Sugar Research Australia

B14025

Booklet

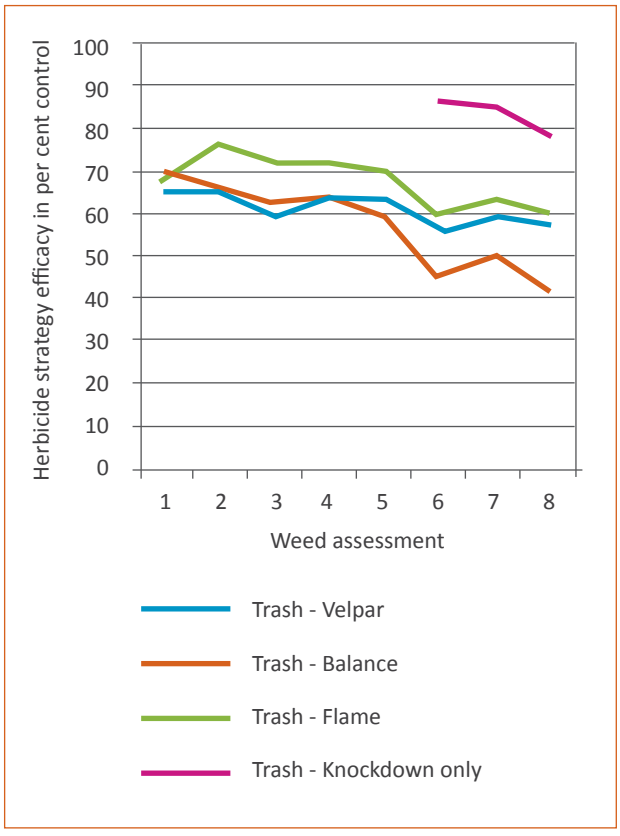
Managing weeds in trash blanketed ratoons in the Central region

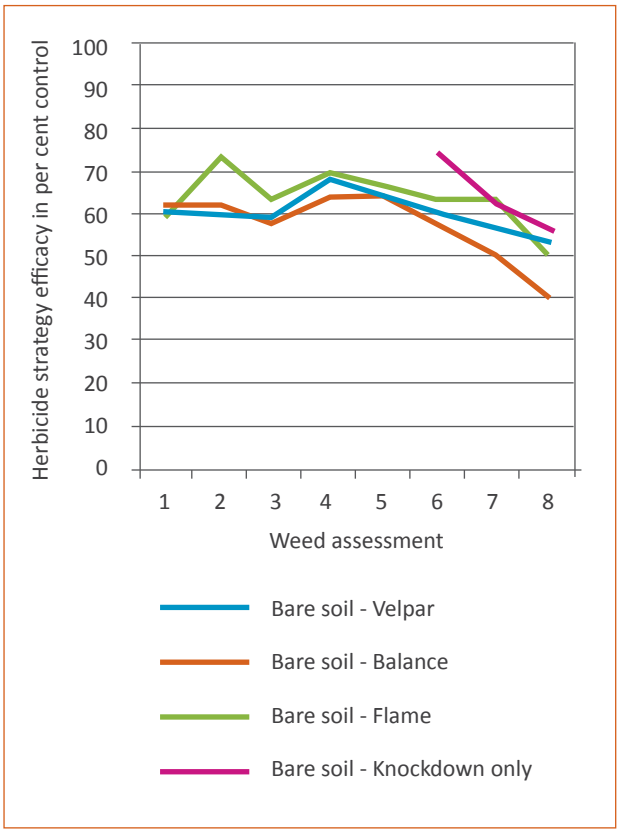
Trials in Central Queensland from 2008 to 2011 studied weed management in trash blanketed ratoons.

Do pre-emergent herbicides work on trash blankets?

The pre-emergent herbicides Flame® (imazapic), Balance ® (isoxaflutole) and Velpar® K4™ DF® (diuron plus hexazinone) all worked equally well on trash as on bare soil. In one trial Flame® performed better than Balance® but in another four trials there was no difference between the herbicides.

Figures 1 and 2 show that there is no difference between the different herbicides and also that all the herbicides performed equally well on trash and bare soil. Pre-emergents were applied just after harvest and were followed by a later knockdown. The "knockdown only" strategy consisted of one late knockdown.





