TORDON* HERBICIDES - OLD ANSWERS FOR NEW PROBLEMS

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Abstract

Group B herbicide resistance (primarily chlorsulfuron) in the key winter weeds black bindweed (*Fallopia convolvulus* (L.) A. Love formerly *Polygonum convolvulus* L.) and common sowthistle (*Sonchus oleraceus* L.) has been reported in North Eastern Australian winter cereal areas. Tordon herbicides (Group I), first registered in 1965 for use in winter cereals, continue to provide reliable control of these and other key winter weed species, whether Group B herbicide resistant or not.

Residual control of black bindweed and milk thistle with either Tordon* 242 Cereal Herbicide (26 g/L picloram + 420 g/L MCPA) or Tordon* 75-D Herbicide (75 g/L picloram + 300 g/L 2,4-D) has been observed in trials by the author and commercially sprayed areas by agronomists in the Goondiwindi and Moonie districts.

Historical review of data over the last 20 years showed excellent winter cereal crop selectivity of Tordon herbicides. Label rates of Tordon herbicides were compatible with Topik? 240EC for one-pass control of the key grass weed, wild oat (*Avena sterilis* ssp. *ludoviciana* (Dur.) Gillet & Magne) plus broadleaf weeds. Winter application of Tordon herbicides has also allowed safe summer cereal plantings, where double cropping was possible.

Keywords Tordon 75-D Herbicide, Tordon 242 Cereal Herbicide, picloram, 2,4-D amine, MCPA amine, resistance, Group B, residual, common sowthistle, black bindweed, compatibility, grass herbicides, Topik 240EC, plantback.

Sulfonylurea (SU?s) herbicides like chlorsulfuron and triasulfuron gave cost-effective, long term control of key broadleaf weeds in winter cereals when they were first introduced in the 1980?s. They even gave some control of weed species in the spring fallow due to their persistent nature. Low-cost and long-term weed control has led to widespread use in the cereal areas of northern Australia. However, weed resistance developed due to soil persistence, site specific mode of action and over reliance on herbicides for weed management. Spray failures on key weeds common sowthistle (SONOL) and black bindweed (POLCO) and weedy spring fallows were the result.

Higher production costs and variable commodity prices have meant one-pass weed control is highly desirable where grass and broadleaf weeds occur together. These economic conditions, together with variable rain, led growers to opportunity crop in summer and sometimes double crop. Variability in persistence of SU herbicides meant growers have had to explore other options for winter weed management and safe summer cropping.

Crop selectivity of Tordon herbicides to winter cereals has also been questioned. Since 1976, Dow AgroSciences, Agrisearch Services Pty Ltd and independent governmental officers have tested selectivity. Government and independent research on plantback to summer cereals and control of herbicide resistant weeds will also be reported.

During the past four winters, research has concentrated on the following key questions:

• Do Tordon herbicides give effective knockdown and residual control of common sowthistle and black bindweed?

• Are Tordon herbicides compatible with Topik 240EC for one-pass grass and broadleaf weed control, and

• Are they selective to commonly grown winter cereal varieties?

Results and discussion

Black bindweed and common sowthistle

Trials from 1976-97 have shown the excellent efficacy and significant residual effect of Tordon herbicides on POLCO, as shown in Table 1. Adkins *et al*. (1), Wills *et al*. (7, 8) and Boutsalis and Powles (3) have stated that POLCO and SONOL resistant to group B herbicides have shown no resistance to herbicides such as picloram, fluroxypyr or bromoxynil. Results for Harmony M are poorer than those previously reported (2) and may reflect the drier seasons under which much of this trial work was conducted.

Table 1: Percent knockdown and residual control of black bindweed with Tordon herbicides in winter cereals (100 = complete control).

Herbicide	Use rate (L/ha)	Percent knockdown	Residual control
Tordon 75-D	0.3	77 (7)[a] [58-97]	67 (2) [63-68]
Tordon 75-D + 2,4-D	0.3 + 0.47	85 (7) [60-100]	87 (3) [84-94]
Tordon 242	1.0	83 (10) [23-98]	85 (2) [80-90]
Harmony[b] M	40 g	73 (13) [30-100]	0 (2) [0-0]

a (7) = number of trials; [58-97] = range of control ratings?

b Harmony M + 0.1% v/v BS-1000 (Harmony M is a registered trademark of DuPont Australia Ltd)

More recently, milk thistle has become a problem in western areas due to herbicide resistance, weed tolerance to herbicides and rates applied, or decreased reliance on stock for weed management during the fallow. In 1997, trials showed Tordon herbicides have significant potential for control and some residual effect where SONOL was the main weed. These results are summarised in Table 2. Results reported above (1, 7, 8) have been confirmed by G. Cripps (1997, *pers. comm.*), where SONOL resistant to SU herbicides was treated with other mode of action herbicides and a good result acheived.

Table 2: Percent knockdown and residual control of common sowthistle with Tordon herbicides in winter cereals (100 = complete control).

