

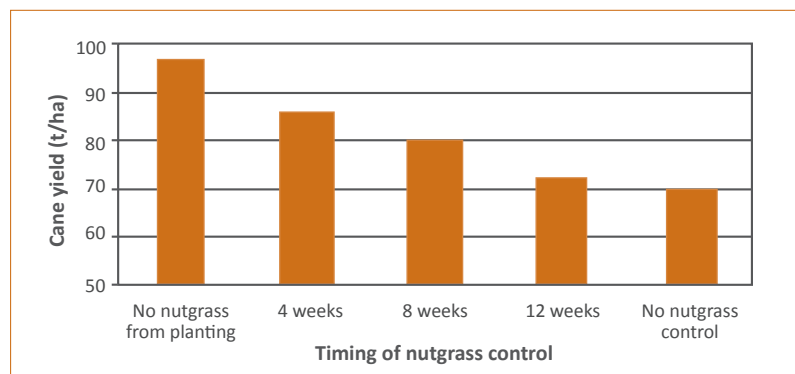
Managing nutgrass in cane

Benefits of nutgrass control

Trials undertaken from 2007 to 2010 in NSW showed cane yield losses of around 30% in both plant and ratoon cane where nutgrass was allowed to grow without any control. Even allowing the nutgrass to grow uncontrolled for 4 to 8 weeks after planting or ratooning resulted in a reduction in cane growth.

Nutgrass reduces the soil moisture and nutrients available to the cane crop. In moderate to heavy infestations nutgrass tops can take up around 25 to 45 kg N/ha that would otherwise be available to the cane crop. Similarly nutgrass tops can take up around 45 to 50 kg K/ha (equivalent to the K applied in many planting mixes).

A thick sward of nutgrass can remove the equivalent of 11 to 12 mm rain from the plough layer in 4 to 8 days.



The effect of different levels of nutgrass control on cane growth 100 days after planting.



Nutgrass not controlled.



Nutgrass allowed to grow for 4 weeks then controlled.



Nutgrass controlled since cane planting.

Know your nutgrass

- Nutgrass reproduces and survives from vegetative tubers (nuts) in the soil.
- The tubers are up to 10 mm in diameter and up to 20 mm long.
- A new plant develops from each tuber.
- In ideal growing conditions a single tuber can produce a further 100 tubers in 90 days.
- In northern NSW cane lands, about 90% of the tubers are in the 0-15 cm depth.
- Tubers are killed when exposed to very dry soil or are brought to the surface after their roots are cut.
- Mechanical cultivation is an effective control strategy only if conditions remain dry after the tubers are brought to the surface. If rain occurs shortly after cultivation it can increase tuber numbers and enhance nutgrass spread.
- Nutgrass can only be managed using a long-term integrated approach. The key to long term control is to reduce the number of viable tubers.
- No single 'one-off' treatment will control nutgrass. Repeated treatments are the only sure way of controlling nutgrass. A single 'one-off' treatment will reduce nutgrass competition in the short term but, because of its ability to rapidly propagate under suitable conditions, repeated treatments are imperative.



Tactics for managing nutgrass in cane - current treatment options

A long-term integrated approach involving repeated treatments is required.

Mechanical cultivation

- Mechanical cultivation has been shown to be effective in drier environments. Provided the tubers are brought to the surface and desiccated it can be effective in reducing tuber density.
- Cultivation will only be effective if soil is dry prior to cultivation and the cultivation is timed to occur when no rain is forecast. Our studies in NSW cane lands suggest that about 90% of the tubers are in the 0-15 cm depth. However, cultivation to 30 cm is likely to be required to effectively control nutgrass.
- On the coastal floodplains of northern NSW it is likely to be less successful due to the wetter environment.
- If rain occurs shortly after a cultivation, or if the soil is moist, then cultivation will enhance nutgrass spread. Studies have shown that cultivation under moist conditions can increase shoot and tuber numbers.
- For minimum tillage, cultivation is not an option and nutgrass specific herbicides are required.

Shading

- Shading may provide some control after canopy closure but large yield losses will occur if nothing is done to control nutgrass in the period before canopy closure.

Herbicides

- No residual/pre-emergent herbicides are currently registered for nutgrass in cane.
- Applications of paraquat or high rates of 2,4-D, while temporarily retarding nutgrass, do little to reduce tuber viability. If growers want a long term solution to nutgrass they will need to move away from these temporary, ad-hoc treatments.
- There are a number of contact/systemic herbicides registered for nutgrass in cane (see table).
- Best results are achieved when nutgrass is actively growing. Avoid spraying when nutgrass is stressed.

