

NUTGRASS CONTROL IN COTTON

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Summary

Nutgrass (*Cyperus rotundus*) remains one of the major problem weeds of cotton production.

However, extensive research has show nutgrass can be controlled using management strategies which: ensure a strong, competitive crop; use herbicides to control nutgrass when its actively growing; use cultivation when nutgrass is stressed, in hot, dry conditions, and; prevent nutgrass spreading on equipment.

Results from last season were very promising, with even a single, shielded Roundup application dramatically reducing the nutgrass population. Two growers, John Watson and James Kahl, who applied glyphosate in-crop last season, were extremely pleased with their results. Research plots in John Watson's field showed a 0.8 bales/acre yield increase when shielded Roundup was applied in-crop on 3 occasions.

Introduction

Purple nutgrass (*Cyperus rotundus*) is one of the major weeds of irrigated summer cropping. It occurs in cotton from Emerald to Warren, but has not been reported in the Walgett and Bourke areas. In 1991, nutgrass was a major weed on 79% of NSW cotton growing properties and a serious problem on 15% of the cotton area. It is import to realise, however, that at least eight different species of nutgrass occur in the cotton area, of which *C. rotundus* (purple nutgrass) and *C. bifax* (Downs nutgrass) are the most common. These two species can be easily confused, but whereas purple nutgrass can be a severe weed problem and is difficult to control, downs nutgrass is not strongly competitive, spreads relatively slowly, and is relatively easily controlled.

Distinguishing purple nutgrass

The two species can be distinguished on vegetative and floral characteristics, as described in the following table.

	Purple nutgrass	Downs nutgrass
Height	short, often 10 - 30 cm but may be up to 60 cm	taller, larger plants, 50 - 70 cm
Leaves	dark green	paler green
Flower head	dark purple fading to orange	orange
Stem base	several purple layers	green
Clumps	very dense	plants >2 cm apart

Controlling Nutgrass

Nutgrass can be controlled by management strategies which include: ensuring a strong, competitive crop; using herbicides to control nutgrass when its actively growing; using cultivation when nutgrass is stressed, in hot, dry conditions, and; preventing nutgrass spreading on cultivation equipment. Strategies for developing a nutgrass management program were described in an article in the Australian Cotton Grower, March - April, 1996, pages 18 to 22.

In my research, Roundup has given the most consistent and effective control of nutgrass, both in cotton and in fallow, although cultivation, Zoliar, and MSMA are useful components of a nutgrass management program.

Controlling nutgrass with cultivation

Nutgrass tubers are readily killed by high temperatures and desiccation. During dry conditions, cultivation which exposes nutgrass tubers at the soil surface and severs the plants roots will kill nutgrass. In very dry conditions, cultivation at fortnightly intervals is extremely beneficial, as all tubers in the top 10 cm of the soil should be killed by desiccation within a fortnight of cultivation. Nevertheless, it is essential that thorough cultivation occurs, as tubers with a single intact root will probably survive. Several growers have found heavy cultivation immediately before cotton planting is also beneficial, setting the nutgrass back for several weeks and allowing the cotton to establish.

Cultivating when the soil is moist or wet will not control nutgrass, but will spread the weed through the field.

Controlling nutgrass with glyphosate

At higher rates (2.4 L/ha or more of the CT formulation), glyphosate can effectively control nutgrass, killing shoots and tubers, although it will not affect tubers not connected to a vegetative plant. Under favourable conditions,

glyphosate applied through a shielded-sprayer to nutgrass in the furrow, will translocate, giving some control of nutgrass in the cotton plant line.

Glyphosate is relatively ineffective in controlling nutgrass from early spring applications. Autumn applications give the best result, but nutgrass must never be allowed to grow unchecked over summer in the hope of successful autumn control. Late spring and summer glyphosate applications to actively growing nutgrass should be effective and prevent the production of new tubers, although after spraying, new green shoots may emerge from untreated tubers.

A nutgrass management program

The key to managing nutgrass is to be able to respond to opportunities and prevailing conditions. To prevent nutgrass producing new tubers, plants must be treated within 4 weeks of initial shoot emergence; ideally treatment should occur at about 4 weeks to allow the maximum number of shoots to emerge and be treated. If the nutgrass is not actively growing at this point, cultivation is the best option for treatment. On actively growing nutgrass, glyphosate has given the best results.