Figures 1 and 2: Performance of herbicide strategies to control weeds in the first four month after harvest on bare soil (left graph) and on trash blanket (right graph). Values are the averages of five trials. Assessments were made every two to three weeks.

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Performance of pre-emergent herbicides applied on trash

Photo 1: Flame® applied just after harvest.

Photo 2: Untreated adjacent plot.

Photo 3: Balance® applied just after harvest.

Photo 4: Untreated adjacent plot.

Photo 5: Velpar® K4™ DF® applied just after harvest.

Photo 6: Untreated adjacent plot.

Do pre-emergent herbicides applied on trash increase cane yield?

The benefit of using pre-emergent herbicides versus no herbicide control

Yields obtained on a trash blanket tend to be slightly higher (average seven per cent) when pre-emergent herbicides are applied in comparison with untreated fields. In most cases, the trash layer itself provides adequate weed suppression.

When weed pressure is very low, using herbicide can actually lead to a yield penalty; a nine per cent yield reduction in one trial.

As expected, pre-emergents applied on bare soil resulted in significant yield benefits; up to a 27 per cent increase.

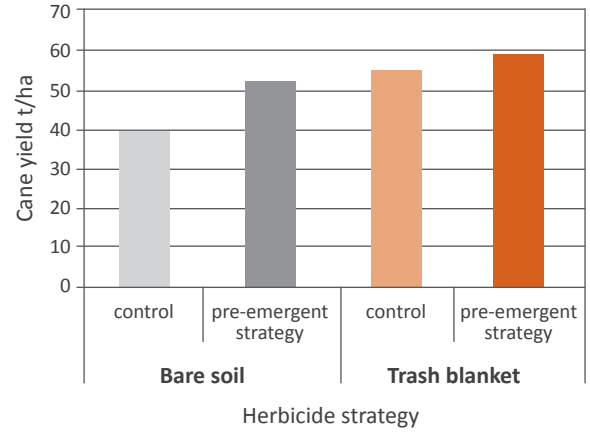

Figure 3: Average cane yield (t/ha) from five trials. Results are grouped by type of strategy. Yields are particularly low because weedy trial sites on old ratoons were selected.

The benefit of using pre-emergent herbicides versus knockdown only strategies

In most situations the trash blanket itself provides adequate weed control in the first weeks after harvest and a late knockdown herbicide application is sufficient until canopy closure.

Figure 4 shows that pre-emergents applied on bare soil result in much greater yield increases than knockdowns only. However, on trash blanket ratoons, generally there is little benefit from using a pre-emergent compared to knockdowns only.

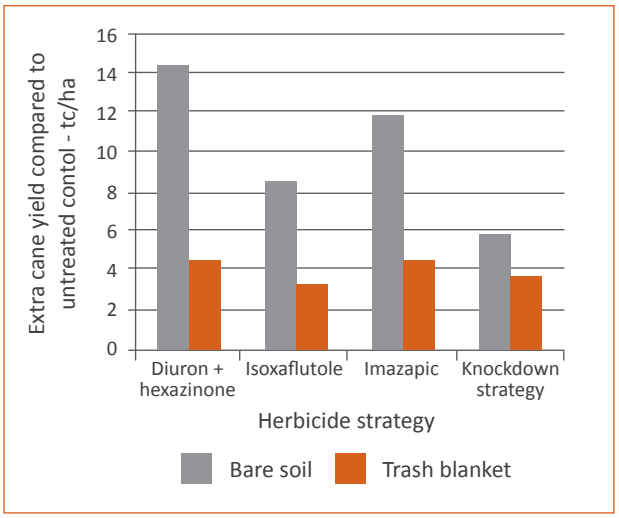

Figure 4: Average cane yield (t/ha) from five trials, comparing herbicide strategies on bare soil and trash ratoons.

Strategies on GCTB including pre-emergent treatments should only target specific situations such as paddocks expecting heavy weed pressure, covered by a thin level of trash or with limited access during the wet season.

Photo 7: Cane block that has not been sprayed. Here, the weed pressure is low and the trash blanket is sufficient to prevent weed growth.

Should pre-emergent herbicides be applied early after harvest or late in the season?

