Weed control weak links in dryland cotton cropping systems

By Steve Walker[1] and Ian Taylor[2]

A new research project is currently tackling the complex and expensive issue of weed management in cropping systems with dryland cotton. This is a consequence of a recent survey of dryland cotton growers throughout southern Queensland and northern New South Wales. The Cotton CRC and Weeds CRC plus GRDC and CRDC jointly commissioned the survey, which successfully highlighted the various weak links for weed control in this cropping system.

Overall, growers nominated 42 weeds they were targeting to control in various parts of their diverse crop rotations with dryland cotton. Surprisingly, growers spent on average $220 per hectare on weed control in dryland cotton, as well as another $20–60 per hectare in the rotational crops plus $35 per hectare for each six month fallow.

Even with this level of input, many growers admitted that many weeds were not effectively controlled, resulting in an additional $18–$121 per hectare loss in production due to competition from these residual weeds.

While weed control in dryland cotton consisted of many combinations of selective and some non-selective herbicides, cultivation and manual chipping, weed control in the rotational crops and fallows was mostly limited to a few key herbicides. But effective control with these herbicides (particularly glyphosate and atrazine), was not achieved consistently, especially for some of the more difficult-to-control weeds.

Also, weeds survived in the wide row spaces used for some summer crops and produced prolific amounts of seed, increasing problems in the following parts of the rotation. The new research is investigating more effective weed control options in these weak links of the rotations, to ensure that weed pressure in dryland cotton crops and the economic impact of weeds are reduced over time. Not an easy task, as these management strategies need to take into account the great diversity of weeds as well as maintain the flexibility of the cropping system.

Fleabane has become a major weed problem, as seen here growing in the wide inter-row spaces in dryland cotton.

Survey

In the postal survey, a first for dryland cotton farms, growers were asked to provide details of cropping system and weed control practices in late 2001. Each grower was asked to list the five main weeds for each crop and fallow, the herbicides used on these weeds, the level of control achieved and to estimate yield losses from uncontrolled weeds.

Finally, they were asked what they considered were their most difficult-to-control weeds overall. Approximately two thirds of the surveys were from growers on the Darling Downs, and one third were from northern NSW. To complement this, over 30 paddocks of dryland cotton and fallows were surveyed for weeds at the beginning and end of the summer season.

Rotations

Growers indicated that soil water conservation and weed control were the main reasons for choosing their crop rotations, which were made up of numerous combinations of different crops and fallows of various lengths. About half of the growers grew dryland cotton in rotations with one or two wheat crops.

Another common rotation, which was used by about a quarter of the surveyed growers, consisted of either just sorghum or sorghum with one or two wheat crops. Interestingly, dryland cotton was also grown continuously by some growers, or in much more complex systems with various combinations of winter and summer cereals and pulses.

TABLE 1: The most difficult-to-control weeds in dryland cotton farming systems, listed in order of importance by growers in the two regions

Darling Downs		Northern NSW	
Problem weed	% of growers	Problem weed	% of growers
Sowthistle	47	Black bindweed	56
Bladder ketmia	34	Fleabane	25
Black bindweed	28	Cowvine	20
Cowvine & bellvine	28	Sowthistle	20
Liverseed grass	13	Paradoxa grass	20
Wild oats	13	Wild oats	20
Burrs	10	Burrs	20

Weeds in fallows

In summer fallows, the most common weeds were:

- Bladder ketmia;
- Sowthistle (milk thistle);
- Caltrop;
- Liverseed grass;
- Burrs;
- Barnyard grass;
- Thornapples;
- Cowvine; and,
- Pigweed.

In winter fallows, the most common were:

- Wild oats;
- Sowthistle;
- Black bindweed (climbing buckwheat);
- Turnip weed;
- Paradoxa grass;
- Wireweed;
- Thistles; and,
- Mustards.

But there were some regional differences, with bladder ketmia more common on the Darling Downs, while burrs, wild oats, paradoxa grass and turnip weed were more common in northern NSW.

The large majority of growers used glyphosate either alone or mixed with 2,4–D amine, fluroxypyr (for example Starane) or metsulfuron-methyl (for example Ally) for fallow weed control.

Members of the survey team identifying the weed problems in dryland cotton farming systems.

Most growers believed that they achieved very good control of wild oats and paradoxa grass in winter fallow, but less achieved equivalent control for liverseed and barnyard grass in summer fallow. The broadleaved weeds not controlled well by many growers were bladder ketmia, black bindweed and sowthistle — particularly when glyphosate alone was used for these weeds compared with the various glyphosate mixes.

Weeds in summer crops

Not surprisingly, the weeds in dryland cotton and sorghum were similar to summer fallow, except that amaranths were

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more important in these crops and sowthistle was less important. Again there were some regional differences with bladder ketmia, amaranths and caltrop more common in summer crops on the Darling Downs, whereas barnyard grass was more common in northern NSW.

Growers listed 30 different herbicides that they used in dryland cotton. The most common sprays were fluometuron plus prometryn mixes (for example Cotogard) applied pre and post-emergence, and glyphosate applied with a shielded sprayer between the rows. Many growers also used inter-row cultivation and some chipping.

Atrazine and atrazine mixes were the most common herbicides used in sorghum. Some inter-row cultivation was used, but to a lesser extent than in dryland cotton.

But the majority of growers did not achieve very good control of several common weeds in these crops, particularly bladder ketmia in cotton, and liverseed and barnyard grasses in both crops. Grass control was generally better in sorghum for those growers who mixed atrazine with metolachlor (for example Dual Gold).

A summer fallow paddock heavily infested with bladder ketmia.

Weeds in winter crops

Wheat and chickpea were infested mainly with turnip weed, sowthistle, black bindweed and wild oats. The majority of wheat growers applied metsulfuron-methyl, MCPA, or mixes of these herbicides for broadleaf weed control, and clodinafop (for example Topik) or fenoxaprop (for example Wildcat) to control grass weeds.

Chickpea growers used mainly haloxyfop (for example Verdict), simazine or mixes with simazine, although some applied glyphosate as a shielded application between rows. Weeds controlled poorly with herbicides were black bindweed in both crops and sowthistle in chickpea.

Problem weeds

As expected, growers nominated sowthistle, bladder ketmia, black bindweed, summer and winter grasses as the most difficult-to-control weeds in these farming systems (Table 1). But while growers did not list fleabane as a common weed, they rated it as the second most problematic weed in northern NSW. Since the survey fleabane has also become more of a problem in southern Queensland.

Where to next

The survey clearly identified the need and gave direction for new research on weed management in cropping systems with dryland cotton. It is currently focusing on techniques to improve control of the prevalent and problematic weeds — bladder ketmia, sowthistle, barnyard grass, liverseed grass and fleabane.

Experiments have been initiated on the seed persistence of these weeds in the soil seed-bank, options for improved control with herbicides in fallows, and more reliable control in winter cereals and sorghum, using combinations of crop competition and chemicals. Highlights of this research will appear in future articles in this magazine. Further down the track, the project team, in consultation with the industry, will integrated the new technology into weed management packages for dryland cotton growers.

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