SUCCESSFUL NUTGRASS CONTROL IN COTTON

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Introduction

Nutgrass (*Cyperus rotundus* L.) is a major weed of cotton production. It is very competitive, can spread rapidly and resists most control measures. Nutgrass produces large numbers of under-ground tubers, or 'nuts'. These may remain dormant in the soil for long periods, but rapidly produce a new plant under favourable conditions. These tubers are large, up to 2 cm long and 1 cm in diameter, and produce vigorous plants which easily compete with slow growing cotton seedlings. Heavy nutgrass infestations can substantially reduce cotton yields, while uncontrolled infestations preclude cotton production. Over the years, many cotton growers have found the combination of good soil moisture, good soil nutrition, and a lack of strong competition from cotton have led to an isolated nutgrass patch becoming a major problem.

The good news is that nutgrass can be controlled. The bad news is that successful control is a long-term venture. Nutgrass control requires good management over a number of seasons, and will be expensive, but the alternative is far worse.

In a recent Cottongrower article, Kylie May, agronomist at Norwood, Moree, emphasises that:

"Perseverance, patience and full commitment are key requirements for a nutgrass control program."

Research results

Experiments over the last 4 seasons at Norwood, have shown the value of components which may be part of a nutgrass control program.

The Norwood field was in fallow in the 1990/91 and 1991/92 seasons. It had a low level of nutgrass infestation in spring 1990, averaging 2 tubers per kg soil, taken from a 0 to 15 cm soil core (Figure 1).

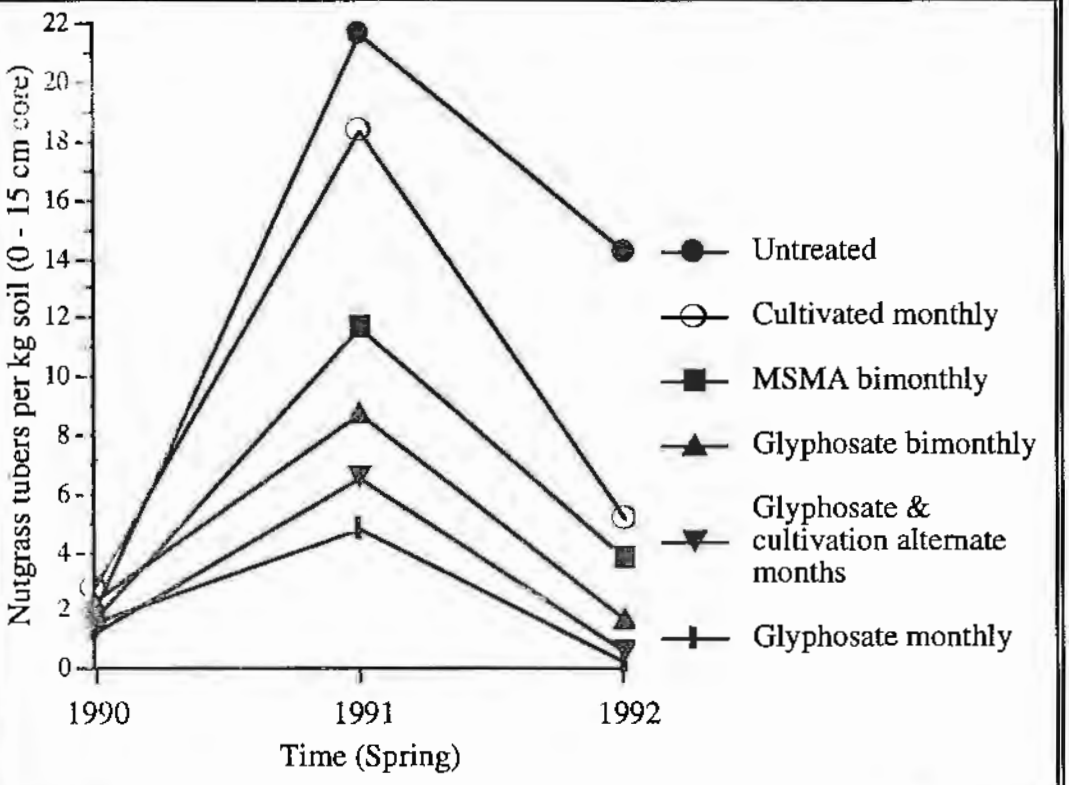

Figure 1. Nutgrass tuber concentration in a bare fallow at Norwood. Treatments were applied over summer (Oct to May). Glyphosate and MSMA were applied at 1.1 and 1.8 L a.i./ha.

