

## Knock twice for reliable fleabane control

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A 'double knock' comprising an early spray on young weeds followed by a second approximately 7-10 days later is the most reliable chemical control for flax-leaf fleabane, *Conyza bonariensis*, in stubbles.

A well-timed early spray, sometimes of a high rate of glyphosate but more often of glyphosate plus 2,4-D, applied in good conditions to actively growing young plants can give more than 90% control. However, achieving this timing can be difficult because plants can emerge in crop ahead of harvest and be well established before a spray can be applied.

Older plants can survive a single spray but are usually controlled by a 'double knock'.

Given the potential impact of this weed and the fact that a flax-leaf fleabane plant can produce more than 100,000 wind-borne seeds it is vitally important to prevent seed set in paddocks and adjacent areas that might be sources of re-infestation.

Much of the work on control of this weed, which is favoured by no-till and zero-till farming systems, has been done in northern NSW and southern QLD but a new project, funded by the GRDC, is underway in SA to clarify which chemical controls work best in SA conditions and how to get the best from them.

"We know flax-leaf fleabane needs light and an extended period of moisture to germinate but we are not sure of its exact germination regime in SA conditions," said University of Adelaide weeds scientist Dr Chris Preston, who is heading the three-year research program.

"We also know it is mainly a weed of fallows and is quite tolerant of glyphosate and most herbicides once it starts to elongate (bolt) but are not quite sure of exactly the best chemical combinations or strategies for use in SA."

A well-timed application of a suitable chemical can give good results on young seedlings but it can be difficult to spray early enough and paddocks often contain young and much older fleabane plants.



FLAXLEAF FLEABANE IS A HIGHLY COMPETITIVE WEED THAT FLOWERS PROLIFERICALLY, WITH EACH PLANT CAPABLE OF PRODUCING 100,000 WIND-BORNE SEEDS. THE FINE HAIRS ON ITS LEAVES (SECOND FROM LEFT) AND STEMS ARE ALSO CHARACTERISTIC.

Research and grower experience from northern cropping areas suggest the most consistently reliable results are achieved from a 'double knock', usually glyphosate plus 2,4-D followed by Spray.Seed.

Research by WA weed scientist Dr Sally Pelzer suggests 'double knock' is the most reliable treatment for large fleabane in WA stubbles.

In her trials the most effective treatment was an application of 2 L/ha of glyphosate or a combination of 2 L/ha glyphosate plus 2 L/ha of 2,4-D amine with a follow up spray of 2 L/ha of paraquat seven days after the initial spray.

A single spray of 2 L/ha of glyphosate or a combination of 2 L/ha of glyphosate plus 2 L/ha of 2,4-D amine applied without a following spray of paraquat provided good but incomplete control.

Researchers across the country have identified a variety of tank mixes that will control fleabane but many of them contain chemicals not registered for use on this problematic weed.

"There are very few chemicals registered for control of fleabane either in crops or in fallows, said Barry Haskins, District Agronomist at Hillston, in south-west NSW.

### RESISTANCE A MAJOR ISSUE

*Conyza bonariensis*, one of seven *Conyza* species in Australia, has the ability to rapidly develop resistance to glyphosate and there are currently eight glyphosate-resistant flax-leaf fleabane populations in Australia.

Overseas flax-leaf fleabane populations have developed resistance to chemicals from four herbicide groups - glyphosate (Group M), chlorsulfuron (Group B), atrazine and simazine (Group C) and diquat and paraquat (Group L).

Queensland Alliance for Agriculture and Food Innovation (University of Queensland) Associate Professor Dr Steve Walker, whose team confirmed resistance in the Australian populations, reports that seedlings from them can withstand up to eight times the normal rate of glyphosate.

Given the rapid development of such high levels of glyphosate resistance in these Australian populations, plus the elevated levels of tolerance to glyphosate in many Queensland fleabane populations and that *Conyza* species were among the earliest weeds to develop glyphosate resistance in the US, it seems reasonable to expect that more glyphosate-resistant populations will develop or be identified.

This also suggests that growers should not expect to be able to rely on glyphosate alone for control of fleabane and researchers have explored a wide variety of tank mixes for efficacy against it.

“This is a huge issue, considering it is our major weed in cropping systems.”

