

Alternative chemical options to control Group A herbicide resistant ryegrass

SUMMARY

Group A herbicide resistant ryegrass is difficult to control in a continuous cropping rotation. If you have resistant ryegrass it is essential to use more than one control option. Other options are crop topping in pulse crops, making hay to stop seed set of ryegrass, spray topping pastures etc. In crop there is still a need for control and alternative chemicals from different groups are required. This trial investigated alternative chemicals for the control of ryegrass in wheat; and in broadleaf crops, canola, lentil and field pea. In wheat: Amitrole, Triflur480, Dual Gold plus Diuron and IPU all had useful levels of control and suppression of ryegrass. These chemicals may be an additional tool for the suppression of group A resistant ryegrass in wheat. Crop damage can occur with some of these chemicals and a good understanding of how these chemicals work and their registration status is essential before commercial use. In canola, lentils and field peas: Propon (2,2 DPA) was investigated and was found to be not very effective in controlling very high populations of group A resistant ryegrass.

BACKGROUND

Herbicide resistant ryegrass is becoming much more common. Only a few years ago growers in the southern Mallee were saying it was not their problem and would never become their problem - the attitude 'It won't happen to me' was alive and well. It is now well and truly a problem with patches of group A resistant ryegrass very common in the district and spreading rapidly. Growers further south have had to contend with resistant ryegrass for much longer, and now also have to deal with resistant wild oats. The BCG has been working on herbicide resistant ryegrass since 1998. A field day was held in 1998 and over 500 people attended to check out what happens if ryegrass cannot be controlled with the group A herbicides and to see new ways to deal with the problem. On the farm, where the field day was held, the problem has been greatly reduced by good management using options such as the intensive use of trifluralin, hay making, changing sowing times to allow for a good weed kill prior to sowing, crop topping in lupins, and the occasional burning of stubble. Cropping has continued and the problem is not as threatening as it was a few years ago. The BCG have continued to work on the property and in 2000 investigated a range of alternative chemical options from different groups to control resistant ryegrass in cereals and broadleaf crops.

METHODS

Two trials were undertaken with alternative chemicals:

1. Amitrole and IPU to control ryegrass in wheat
2. Propon to control ryegrass in broadleaf crops

All treatments in both trials were replicated and sprayed in a nearest neighbour control design - so that an unsprayed control was always adjacent to a sprayed treatment.

1. ALTERNATIVE CHEMICALS IN WHEAT

Weeds were sprayed with RoundUp CT Xtra at 1L on May 7 for a general knockdown. On June 6, Pre-Sowing treatments were applied, the site was sown with Whistler wheat at 80 kg/ha, MAP (55kg/ha), Urea (100kg/ha). Immediately after sowing the Post Sowing Pre-Emergent treatments were applied. The one Early Post Emergent treatment (IPU) applied at the four leaf stage of the crop (Z14,21) (see Table 1 for treatments).

Table 1. Alternative chemical treatments in wheat (all rates per ha)

Chemical Trade name + rate	Chemical name	Timing	Group
Control (no spray)			
Nuquat 0.7L	paraquat	Pre#	L
Nuquat 0.7L; Triflur480 1.6L	paraquat; trifluralin	Pre; IBS	L and D
Nuquat 0.7L; Dual Gold 0.5L + Diuron 0.5L	paraquat; metolachlor + diuron	Pre, PSPE	L, K and C
Amitrole 1.4L	amitrole	Pre	F
Amitrole 2.8L	amitrole	Pre	F
Amitrole 1.4L + Propon 2kg	amitrole + 2,2 DPA	Pre	F and J
Nuquat 0.7L; Amitrole 1.4L	paraquat;	Pre; PSPE	L and F
Nuquat 0.7L; IPU 2L	paraquat, isoproturon	Pre; EPE	L and C

Pre=Pre-sowing; IBS=Incorporated by Sowing; PSPE=Post Sowing Pre-emergent; EPE =Early Post Emergent

RESULTS

Figure 1. Treatment effects on ryegrass (plants/m²). The white bars are significantly different from the control.