However, the field was irrigated 4 times during 1990/91 (simulating a wet summer), and the infestation on untreated plots rose to 22 tubers in 1991. Summer 1991/92 was much 'drier', but only on the 'Glyphosate monthly' and 'Glyphosate & cultivation alternate months' treatments were the final nutgrass infestations, after two seasons in a bare fallow, less than the initial infestations.

These results clearly show the potential to get it wrong. Even monthly glyphosate applications couldn't control a nutgrass infestation in a 'wet' summer. In contrast, a 'dry' summer saw a 35% decrease in the nutgrass tuber population, even where no treatment were imposed, and almost complete nutgrass eradication on the intensive 'Glyphosate monthly' and 'Glyphosate & cultivation alternate months' treatments.

This was followed by a second experiment established on the same site, to examine nutgrass control in cotton (Figure 2).

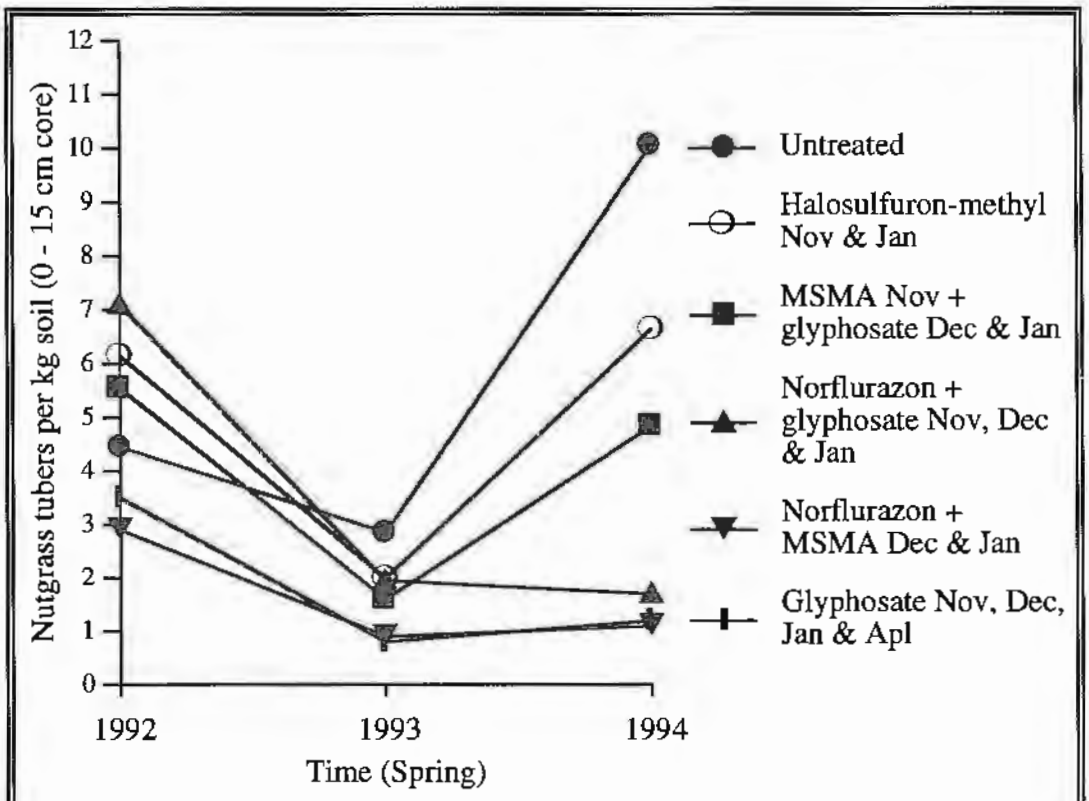

Figure 2. Nutgrass tuber concentration in back-to-back cotton at Norwood. Halosulfuron, glyphosate and MSMA were applied through a curtained sprayer at 35 g, 1.1 and 1.4 L a.i./ha, respectively. Norflurazon was applied at 3.2 kg a.i./ha, pre-plant.