Controlling nutgrass in fallow

Nutgrass density from an experiment including cultivation and Roundup are presented in Table 1. Although monthly Roundup gave the best result, alternating Roundup and cultivation gave a comparable result at lower cost. If treatments had been applied only as necessary, with cultivation in dry conditions and Roundup when the nutgrass was actively growing, an even greater reduction in tuber number could be expected from fewer treatments.

Table 1. Nutgrass density following 2 seasons of treatment in a fallow field.

Treatment	Nutgrass density (tubers per m ²)
Untreated	2879
Monthly cultivation (Oct to May)	1114
Monthly Roundup (Oct to May)	47
Monthly - alternating cultivation and Roundup (Oct to May)	118

Controlling nutgrass in cotton

Research over the last 6 seasons has clearly demonstrated that nutgrass can

be controlled in cotton, although not as easily as in fallow. Typical results from previous seasons at Warren and Moree are presented in Tables 2 and 3.

Table 2. Nutgrass density following 2 seasons of treatment in cotton at Warren.

Treatment	Nutgrass density (tubers per m ²)	Lint yield (bales per acre)
Untreated	7194	1.0
Shielded Roundup (Nov, Dec & Jan)	611	1.6
Zoliar + Roundup (Dec & Jan)	160	2.3

Table 3. Nutgrass density following 2 seasons of treatment in cotton at Moree.

Treatment	Nutgrass density (tubers per m ²)	Lint yield (bales per acre)
Untreated	1033	2.3
Shielded Roundup (Nov, Dec & Jan)	149	2.2
Zoliar + Roundup (Nov, Dec & Jan)	174	1.8

Results from both seasons and both sites demonstrate the large reductions in nutgrass density which can be achieved through treatment in cotton. As in fallow, Roundup applications were timed to occur at 4 weekly intervals, commencing as early as practical in the season. It is essential, though, that glyphosate only be applied through well designed and well set up shielded sprayers, as drift on to cotton can result in large reductions in cotton yield.

Controlling nutgrass will result in a long-term yield increase and greater profitability, but does not always give an increase in yield in the season of application due to cotton damage from herbicide drift. On a severe nutgrass infestation at Warren (Table 2), there was a significant 1.3 bales/acre yield increase on the Zoliar + Roundup treatment, which more than covered the cost of treatment. On a lighter nutgrass infestation at Moree (Table 3), the cotton yield was reduced on one of the Roundup treatments, due to herbicide damage.

Last seasons results

Conditions during the 95/96 season were not conducive to in-crop applications of herbicides (due to prolonged wet and windy conditions), but Roundup applications still gave very good results. A shielded Roundup application

in mid-December on country at Boggabri (NSW), gave extremely good control of nutgrass and control improved with additional applications. Although nutgrass densities are not yet available for this site, there was a large yield response to treatment, as shown in Table 4.

Shielded glyphosate was applied to the remainder of the field in mid-January with similarly good results. Treatments at Moree also gave very good results, although there was no yield increase due to treatment.

Table 4. Cotton lint yields from 1 seasons treatment in cotton at Boggabri.

Treatment	Lint yield (bales per acre)
Untreated	1.6
Shielded Roundup (Dec & Jan)	2.2
Shielded Roundup (Dec & Jan) (2 applications in Jan)	2.4

Other herbicides

While Roundup gave the best results in my work, other herbicides have a place. Although more expensive, Zoliar has the distinct advantage of being a residual herbicide, which is most active in wet conditions, when it is most needed. When adverse weather conditions prevent other herbicides being applied, Zoliar can still control a nutgrass problem. Nevertheless, Zoliar is more effective when used in combination with other herbicides (Zoliar applied pre-planting, combined with another herbicide applied in-crop). At the Boggabri site, for example, all the field had been treated with Zoliar, pre-plant incorporated. While this Zoliar did not kill the nutgrass, it did suppress the nutgrass growth, which was then effectively controlled with Roundup.

Similarly, MSMA has been ineffective in controlling nutgrass in my work, but dramatically suppressed nutgrass growth when applied to nutgrass which had previously been treated with Zoliar. It should also be noted that MSMA is quite effective in controlling downs nutgrass.

Continuing work

Research on the control of nutgrass is continuing, focusing on issues including how best to use Zoliar as part of the nutgrass control system, and how to maintain the control of nutgrass in the longer-term.

