Management of fleabane in crop rotations

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Take home message

Fleabane is difficult and expensive to control in fallow. The aim then is to control fleabane using both **herbicides and cultural control strategies** prior to the fallow period. Regular paddock monitoring and sound planning is crucial for successful management of fleabane, as well as using a range of control strategies throughout the year.

Fleabane life cycle

The best way to defeat an enemy is to attack it at its weakest point. Inverse to this though has been the amount of fleabane that has been controlled (or attempted to be controlled) in the fallow period when the weed is at its toughest point. To manage fleabane, producers and agronomists need to acknowledge the strength and weaknesses of the weed and hit it when it is most vulnerable.

Gaining an understanding of the life cycle of fleabane is the first step towards successful control. For the central-west region most of the fleabane germination occurs in mid to late autumn, then again in late winter-early spring. Fleabane requires light for germination, and is also favoured by moisture. Seeds will only germinate from the top 1 cm of soil (Widderick 2009).

If left uncontrolled in crop, it is these weeds that germinate in mid-late autumn and in late winter/early spring that make up the majority of the weed population in the fallow period. For a fleabane plant that germinates in April, it may be seven to eight months until the start of the fallow period, making that weed particularly difficult to control in fallow.

The good news is though that while fleabane is tough and hard to kill in fallow, it is relatively weak when small, and even weaker when combined with crop competition. Further to this, while seed can be distributed over reasonable distances, the majority of the germination that occurs within a paddock comes from local plants. This means that successful control in one year can reduce the pressure on subsequent crops.

Crop choice

The actual crop planted into a paddock can have major impacts of fleabane population. For the majority of the central west, the options include

- Cereals

    - Choice of wheat or barley has implications for some herbicides
    - Barley is generally more competitive than wheat
    - A range of Group I herbicides applied at correct growth stages will provide good to excellent residual and knockdown control in crop.
- Canola
    - Choice of hybrid v open pollinated will affect crop competition
    - Choice of herbicide tolerance is significant.
        - Triazine herbicides applied at sowing or in crop generally do an excellent job on fleabane resulting in clean fallows. Atrazine appears the strongest of the triazine herbicides on fleabane.
        - Roundup Ready, imidazolinine tolerant and conventional varieties require clopyralid for high level of control.
- Chickpeas
    - Several Group C herbicides with the addition of Balance at label rates generally results in good control.
    - Avoid planting chickpeas in a high pressure situation, as they are uncompetitive and herbicide failures will result in significant weed growth
- Field peas and faba beans
    - Several Group C herbicides are registered for weed control in these crops. The Group B herbicide imazethapyr may also add to control.

Pre-sowing control of fleabane

As has been stated previously, fleabane germination may occur in autumn, especially in seasons when there is abundant moisture. This provides an option to apply a knockdown herbicide prior to planting the winter crop. A non-selective herbicide will generally be used to control other weeds, but the mixing partner to aid with fleabane control will be largely dependent on the planned crop for that year. Plant back periods need to be adhered to, which will ensure crop damage does not ensue.

Prior to sowing cereals, the addition of a 2,4-D product (amine salts appear the most efficacious with glyphosate, but ester appears best with paraquat) will aid with fleabane control. These 2,4-D products can also be applied prior to planting canola and pulses, however the plant back period for these crops is greater than for wheat.

The use of clopyralid pre-sow with a knockdown herbicide is an option for canola, which will reduce the plant back period to one week. This is not an option before planting pulse crops.

Regular paddock monitoring and correct weed identification are crucial for control pre-sow, bearing in mind that a small weed that may not necessarily have an immediate impact on the crop may have a significant impact in the later fallow period.

Sowing practices

Crop competition is known to be a factor that reduces the germination and growth of fleabane. This was highlighted in a trial at Trangie Agricultural Research Centre (TARC) in 2011, where increasing the row space of Crusader wheat from 33 cm to 66 cm resulted in a 120 % increase in fleabane plants in the stubble immediately after harvest (Figure 1). Obviously 66 cm is an excessively wide row space, but the trial showed that the effect of row space is real and measurable, and can add significantly to other weed control practices. The trial showed no significant effect of seed rate on fleabane population post-harvest. Based on past trial results and the practicalities of row spacing,

the ideal set up seems to be about 25 cm for disc seeders and about 30 cm for tine seeders for western areas, and potentially narrower for eastern regions.