Where a pre-emergent herbicide is warranted in a trash blanket ratoon, early pre-emergence programs applied just after harvest followed by knockdown, usually result in higher yields than a late application of a pre-emergent applied just before cane closure (Figure 5).

An early pre-emergent application well before the usual wet season also reduces the risk of herbicide losses in surface run-off or through leaching. This helps to improve the water quality of run-off from farms.

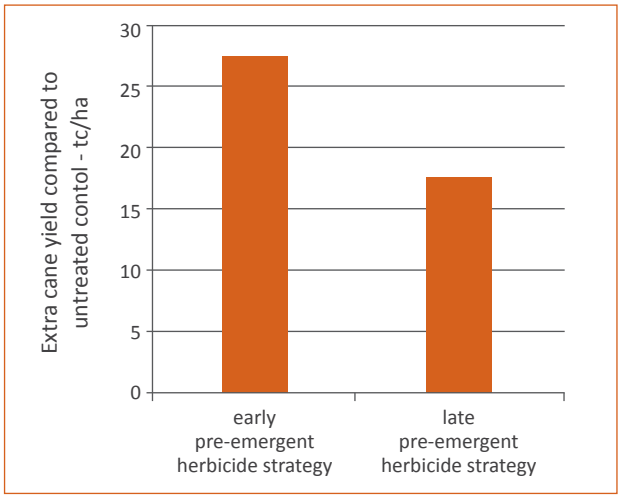

Figure 5: Extra cane yield obtained from two pre-emergent herbicide strategies, compared to not applying herbicides. Results are often variable, depending on site and weather conditions, however generally it is better to apply a pre-emergent sooner after harvest rather than later.

Pre-emergent herbicides applied just after harvest are more efficient in controlling weeds than a late application before the out-of-hand stage. Early applied pre-emergent applications will generally need to be followed up with a later knockdown.

Following a rain event, it is not recommended to apply pre-emergent herbicides on trash without fast incorporation as weeds will germinate under the trash while the pre-emergent herbicides will remain on top of the trash. Trial results show that imazapic (e.g. Flame®, Impose®) performance in particular is dramatically reduced in this situation.

How long after application should pre-emergents be incorporated?

Product labels specify the best mode and timing for incorporation of pre-emergent herbicides.

Balance®, Flame® and Velpar® K4™ work better on grasses if incorporated by irrigation one month after application, rather than immediately after spraying. In trials, Balance® and Flame® were particularly responsive to delayed incorporation.

In early harvested fields, the following dry period may prevent weeds from growing for more than two months after harvest; explaining the success of delayed incorporation of the pre-emergent herbicides. If incorporation is delayed, these herbicides remain inactive until incorporated, extending their activity through to the beginning of the wet season when the weed pressure increases.

Balance® and Flame® appear to be flexible options in terms of delayed incorporation, probably due to their high resistance to UV light. Their ability to remain stable and be activated with the first rainfall makes them suited to areas like Mackay where rainfall events are very variable from one year to another. Cane farmers can spray these stable pre-emergent herbicides even in the dry season (when the risk of leaching and run-off is extremely low), and be confident the products will remain stable for up to one month and become active when needed.

Photo 8: Pre-emergent herbicide applied at spiking stage will be activated by the first rainfall or irrigation.

Trash blanket as a weed control management tool

Field trials show all trash levels reduce the weed coverage compared to bare soil, although light trash levels are insufficient to provide adequate control for most weeds.

Photo 9: Thin trash blankets do not supress most grass and broadleaf weed.

Grass emergence reduces as the level of trash increases. The emergence of most broadleaved weeds is reduced by medium and thick trash levels (more than 11 t/ha).

Vine emergence is reduced and slowed down by the thick trash levels, but enough seedlings manage to grow through the trash to create a weed issue that still needs to be managed with herbicides (Table 1).

Table 1: Percentage emergence of vines depending on trash thickness (percentage of emergence in bare soil is less than 100 per cent as not all seeds are viable).

Treatment*	Percentage vine emergence
Thick trash	26
Medium trash	57
Thin trash	81
Bare soil	84

Medium and thick levels of trash prevent most grasses from developing but broadleaves, mainly vines can still develop.