**Small fleabane is easy to control with herbicides, Mr Haskins said. Older plants are more difficult but a double knock can be very effective.**

“Combinations of glyphosate 450 at rates of one to 2L/ha plus 2,4-D (amine or ester 625-680) at one to 2L/ha followed by 2L of either Spray.Seed or Gramoxone seven to 10 days later can give 100% control on fleabane.”

However, while these chemicals are all registered for use in dryland cropping, they are not registered for use in these combinations on this weed; despite a great deal of data pointing to their efficacy in this application, he said.

In trials Mr Haskins conducted on advanced weeds in difficult conditions last season, using Gramoxone as the second spray in double knock treatments gave better results than Spray.Seed at less than half the cost.

In Queensland trials a double knock of glyphosate followed by paraquat on re-growth has consistently given good levels of fleabane control, provided robust rates of chemical are used and the treatments applied at water volumes up to 100 L/ha when growing conditions are good, said Queensland weed scientist Steve Walker.

In trials conducted by Dr Walker and his team three ‘double knock’ combinations each gave better than 90% control of young weeds:

- glyphosate plus Tordon 75D followed by Spray.Seed - 96% control
- glyphosate plus 2,4-D followed by Spray.Seed - 95%
- glyphosate plus 2,4-D followed by Alliance - 92%

Using a single spray of glyphosate plus 2,4-D produced only 67% control.

Similar results were achieved in trials at Bellata, in northern NSW, where conditions were drier and fleabane populations lower.

Other work by Dr Walker and his team

## YIELD IMPACTS

Flax-leaf fleabane, a vigorous, upright, tap-rooted member of the daisy family, has a large root system and is able to extract large amounts of moisture from the soil over summer.

There is little data on the direct yield effect of this weed on Australian winter crops but there are reports of yield losses of 65 to 98% in Australian sorghum crops and overseas reports of yield losses of more than 80% in no-till soybeans with a weed density of 150 fleabane plants per square metre.

And there is a significant body of research showing that lucerne and other deep-rooted, vigorous crops with root systems somewhat similar to that of flax-leaf fleabane can significantly reduce soil moisture and the grain yields of following crops.

University of Adelaide PhD student Penny Roberts Craig found that, in the Upper South East, inter-cropping lucerne and wheat reduced wheat grain yields by 32 to 44%. Inter-cropping chickory, another deep-rooted pasture, and wheat reduced wheat yield by up to 41%, depending on conditions.

On Yorke Peninsula, Sam Kleeman found that inter-cropping barley and lucerne almost halved barley yield.

CSIRO scientist Dr Andrew Moore, who used APSIM and other models to explore the impact of building lucerne into cropping systems in Victoria’s Western Districts, found that a lucerne phase reduced the grain yield of following cereals by about 500 kg/ha for three to four years after the lucerne was removed.

suggests weed age is a critical issue when spraying flax-leaf fleabane.

In one trial glyphosate alone killed 88% of fleabane seedlings five centimetres in diameter but only 13% of weeds 10 centimetres in diameter or larger.

In trials near Dalby, on Queensland’s Darling Downs, glyphosate mixes and a double knock of glyphosate followed by paraquat killed 91% of month-old fleabane plants. Applying the same sprays to three-month old weeds at the large rosette and early elongation stages killed only 75% of the population.

Double knock fallow spraying killed 98% of one and two-month old weeds but was less effective on three-month old plants.

Group I herbicides applied in wheat gave 95% control of one-month old weeds but only 57% on two-month old plants, with crop competition an important factor in the level of control achieved in these trials, Dr Walker said.

Pot trials to compare the impact of weed age and soil moisture on flax-leaf fleabane control showed that weed age has a greater impact than moisture stress, which reduced efficacy by 8%.

However, the efficacy of a ‘double knock’ of glyphosate plus Tordon 75-D (picloram plus 2,4-D) followed by Spray.Seed was relatively unaffected by weed

age. A mixture of Tordon 75-D plus glyphosate is registered for control of fleabane seedlings and young plants at the rosette stage in Queensland.

NSW researchers Andrew Storrie and Tony Cook have found that newly emerged flax-leaf fleabane seedlings can be effectively controlled with phenoxy (Group I) herbicides in spring and that post-emergent application of chlorsulfuron may be effective on the newly-emerged flax-leaf fleabane.

Flax-leaf fleabane is not on Group I herbicide labels but chemicals from this group are registered for use on cereal crops in late winter and early spring, when flax-leaf fleabane often germinates.