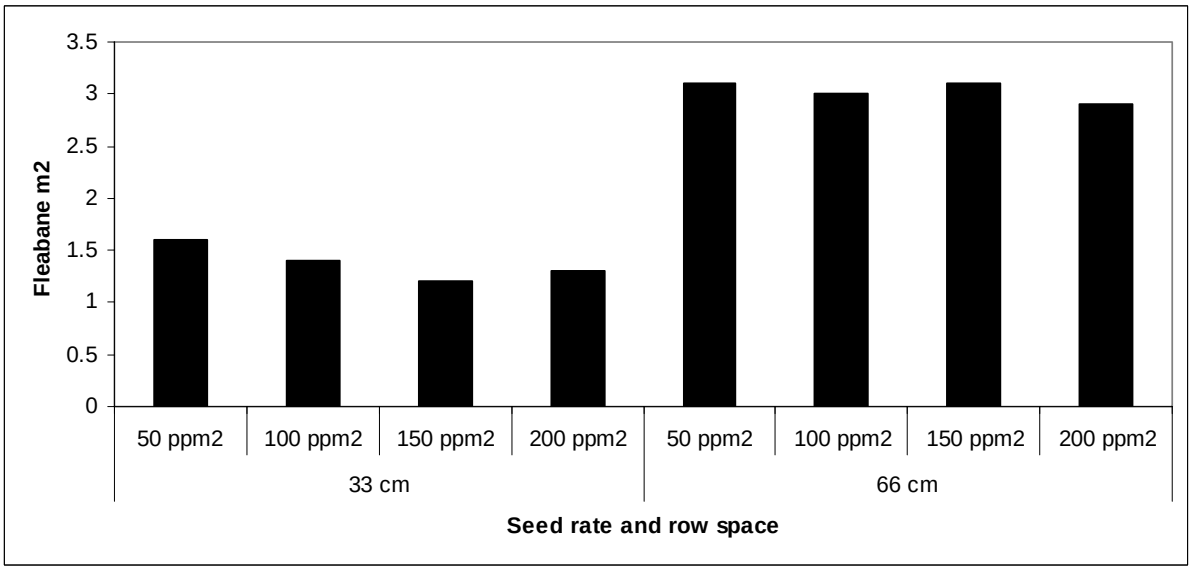

Figure 1: Wide rows reduce crop competition with fleabane. This was shown at TARC in 2011 with 66 cm row space resulting in 120 % more fleabane in fallow than the 33 cm row space (sow time l.s.d. $p < 0.05 = 0.34$) , with no significant effect of seed rate on subsequent fleabane population.

Pre-emergent herbicides

Group B sulfonylurea herbicides applied to wheat pre-emergent will suppress fleabane for the late autumn/early winter period (i.e. early in the crop). Herbicides that contain a pyridine (group I) active ingredient show much greater efficacy (e.g. picloram + 2,4-D amine).

For triazine tolerant canola atrazine generally results in excellent control and with good activation conditions crops will remain free of fleabane into the fallow period. Recent developments with regard to hybrid triazine tolerant varieties have made the triazine tolerant option more attractive for a range of weed control reasons.

In crop herbicides

There are two main types of herbicide that can be applied to crops, with these being either knockdown or residual in nature (or both). Further to this there are two germination stages (autumn and spring) that may need to be targeted. Often producers may need to control other weeds early in the crop development, so unless a residual herbicide is applied for fleabane subsequent germinations will not be controlled. The residual component is not as valuable during spring when the bulk of the germination has occurred.

A trial was conducted at Trangie Agricultural Research Centre (TARC) in 2011 to look at residual herbicide options for control of spring germinating fleabane plants (Figure 2) at the late tillering stage of wheat. While these products also have a knockdown component, the majority of control in this trial was due to their residual nature. This trial showed that common herbicides with relatively broad spectrum weed control (e.g. clopyralid, picloram + MCPA amine, fluroxypyr + aminopyralid) provide moderate to excellent residual control of subsequent fleabane germinations. Control of actively growing weeds may be improved by adding a knockdown herbicide such as LVE MCPA. Early applications of knockdown products alone such as LVE MCPA do not appear to provide a high enough level of control, as there is no residual component to control the later germinations.