Herbicides currently registered for use in cane (May 2010)

Product	Active	Group	Rate / ha	Comments
Actril® DS	2,4-D loxynil	C I	1-1.5 L	Add diuron for 3-4 weeks suppression, two applications for satisfactory suppression; fast burn-off.
Flame®	Imazapic	B	400 ml	Registered for broadleaf and grasses in cane. Nutgrass (suppression only) 4-6 leaf stage in peanuts. Only once/year. High Al, Fe and low pH reduce pre-emergence value.
Hero®	Ethoxy sulfuron	B	250 g	Only one application to a crop in 1 year.
Krismat®	Ametryn Trifloxy sulfuron	C B	1.5-2 kg	Don't apply more than two applications per year. Don't plant crops other than cane for 24 months after application.
Roundup CT	Glyphosate	M	2.4 L + 2.4 L	Follow-up treatments made as part of a nutgrass control program.
Sempre®	Halosulfuron	B	65-130 g	6-7 days for visual effects, 4-6 weeks for full effects. Maximum 200 g/ha/yr.

The rotation of soybean with cane provides additional opportunities for an integrated approach to nutgrass control.

- Use glyphosate before and after the soybean crop to reduce tuber viability.
- Use Spinnaker in the soybean crop.



Plant cane with this level of nutgrass has already lost 10% of the yield potential

Economic guidelines for nutgrass control

Trials in NSW have shown that it is highly economic to control nutgrass in cane. Total control of nutgrass resulted in large dollar benefits (\$350-\$450/ha) and these values give an indication of the amount that could be spent while still returning a profit. Trials evaluating 'one-off' herbicide treatments for nutgrass have also shown net benefits of around \$200-\$400/ha after allowing for herbicide costs. This indicates that even where nutgrass is patchy growers could outlay in the order of \$60 to \$100/ha for nutgrass control and still obtain a substantial net benefit.

Summary of trial results

An SRDC funded project in NSW from 2007 to 2010 undertook numerous trials evaluating individual herbicides registered for nutgrass in cane. The following points summarise the findings:

- Actril® - fast burn-off, suppresses nutgrass for 2-4 weeks, no evidence of reduced tuber viability, two (1 L/ha) applications 4 weeks apart gave good suppression but single applications of other nutgrass specific chemicals produced better results.
- Flame® - reasonable knockdown effect, no data collected about effect on tuber viability, potential to damage cane in lighter textured soils in NSW.

- Glyphosate - best herbicide for reducing tuber viability, effective and economic in fallow, if shielded sprayers are not set up correctly small cane yield losses may occur with glyphosate application to inter-row areas.
- Hero® - effective on nutgrass, some evidence for reduced tuber viability.
- Krismat® - gives good general weed control as well as nutgrass suppression. Effectiveness enhanced by a pre-application of 2,4-D prior to Krismat® application (see 'double knock' treatment below).
- Sempra® - apart from glyphosate, the most effective in reducing viable tuber numbers. Highest cost/ha herbicide but still very cost effective.
- 'Double knock' treatments - 2,4-D at high rate (2 L/ha) followed 4 weeks later by either Krismat®, Hero® or Sempra® showed potential for very good control of nutgrass and reduced tuber viability.
- Although not evaluated in replicated trials, lower rates of 2,4-D (1 L/ha) with a shorter interval (eg 2 weeks) to application of nutgrass specific herbicide may be very effective.



Options for nutgrass control at various stage in the cane cycle

Cropping phase	Options
Fallow from PO to pre-soybean	1. Glyphosate 2. Mechanical cultivation
Soybean crop	1. Spinnaker® 2. Glyphosate with shielded sprayer
Fallow, post soybean to cane planting	1. Glyphosate 2. Mechanical cultivation 3. Glyphosate and pre-emergent (eg Flame®)
Plant cane crop	1. Hero® 2. Krismat® 3. Sempra® 4. 2,4-D and either Hero® or Krismat® or Sempra® later 5. Mechanical cultivation
Ratoon crop	1. Hero® 2. Krismat® 3. Sempra® 4. 2,4-D and either Hero® or Krismat® or Sempra® later 5. Mechanical cultivation 6. Glyphosate with shielded sprayer/ dual delivery rig
Final ratoon crop	As for ratoon crops plus dual delivery spray application (for growers with the appropriate equipment).

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