FLAXLEAF FLEABANE AT THE ROSETTE STAGE. SPRAYING YOUNG FLEABANE PLANTS GIVES THE BEST CHANCE OF ACHIEVING GOOD CONTROL.

### Cultivation option

Fleabane can be a weed in all farming systems, not just no-till, but is easier to control with cultivation than with chemicals and growers prepared to include some form of soil disturbance in their farming system can go a long way towards minimising the impact of this weed.

*C. bonariensis* requires light and an extended period of moisture to germinate; a combination that helps explain why it is rapidly becoming a major weed in no-till stubble retention systems in which surface cover keeps more moisture at the soil surface for longer and there is no


cultivation to cover the seed.

Cultivation can prevent seeds germinating because the requirement for light means a cover of soil will prevent germination. It can also kill flax-leaf fleabane seedlings.

Crop competition will also inhibit this increasingly problematic weed, with 90% shade reducing germination by 80%. A combination of crop competition and spraying young fleabane seedlings with a robust rate of post-emergence selective herbicide can give a good level of control, according to Queensland weed scientist Steve Walker.

The mid to low 20s is the optimal

temperature range for germination of flax-leaf fleabane, which in northern cropping systems means it germinates in autumn, early winter and spring. In southern systems it germinates mostly in spring and early summer.

This timing means fleabane often establishes in maturing winter crops and, once the crop is harvested and the weed has no competition for light or moisture, can grow rapidly, especially if there is summer rain. Consequently, fleabane plants are often quite mature, with a large root system and high tolerance to most herbicides, by the time there is an opportunity for post-harvest spraying. 

## Conservation Agriculture in action

ALEX MILNER-SMYTH

It's quite amazing to think that SANTFA was set up to promote the idea of no-till farming in South Australia more than 10 years ago. Today more than 90% of SA's cropping farmers practise no-till farming methods, making SA one of the more successful States in Australian conservation agriculture.

Over the past decade SANTFA has broadened its focus from exclusively no-till to related topics and issues pertinent to growers. These issues range from pest and disease control to the impacts of the carbon tax on agriculture.

However, while the topic range has increased, SANTFA's underlying objective remains the same today as it was when the association as established: to help its members find better ways to apply more ecologically sound principles in their farming enterprises with the aim of increasing profitability and sustainability while reducing negative impacts on the environment.

This was the context for a meeting of SANTFA staff and board members in early October to develop a five-year strategic plan to guide the organisation in its efforts to continue delivering relevant and topical information to members.

Conversation flowed well throughout the day-long event and it was reassuring to see that participants were 'on the same page' in terms of what SANTFA members need and how those needs should be met and services delivered.

### THREE PILLARS

The three pillars of conservation agriculture are:

- absence of tillage
- biodiversity (crop rotations)
- permanent cover

Aspects of these three pillars have been covered in the SANTFA journal in recent years and this will continue in the future, with each pillar approached from a variety of perspectives and viewpoints to address the diversity of SA farmers and the variety of climate, soil and regional characteristics they are working with.

Perhaps the most significant decision taken during the planning exercise was to position SANTFA as a conservation agriculture (CA) association and promote CA as a system of which no-till is part.

This decision to move away from being only a 'no-till' association is reflected in a new slogan - 'Conservation Agriculture in Action' - which captures perfectly what we're all about.

Flowing from this, SANTFA will use the three pillars of CA as reference points for decisions about the future direction of the association, the information needed by members and the delivery of services

including our journal, website and events.

We believe the decision to position SANTFA as a Conservation Agriculture organisation will improve our attractiveness to sponsors and partners and our ability to build and develop strong relationships with them. This has the potential to broaden our commercial base and improve our ability to successfully tender for a variety of research and development projects. Being able to attract more research funding will enable SANTFA to undertake trials that are relevant to members and ensure they have front-row access to findings from this research work.

SANTFA is currently involved in several projects to help farmers reduce the impact of the carbon tax on their businesses and determine the value of opportunities for them in the carbon farming initiative and the renewable energy sectors. More information on these initiatives will feature in the January issue of 'The Cutting Edge'.

The changes flowing from implementation of SANTFA's strategic plan are designed to ensure each member gains even greater benefit from being involved in our organisation into the future than has been the case to date.

If you have a query or comment about the changes that are occurring, or would like to receive a copy of the strategic plan, contact Alex at [Alex@santfa.com.au](mailto:Alex@santfa.com.au) or call 08 8842 4278. 