Herbicide	Use rate (L/ha)	Percent knockdown	Residual control
Tordon 75-D	0.3	65 (4)[a] [35-88]	62 (2) [60-63]
Tordon 75-D + 2,4-D	0.3 + 0.47	73 (3) [23-98]	90 (2) [86-93]

Tordon 242	1.0	74 (4) [63-85]	59 (2) [52-66]
Harmony[b] M	40 g	16 (3) [0-25]	2 (2) [0-4]

a (4) = number of trials; [58-97] = range of control ratings?

b Harmony M + 0.1% v/v BS-1000 (Harmony M is a registered trademark of DuPont Australia Ltd)

Topik 240EC compatibility

Topik 240EC compatibility with Tordon herbicides for wild oat and broadleaf weed control has been tested since 1994. These data are reported in Table 3. Topik 240EC was fully compatible with Tordon herbicides when wild oats was the target grass weed.

Table 3. Percent control of wild oats in wheat after application of Topik 240EC with or without Tordon herbicides (100=complete control).

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		?	Topik 240EC rate/ha
Partner herbicide	**Rate (L/ha)**	85 mL	125 mL
None[a]	-	93 (9) [80-100]	98 (5) [97-100]
Tordon 75-D	0.3	92 (9) [85-100]	?
Tordon 242?	1.0	87 (6) [75-100]	?

a Addition of Uptake Spraying Oil at 0.5% v/v to all treatments.

When Topik 240EC was mixed with Tordon herbicides, there was some reduction in paradoxa grass (*Phalaris paradoxa* L.) control compared to Topik 240EC alone. Results of limited trial data are shown in Table 4. The highest label rate of Topik 240EC should be used with either Tordon herbicide when paradoxa grass is the key grass weed.

Table 4. Percent control of paradoxa grass in wheat after application of Topik 240EC with or without Tordon herbicides (100=complete control).

		?	Topik 240EC rate/ha
Partner Herbicide	**Rate (L/ha)**	125 mL	160 mL
None[a]	-	89 (4) [83-98]	90 (3) [85-98]

Tordon 75-D	0.3	76 (2) [75-77]	?
Tordon 242?	1.0	74 (2) [70-78]	?

a Addition of Uptake Spraying Oil at 0.5% v/v to all treatments.

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Cereal selectivity

Tordon herbicides have been tested since 1976 for selectivity to common wheat, barley, oat and triticale varieties. Research by Dow AgroSciences, Agrisearch Services Pty Ltd, NSW Agriculture and Qld DPI showed that over 90% of cereal screens tested resulted in no significant reduction in yield when compared with the untreated control. NSW Agriculture at Wagga Wagga found (over an eight year period) that Tordon 242 at 1 L/ha caused significant yield reduction in 19% of 114 cereal screens, where 60% of these cases had yield reductions <10% of the untreated control plots. An example of such trial work by Agrisearch is shown in Table 5. The results showed that Tordon herbicides had similar selectivity to another commercial treatment, Harmony M.

Plantback to summer crops

Marley (5) showed that picloram, applied as Tordon 75-D Herbicide (formerly Tordon 50-D), at rates up to 70 gae/ha was safe for recropping with wheat 7.4 months later. Results for lucerne were similar on montmorillonite clay at Warwick. Data from USA and Canada (4, 6) also showed the same trend where corn or sorghum were safely planted into areas treated with picloram.

These results are consistently seen commercially, where growers apply Tordon herbicides in winter cereal crops for broadleaf weed control and safely plant either sorghum or maize in the following summer.

Table 5: Wheat and barley yield as percent of untreated after application of Tordon herbicides, 1996. (Source: Agrisearch 1996 tolerance screen)

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?	?	**Herbicide and Rate**		
CROP	**Variety**	**Tordon 242 1 L/ha**	**Tordon 75-D/2,4-D 0.3/0.47 L/ha**	**Harmony M 40 g/ha**
Barley	Gilbert?	95	106	91
	Tallon	113	109	116
Wheat	Yallaroi?	76[a]	90	84
	Tasman?	82	95	85
	Sunstate?	90	94	83
	Sunland?	83	95	99
	Sunco?	87	99	99
	Sunbrook?	105	107	98

Sunbri?	97	102	95
Rowan?	101	106	112
Pulsar?	101	96	114
Perouse?	110[b]	109	117[b]
Mercury?	113	98	103
Janz?	99	111	113[b]
Cunningham?	106	110	125[b]
Batavia	100	99	102

a Yield significantly reduced at 5% level?

b Yield significantly increased at 5% level

Conclusion

The new problem of Group B herbicide resistance in POLCO and SONOL has reduced options for broadleaf weed management in winter cereals in northern Australia. Tordon herbicides together with other options like grazing, continue to give cost-effective control of these weeds, whether Group B resistant or not. They also give useful residual control of POLCO and potentially SONOL, so that fallows after harvest are cleaner. Tordon herbicides have shown acceptable cereal selectivity, good compatibility with Topik 240EC for one-pass grass and broadleaf weed control and allow safe recropping to summer crops after winter application.

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