).

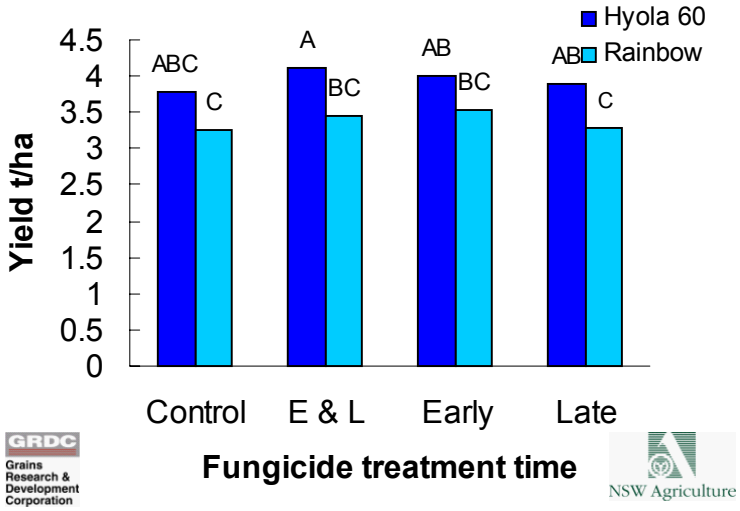

Figure 11. Yield at Wallendbeen for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.5686

Wombat – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Wombat site was extremely low, with a maximum of 0.48 % (Fig 12). The early application of fungicide in Hyola 60 had significantly less percent stem rot than the control. Stem rot in Rainbow was not reduced by any fungicide application.

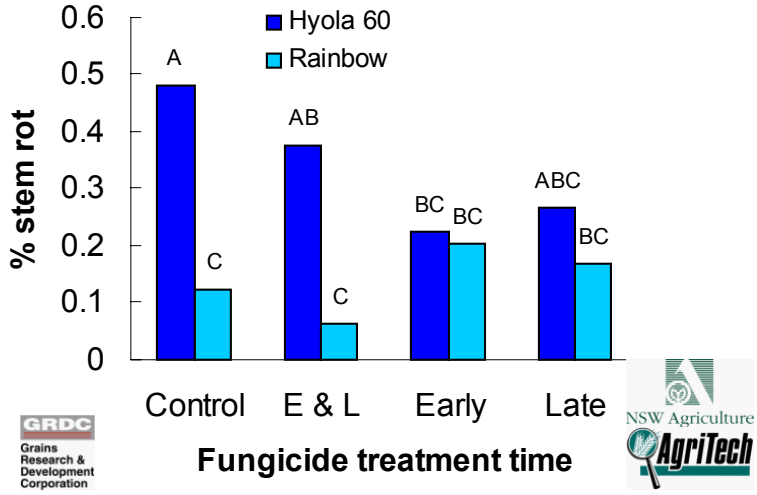

Figure 12. Percent stem rot at Wombat for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.2440

Yield

Hyola 60 had a significantly higher yield than Rainbow at the Wombat site (data not presented). The low incidence of stem rot resulted in no significant yield difference between the fungicide treatments (Fig. 13).

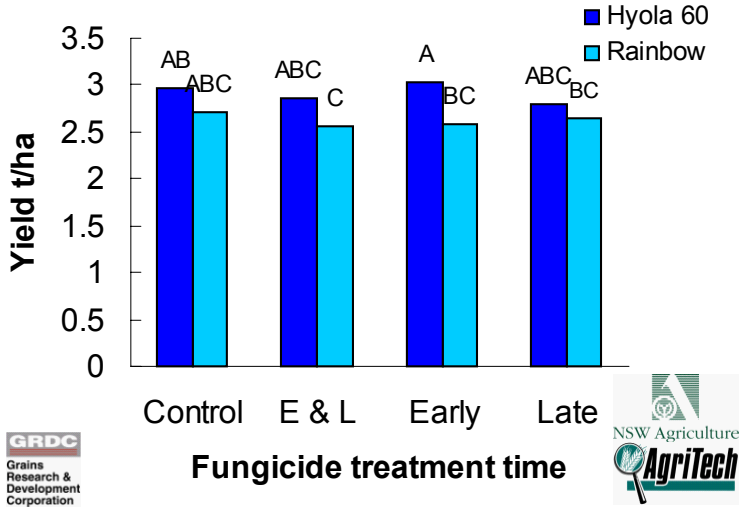

Figure 13. Yield at Wombat for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.3954

Thuddungra – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Thuddungra site was extremely low, with a maximum of 0.62 % (Fig 14). The percent of stem rot for Rainbow and Hyola 60 was not significantly reduced by any fungicide application (Fig. 14).