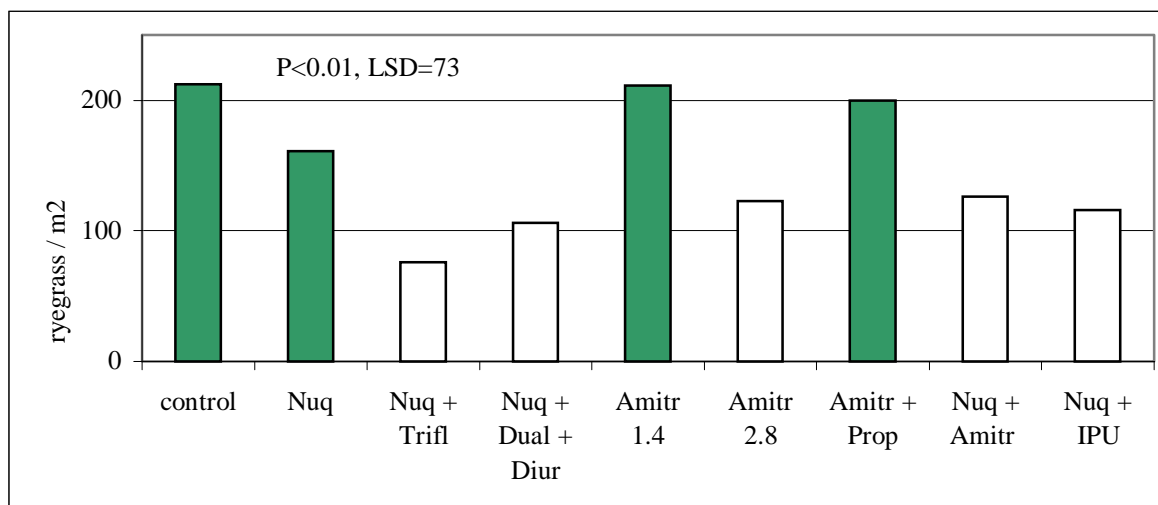


Figure 2. Wheat plant density (plants/m²) resulting from the different treatments.