**Treatment:*

Thin trash refers to 6 t/ha trash (dry matter), produced by a rough estimate of 60 t/ha cane yield.

Medium trash refers to 11 t/ha trash (dry matter), produced by a rough estimate of 80 t/ha cane yield.

Thick trash refers to 16 t/ha trash (dry matter), produced by a rough estimate of 100 t/ha cane yield.

The amount of trash is the combined result of the cane yield harvested the previous year and the cane variety.

Photo 10: Thick trash successfully suppresses weeds when there is low vine pressure.

Photo 11: Poor vine suppression by thick trash when vine pressure is high.

Table 2 shows that when no herbicides are used, a thick trash blanket is needed to prevent yield loss from weeds.

A thick trash blanket is usually sufficient to control weeds, unless problem weeds like vines or nutgrass are present.

Table 2: Combined cane yield of two field trials.

Treatment*	Cane yield estimate (t/ha)
Thick trash	56
Medium trash	47
Thin trash	46
Bare soil	31

Efficacy by weed species

The efficacy of certain herbicides and trash thickness against specific weed species is shown below. Influence of soil type on herbicides do not influencing these results.

Weed group	Weed species	Effective strategies
Grasses	**Awnless Barnyard grass**	Awnless Barnyard grass germination is prevented by trash thicker than 6 t/ha (dry matter). Balance® was sometimes more effective than Flame® regardless of the presence of trash or not*. In dry conditions, Balance® and Flame® are more effective after delayed incorporation (four weeks). It is better to wait before activating these herbicides so they are active when soil is moist and favourable for weed growth.
	Summer grass	In most cases trash reduces its germination. Flame®, Velpar® K4™ and Balance® all worked equally well on trash as bare soil.
	Green summer grass	In most cases trash reduces its germination. Velpar® K4™ and Flame® sometimes work better than Balance® on trash and bare soil*.
	Hairy arm grass	11 t/ha trash (dry matter) reduced its germination. Flame® is sometimes more effective than Balance® on trash and bare soil*.
	Feathertop Rhodes grass	11 t/ha trash (dry matter) reduced its germination.
Broadleaves	**Amarantus**	Velpar® K4™ and Flame® are sometimes more effective than Balance® when applied on trash*.
	Blue top	The presence of trash favours Blue top by reducing the competition from other weeds compared to bare soil; however less Blue tops are present at medium and thick trash levels compared to a light trash level. Flame®, Velpar® K4™ and Balance® all work equally well on trash and bare soil.
	Common sensitive weed, phyllanthus	Thick trash prevented its growth. Velpar® K4™is sometimes more effective than Balance® or Flame® on both trash and bare soil*.
	Vernonia	Flame®, Velpar® K4™ and Balance® all work equally well on both trash and bare soil*.
	Phyllantus, Bacopa, Blackberry nightshade, Vernonia, common sensitive weed, Fleabanes	The presence of trash favours these weeds by reducing the competition from other weeds compared to bare soil; however less weeds are present at medium and thick trash levels compared to light trash levels.

(Continued overleaf)

Weed group	Weed species	Effective strategies
Vines	**Red convolvulus and pink convolvulus**	The presence of trash reduces the number of seedlings germinating compared to bare soil and thicker trash levels that reduce the germination even further. However seeds germinating in trash require control because of the invasive potential of the vines and their ability to grow over the canopy. The thicker the trash the later the germination creating bigger control issues, as the onset of the wet season may restrict late spraying. Velpar® K4™ and Flame® are more effective than Balance®.
	Star of Bethlehem	The presence of trash favours these weeds by reducing the competition from other weeds compared to bare soil. Velpar® K4™ and Flame®are sometimes more effective than Balance® on trash*.
Sedges	**Nutgrass**	7 to 13 t/ha trash (dry matter) favours nutgrass by reducing the competition from other weeds compared to bare soil. Flame®is more effective then Balance® or Velpar® K4™. Velpar® K4™is sometimes more effective then Balance®*.

** significant differences obtained from one trial.*

References

Fillols E. (2013). *Efficacy of pre-emergent herbicides applied on trash blankets and weedicide properties of trash blankets in sugarcane crops* (Poster). 16th Symposium European weed Research Society.

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