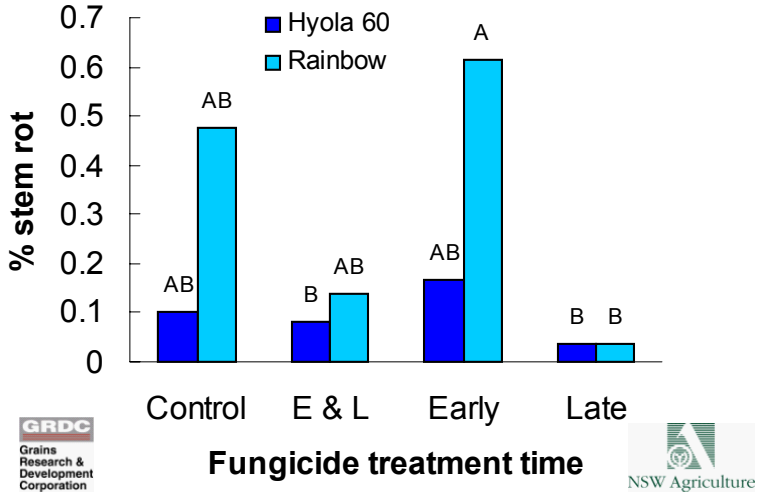

Figure 14. Percent stem rot at Thuddungra for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). (lsd = 0.4752. Note: lsd taken from √ % stem rot data, data presented above are not square root data).

Yield

Hyola 60 had a significantly higher yield than Rainbow at the Thuddungra site (data not presented). The low incidence of stem rot resulted in no significant yield difference between the fungicide treatments (Fig. 15).

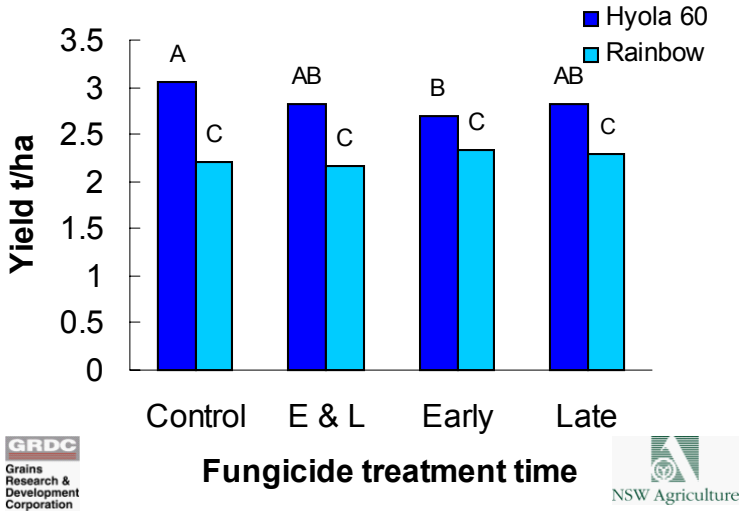

Figure 15. Yield at Thuddungra for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.2945

Greenethorpe – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Greenethorpe site was extremely low, with a maximum of 0.32 % (Fig 16). The early and the early & late fungicide applications in Rainbow significantly reduced percent stem rot. Stem rot in Hyola 60 was not reduced by any fungicide application.

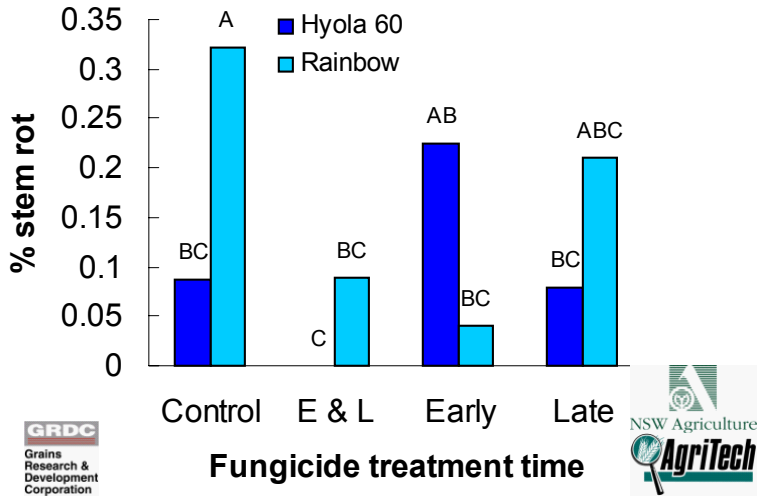

Figure 16. Percent stem rot at Greenethorpe for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.2235

Yield

At the Greenethorpe site the low incidence of stem rot resulted in no significant yield difference between the fungicide treatments in Rainbow and Hyola 60 (Fig. 17).

