

Cultivation practices and pre-sowing herbicides to control resistant ryegrass in wheat

SUMMARY

Ryegrass numbers were lowest in a minimum tillage and direct drill situation (compared to a summer and long fallow). Pre-sowing herbicide applications with trifluralin and Avadex type products all reduced ryegrass numbers compared to the control – however none of the treatments were commercially acceptable (in terms of crop competition and seed set of ryegrass). Herbicide options based on trifluralin or Avadex (at varying rates and in mixes) are an additional tool in the battle with resistant ryegrass.

Fop and dim resistant ryegrass is becoming a wide spread problem. Many grain growers have gone back to using trifluralin to achieve early control of ryegrass, with varying results. Since the introduction of trifluralin some 20 years ago crop establishment practices have changed. Direct drilling or minimum tillage is now common and trifluralin use has been adapted to the new cropping practices. In this trial the efficacy of trifluralin applied immediately prior to sowing was investigated on four different cultivation practices. Trifluralin (Group D) use has increased in terms of repetitive yearly use as well as in quantity used, and the potential for ryegrass developing resistance to trifluralin is now a concern. Herbicides in other groups need to be investigated for ryegrass control to increase herbicide options available for ryegrass control.

METHOD

The site has a high seed bank of fop and dim resistant ryegrass with some 200 ryegrass plants per square metre. Four cultivation practices were investigated: long cultivation (first cultivated by disking in September 1998), short cultivation (first cultivated over summer 1999), minimum tillage (first cultivated prior to sowing) and direct drilling (no cultivation). The plots were sown to Rosella wheat with a Simplicity airseeder, Janke tynes set at 9 inch spacings, pulling a prickle chain. Herbicide treatments were applied at right angles immediately prior to sowing (except for the trifluralin and Diuron treatment: the trifluralin was applied pre-sowing and the Diuron was applied immediately post sowing). The herbicide plots were arranged in a replicated nearest neighbour design (each treatment plot was located adjacent to a control). Herbicide treatments were with trifluralin (Group D), Avadex (tri-allylate; Group E), Diuron (Group C) and Yield (trifluralin + oryzalin; Group D). Ryegrass populations were counted in August. The control plots were not harvested because of very high ryegrass populations and these plots were slashed prior to seed set. Products used were Trilfur480, Avadex Xtra, Diuron and Yield.

RESULTS

Table 2.11. Ryegrass control

Cultivation	Ryegrass plants/m ²			
	DD	MT	Short	Long
Control	133	161	226	193
Trilfur480 0.8L	67	45	68	76
Triflur480 1.6L	35	48	83	70

Avadex Xtra 1.6L	54	72	150	101
Avadex Xtra 3.2L	26	57	70	58
Triflur480 0.8L + Avadex Xtra 1.6L	52	42	101	94
Triflur480 1.6L + Avadex Xtra 1.6L	60	20	58	60
Triflur480 0.8L + Diuron 1L	68	45	107	68
Yield 2.3L	76	59	92	103
Significant difference: Cultivation practice Herbicide	P<0.001 LSD=17 P<0.001 LSD=26			

All treatment plots were located adjacent to an unsprayed control. This design allows for a determination of the effectiveness of control for each of the chemical treatments. Herbicide effectiveness was worked out as the % control achieved compared to the adjacent unsprayed plot.

Table 2.12 % Ryegrass control

	% Control		% Control
Triflur480 0.8L	44	Triflur480 0.8L + Avadex Xtra 1.6L	64
Triflur480 1.6L	64	Triflur480 1.6L + Avadex Xtra 1.6L	74
Avadex Xtra 1.6L	53	Triflur480 0.8L + Diuron 1L	53
Avadex Xtra 3.2L	69	Yield 2.3L	41

Herbicide effectiveness was significant ($P<0.01$ $LSD=18$). The cultivation practices had no effect in additional control for the herbicides in the trial.

Table 2.13 The effect of pre-sowing herbicides to control ryegrass on wheat yield

	Status	Cost \$/ha	Yield (t/ha)			
			DD	MT	Short	Long
Triflur480 0.8L	NR*	6.30	4.1	3.8	4.0	4.1
Triflur480 1.6L	NR	12.60	4.4	4.1	4.0	4.1
Avadex Xtra 1.6L	R	26.30	3.9	3.5	3.8	3.9
Avadex Xtra 3.2L	NR	52.60	4.2	3.8	4.2	4.0
Triflur480 0.8L + Avadex Xtra 1.6L	NR	32.60	4.4	3.8	4.4	3.8
Triflur480 1.6L + Avadex Xtra 1.6L	NR	39.00	4.0	3.9	4.2	4.0
Triflur480 0.8L + Diuron 1L	NR	14.00	3.9	3.9	4.1	4.0
Yield 2.3L	R	30.00	4.0	4.1	4.1	4.2
Significant difference: Cultivation practice Herbicide			P<0.05 LSD=0.2 NS			

* not registered for use immediately prior to sowing

INTERPRETATION

Cultivation practice had a large influence on ryegrass populations. Direct drilling had the lowest ryegrass numbers, followed by minimum tillage (one cultivation prior to sowing), long cultivation (disced in 1998), and short cultivation (summer cultivation).

All chemical treatments reduced the ryegrass population significantly regardless of the cultivation practice. The best control was provided by high rates of Avadex Xtra (3.2L), Triflur480 (1.6L) and the mix of Triflur480 (1.6L) plus Avadex Xtra (1.6L). However, none of the treatments provided commercially acceptable levels of control with all plots having too much ryegrass for competition and for seed set control.

There were no added benefits of cultivation for any of the chemical treatments, even for products such as Avadex the level of control was similar in a direct drill (including the prickle chain) to a cultivated situation.

In general, the direct drilled plots had a higher yield compared to the other cultivation practices. However, there were no chemical treatment effects on yield. There was a small trend with the highest yields being achieved in the plots with the lowest ryegrass numbers (presumably due to reduced competition). Using trifluralin and Avadex at high rates immediately prior to sowing did not result in long lasting crop damage. On establishment, typical trifluralin damage with thickened coleoptiles was observed in these treatments, but this did not persist and the crop recovered.

COMMERCIAL PRACTICE

Controlling fop and dim resistant ryegrass successfully in wheat crops is difficult because there are not many effective herbicide control options available. High levels of trifluralin have helped reduce resistant ryegrass establishment in wheat. However, control is often not sufficient to reduce competition or seed set. With increased trifluralin use, resistance in ryegrass to this herbicide will also become more evident. Avadex is in a different chemical group (Avadex - Group E, trifluralin - Group D) and has shown to have activity on ryegrass. However it is not sufficient as the only means of control. Avadex reduced ryegrass numbers but not to commercially acceptable levels, but it is an additional option.

Herbicide choice in a situation with high populations of fop and dim resistant ryegrass is a matter of previous herbicide use and knowledge of what herbicide activity still works on the weeds. It is clear that in a high-density situation, pre-sowing herbicides alone will not be sufficient to reduce ryegrass numbers to commercially acceptable levels.

Management of resistant ryegrass must be based on a long-term plan targeted at reducing the seed bank. As many practices as possible must be in place to achieve this. The chemical options in this trial are only one of the available options.

Warning: Using trifluralin at high rates and/or immediately prior to sowing can lead to severe crop damage. The level of damage is related to factors such as variety sown, soil type, tyne and point placement and incorporation etc. Before trying out new herbicide use practices it is essential for grain growers to test these on farm with their own machinery and soil types.