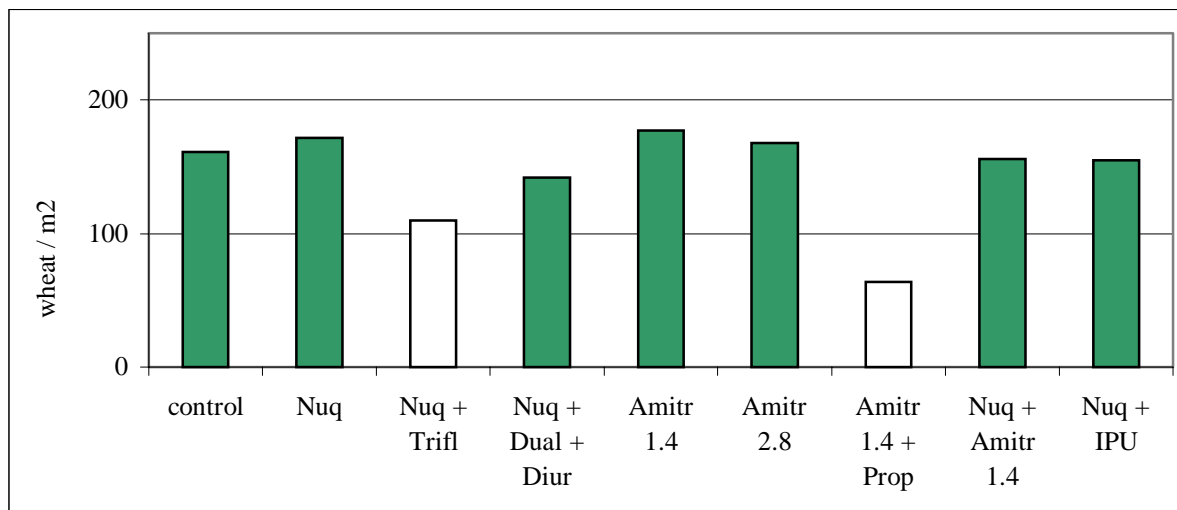
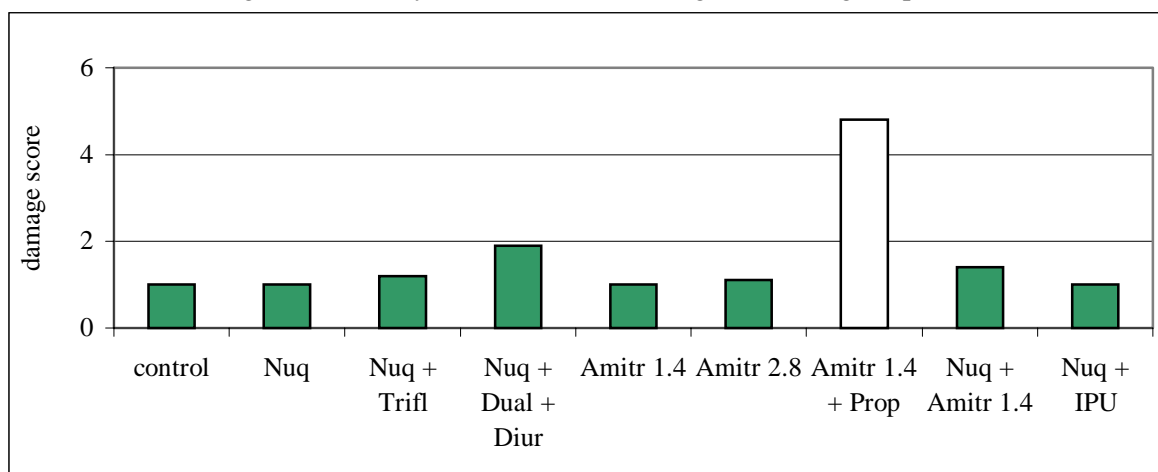


Figure 3. Crop damage score on wheat from the treatments (scores: 1 = no damage, 5 = severely affected and some long term damage expected, 9 = dead).



Several treatments resulted in a significant reduction in ryegrass from the control (P<0.01, LSD=73). The control plots had on average approximately 200 plants of ryegrass per square metre (Figure 1). Even the

most successful treatments still had a high ryegrass population (for example the Nuquat Pre-sowing and Triflur480 IBS treatment still resulted in 76 plants/m² - which is unacceptably high). Some of the treatments caused significant crop damage (Figure 2 and 3) resulting in reduced wheat plant populations and potential for long term damage to the crop.

The plots were not harvested because the ryegrass in the control plots was so dense that a reasonable harvest was not achievable and the ryegrass seed set would have caused long term problems.

INTERPRETATION

Nuquat (paraquat) pre sowing is a good option if glyphosate has already been used as a knockdown earlier in the season. Using chemicals from two different groups (in this case L and M) for knockdown control ensures that resistance developing to either group is unlikely.

Trifluralin, Amitrole, Dual and Diuron and IPU all provided additional benefit for the control of group A resistant ryegrass. However, none of these treatments provided good enough ryegrass control in their own right and competition from ryegrass was still severe. Care has to be taken with trifluralin at high rates (also not registered), severe crop damage can result if the trifluralin is incorporated into the seeding row; Dual and Diuron can also cause severe damage if a large rainfall event occurs immediately post application.

Amitrole is registered in wheat and barley as a pre-sowing herbicide with a plant back of 5 days. As a group F herbicide it will remain an option as a knockdown as an alternative to using a group M (glyphosate) or L (paraquat).

Propon (2,2 DPA) is too severe when used immediately prior to sowing wheat and caused long term crop damage.