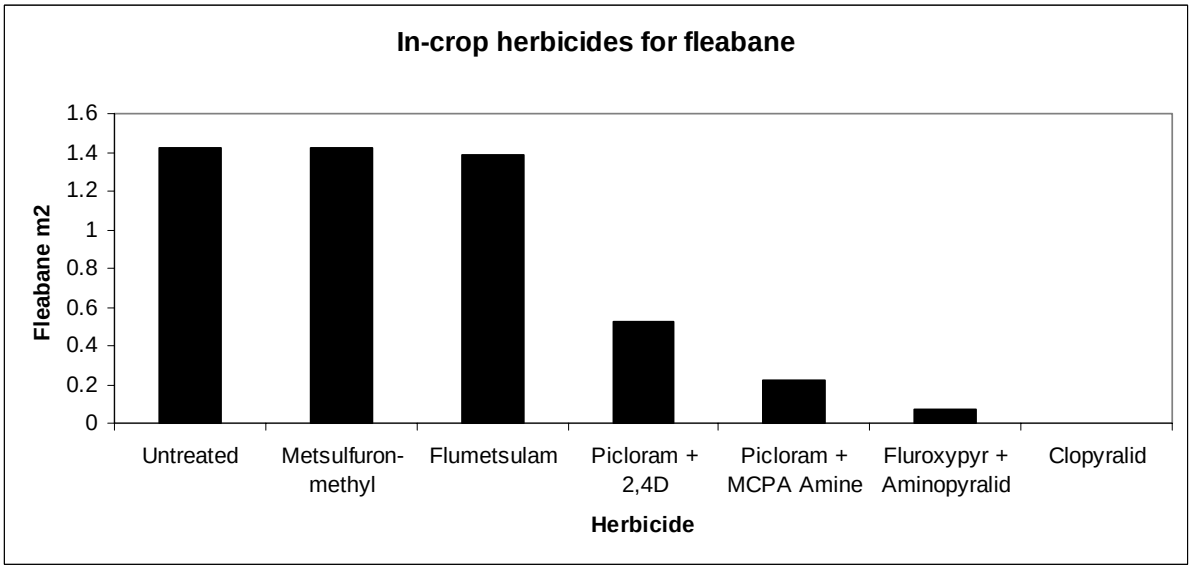

Figure 2: Herbicides applied at the late tillering stage resulted in variable control of spring germinating fleabane in a trial at TARC in 2011 (counts taken after harvest). Treatments containing picloram + 2,4-D amine, picloram + MCPA amine, fluroxypyr + aminopyralid or clopyralid provided at least 65 % control compared to the untreated.

There are several herbicide options available for late post-emergent weed control in cereal crops, however 2,4-D amine products appear to provide the most reliable control of fleabane, and appear more robust than equivalent rates of 2,4-D ester products. 2,4-D amine application should be avoided when the crop is stressed (moisture or frost), which was highlighted from a phenoxy timing trial at TARC in 2011 which showed a yield loss of approximately 15 % when 2,4-D amine (625 g/kg formulation) was applied at 1L/ha at growth stage Z37.

Another option to consider for applications up to Z39 (slightly later than 2,4-D amine) is fluroxypyr, with control being improved by adding LVE MCPA (only up until Z37 for LVE MCPA).

Crop monitoring

Monitoring crops for fleabane requires an extremely thorough approach, and an acceptance of weed tolerance levels in the ensuing fallow. For example if a crop only has 1 fleabane plant/m², it may not seem economically viable to treat with herbicide, but if you picture a fallow with 1 fleabane plant/m² and that those existing weeds in crop will still be there for the fallow period, the herbicide threshold is lowered significantly. Furthermore fleabane is a prolific seeder, and individual escapes from fallow herbicides can set up to 100,000 seeds, which in turn will carry the problem over into the next season.

The effect of low fleabane populations was highlighted in the fallow of 2010-11, where escapes were able to reduce soil moisture for a radius of approximately 1 metre from their main stem (Figure 3).

Figure 3: The effect of the moisture loss from two fleabane plants in the 2010-11 fallow, as shown in wheat planted in 2011 at Coonamble.

Fallow management

By the time the fallow period comes around, fleabane plants are usually relatively old and large. The aim therefore is to implement the practices outlined above so that there is no requirement to kill weeds in the fallow. There will always be cases though where escapes occur, especially in wet years when soil is not trafficable.