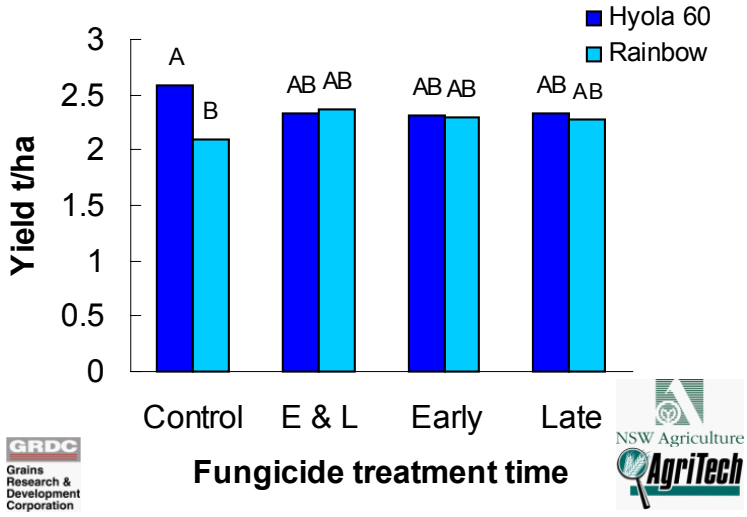

Figure 17. Yield at Greenethorpe for Hyola 60 and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.3375

Tamworth – Stem rot incidence and yield results

Stem rot incidence

Percent stem rot at the Tamworth site was extremely low, with a maximum of 1.04 % (Fig 18). The early application of fungicide in Hyola 60 significantly reduced the percent of stem rot. Stem rot in Mustard and Rainbow was not reduced by any fungicide application.

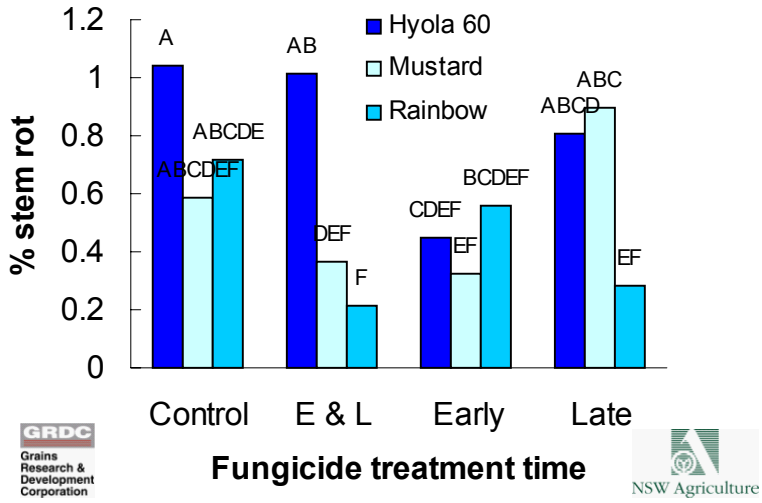

Figure 18. Percent stem rot at Tamworth for Hyola 60, Mustard and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.4528

Yield

At the Tamworth site the low incidence of stem rot resulted in no significant yield difference between the fungicide treatments in Rainbow, Hyola 60 or Mustard (Fig. 19). Mustard had a significantly higher yield than Rainbow or Hyola 60 (data not presented).

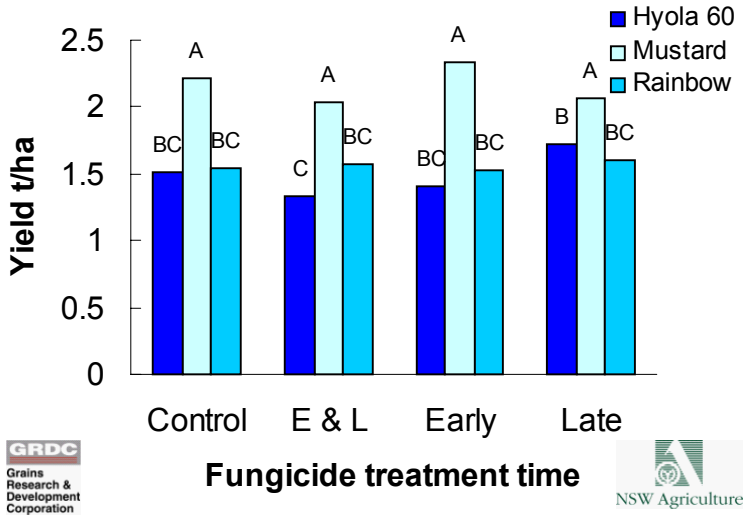

Figure 19. Yield at Tamworth for Hyola 60, Mustard and Rainbow treated with 2L/ha of Rovral liquid fungicide at 20 – 30 % flowering (early), 2 weeks after 20 – 30% flowering (late) and at both 20 – 30 % and 2 weeks later (E & L). lsd = 0.3438