2. PROPON IN BROADLEAF CROPS

Methods

The site was sprayed with RoundUp CT Xtra at 1L on May 7 for a general knock down of weeds. On June 6 the site was sprayed with Spray.Seed (1.5L/ha) and sown on the following day. Blocks of Pinnacle canola, Digger lentils and Dundale Field Peas were sown. Canola was sown with Mallee Mix 1 at 80 kg and Urea at 100kg; lentils and field peas were sown with 80 kg of Legume Super plus Zinc.

All treatments were applied 7 weeks post sowing when the crops were at the 3 leaf stage and ryegrass at 2 to 3 leaf stage (Table 2).

Table 2. Treatments applied to canola, lentil and field pea.

Chemical trade name and rate	Chemical name	Herbicide group
Propon 2kg	2,2 DPA	J
Propon 4kg	2,2 DPA	J
Propon 2kg + Select 0.25L	2,2 DPA + clethodim	J, A(dim)
Appeal 0.4L	haloxyfop	A(fop)
Pantera 0.375L	quizalofop	A(fop)

Results

For the purpose of presentation the results for canola and field peas are presented. The result for lentils was the same as for field peas. The chemical treatment results were highly variable and none provided acceptable control (Figure 4) (at 40% control there were still over 100 ryegrass plants/m²).

The chemicals used in the trial caused minimal damage to the crop (Figure 5).

The plots could not be harvested because the competition from ryegrass (especially in the control) plots was too high and seed set would have been unacceptable resulting in long term problems.

Figure 4. Control of ryegrass with the treatments on canola and field peas.

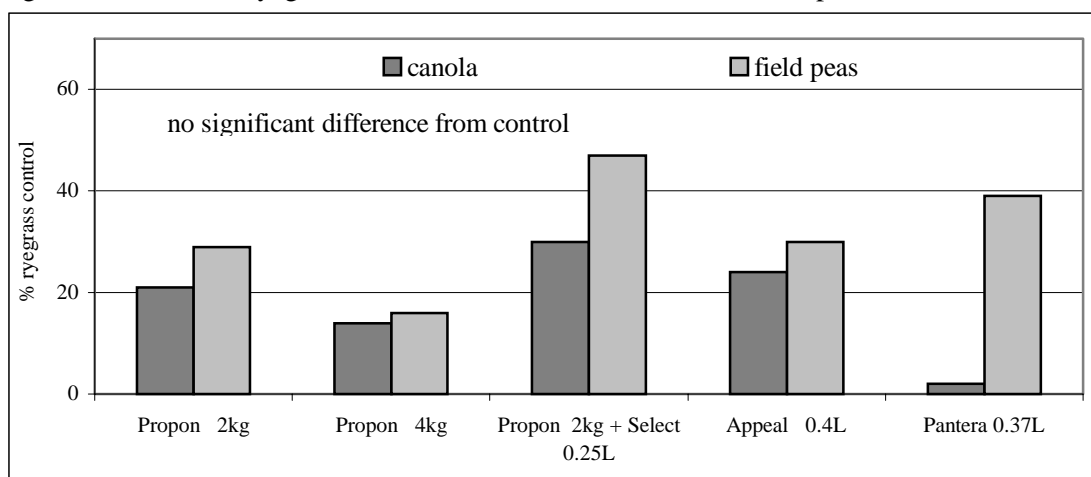
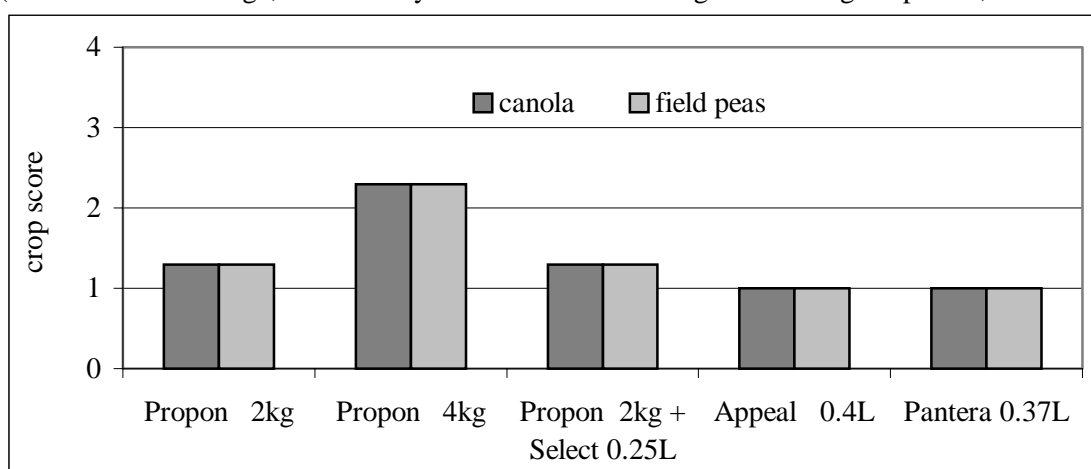