The most reliable control appears to be the use of Glyphosate + a 2,4-D amine product, followed 7-10 days later with paraquat at a minimum of 1.6 L/ha. A small level of added control may be gained by using picloram with the 2,4-D amine (e.g. Tordon 75-D) as shown in Figure 4, however there are significant rotational implications if picloram is used at this stage.

Glyphosate alone followed by paraquat alone has been successful in several situations, however there is little margin for error in the application, especially of the paraquat component, which requires a high water rate (>80L/ha) giving thorough coverage, with control being best in cloudy or dark conditions.

The use of amine and picloram products appears to reduce the level of control that glyphosate provides on other weeds (e.g. sowthistle, awnless barnyard grass). For some weeds (e.g. sowthistle) the following paraquat component will clean up survivors, but this may not be the case for other weeds, especially when large.

Figure 4 shows a reasonable level of control from Roundup Powermax alone, but it must be noted that it was applied to a winter fallow paddock in spring to a population of fleabane that had not had past exposure to glyphosate. With the expansion of glyphosate resistant fleabane in the northern grain belt, the level of control expected with glyphosate is likely to diminish with time.

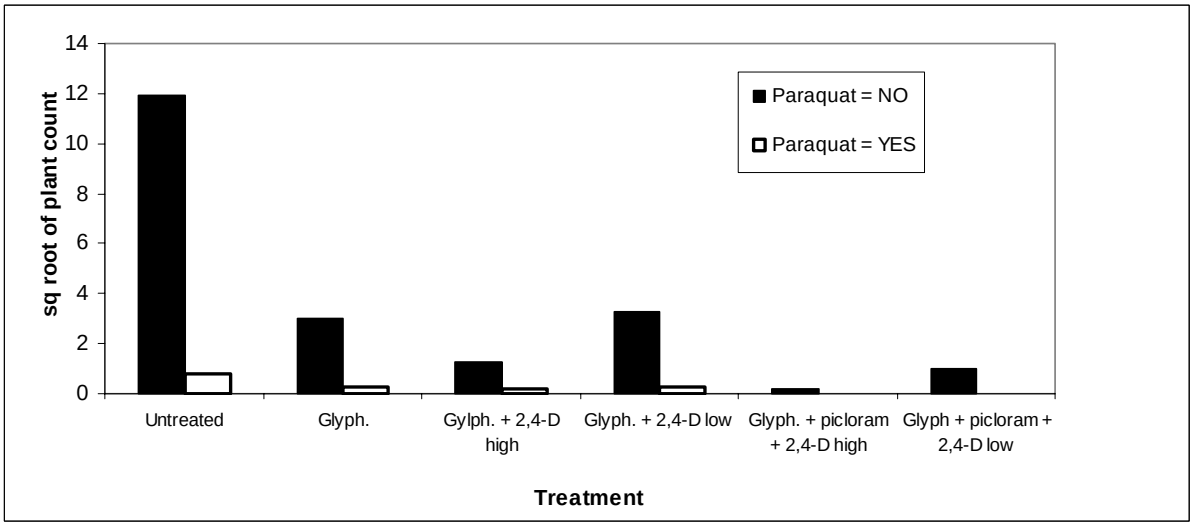

Figure 4: A trial at Gin Gin (near Trangie) in October 2011 showed that best control was achieved by using glyphosate + picloram + 2,4-D, followed by paraquat 7 days later. This was in a situation with > 150 plants/m2 with even 99% control still leaving 1-2 plants/m².

In areas with sensitive crops nearby, the phenoxy herbicides should not be used, with particular attention needing to be paid to the paraquat component to ensure good control.

Further work by Grain Orana Alliance is looking at the use of paraquat with other herbicides that may improve the control of fleabane as a single pass option.

Other factors to consider

The majority of fleabane germinations come from seed from local plants, but some seed may be distributed over wider distances. Fence and creek lines (especially when sprayed and competition removed) can become a haven for fleabane, with the weed then spreading into nearby cropping country. Producers could use a number of control methods for fence lines, such as pulling the fences out where not required; controlling broadleaf weeds but retaining grasses for competition or sowing perennial grass for competition; using residual herbicides for extended control.

Conclusion

Fleabane is hard to kill in fallow, so use a mix of both cultural and chemical control options before the fallow period. There are few single options that provide 100% control at any crop or fallow stage, but 100% control can be achieved by combining the above control options throughout the season.

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