Figure 5. Crop damage score on canola and field pea from the treatments (scores: 1 = no damage, 5 = severely affected and some long term damage expected, 9 = dead).



Interpretation

Propon did not control the very high population of group A resistant ryegrass. Propon plus Select had an increased level of control but because the population was so high the level of control was insufficient. Appeal and Pantera are both group A (fop) herbicides and were not expected to control the ryegrass (a seed test revealed 88% resistance to Hoegrass also a group A (fop) herbicide).

In other trials Propon has shown useful activity on silvergrass and brome grass.

COMMERCIAL PRACTICE

Alternative chemistry to the group A herbicides plays a role in managing herbicide resistant grass weeds, but cannot be depended on. If an alternative herbicide does work it is important not to rely on it because, in time, the ryegrass will develop resistance to the alternative herbicide.

The paddock in which the trial was located was sown to barley and ryegrass control was successful. The management approach taken was to achieve good weed control prior to sowing with the double knock approach (Glyphosate as the first spray, followed by paraquat), the barley was sown late to achieve maximum germination of ryegrass and trifluralin was used prior to sowing.

Managing ryegrass requires a range of alternative practices, including new chemicals. Some of the options are:

1. Green manuring or hay - growing a legume such as vetch for green manuring or hay can effectively stop seed set and provide direct income from hay and indirect benefit from nitrogen fixation.
2. Delay sowing - delay sowing of crops until there has been at least one germination of ryegrass following the break in the season. This ryegrass can then be controlled by cultivation or with a knockdown. Delayed sowing of conventional wheat varieties can reduce yield. Sowing shorter season varieties such as Silverstar wheat could be a good option if delayed sowing is considered.
3. Vigorous crop establishment - establish healthy vigorous crops which can compete with weeds. Sow at optimum depth, treat seed if needed with products known to have minimal impact on crop vigour and use starter N fertiliser.
4. Crop type competition - some crops and varieties are better competitors compared to others.
5. Competitive crops - increase the competitiveness of crops. Increased sowing rate and reduced row spacings help to increase crop competition.
6. Crop topping - topping some pulse crops with paraquat can be very effective in controlling seed set of ryegrass.
7. Autumn cultivation or tickling - an autumn tickle or light cultivation will increase germination of ryegrass which can then be controlled with a knockdown spray or another cultivation prior to sowing.
8. Burning - The occasional hot burn in a cereal stubble may be a good management practice to reduce overall weed populations.
9. Use chemicals from a different group - if the resistance in ryegrass is primarily to Group A herbicides then herbicides from different groups may still work. Have seed tested
10. Biomass control of weeds, leaving heavy stubbles between sowing rows can inhibit weed seed germination. This technique requires minimal disturbance (including sheep) and may work for some operators.
11. Seed collection at harvest - trailer bins can be used to collect chaff (with the ryegrass seed). This can then be moved out of the paddock, burnt or fed to livestock. (Seed collection can be difficult with high yielding crops)
12. Pastures and pasture topping - spray topping with Roundup or Gramoxone in pastures is an excellent way to reduce grass weed seed set.

The BCG would like to thank Shaun Krahnert from Latrobe University for his help with this trial.