In this experiment there was a further decrease in the nutgrass infestation on all treatments in 1992/93. At the end of the second season (1993/94), the smallest nutgrass populations were on the 'Norflurazon + glyphosate', 'Norflurazon + MSMA' and 'Glyphosate' treatments. Surprisingly, these three treatments had fewer nutgrass tubers at the end of 2 seasons of cotton than they started with. However, this reflects not only the treatments used, but also the seasonal conditions and the management imposed on the field, which encouraged rapid cotton establishment, and produced a strong and competitive cotton stand.

The strategy

Successful nutgrass control requires a long-term, integrated control program. The elements of this program are cultivation, herbicides and competition.

Cultivation. Nutgrass tubers are very susceptible to high temperatures and dehydration. Cultivation which cuts nutgrass roots and brings tubers to the soil surface during hot, dry conditions will rapidly kill tubers. However, cultivating wet soil achieves little except to spread the problem around the field. Good machinery hygiene between infested and clean areas is essential.

Inter-row cultivation can be an important tool to suppress nutgrass growth early in the cotton season, although if the soil is moist, herbicides are the better optiou.

Herbicides. MSMA, glyphosate, norflurazon and halosulfuron-methyl can give effective nutgrass control under the right conditions, but are ineffective when nutgrass is stressed during dry conditions. They ueed good soil moisture levels and/or uutgrass growth for maximum efficacy.

Norflurazon is a long-term, residual herbicide which is present and potentially active throughout the season, but is only active when soil moisture levels are high, and it restricts rotation options.

MSMA, glyphosate and halosulfuron-methyl are contact herbicides, and application technique and timing are esseutial for good nutgrass control.

Competition. Nutgrass is susceptible to shading and competes poorly against well established crops. Nutgrass is relatively shallow rooted and needs good soil moisture levels in the soil surface for maximum growth. Well established crops which dry the soil profile prevent nutgrass growth and allow nutgrass control through cultivation.

Good agronomy of cotton and rotation crops is essential to enable the crop to rapidly establish and shade emerging nutgrass.

A control program for a nutgrass infested field

The basic principles are: use competition to disadvantage nutgrass
use cultivation to control nutgrass in dry conditions
use herbicides to control nutgrass in moist conditions
avoid back-to-back cotton where ever possible

In-cotton - ensure good cotton agronomy. Sow the worst infested field last, to allow rapid cotton establishment and chemical or mechanical control of nutgrass that emerges before cotton planting and emergence.
Use inter-row cultivation or herbicides to control emerging nutgrass.
Never use cultivation for nutgrass control in wet conditions.
Use herbicide to control nutgrass at or after defoliation in a wet autumn.

In-fallow - use cultivation to control nutgrass after picking in a dry autumn.
Establish a strong rotation crop.
Control nutgrass with cultivation over a dry summer. In wet conditions, use a herbicide to control nutgrass and consider planting a rapidly growing summer crop such as lab lab.

Summary

From Kylie May's article:

"Once started, the (nutgrass) *program must be continued for several years. It must become an integral part of the overall farm management. Resources must be budgeted for as the costs involved are quite significant. Small patches are a lot easier and cheaper to control than large areas, so it is never too early to start the program."*

and

"Nutgrass control can best be described as fighting dirty - you must punch hard and often and out of turn."

There is no magical recipe for nutgrass control. A successful nutgrass control program is all about being able to use every available technique and every available opportunity to get on top of what is often described as the world's worst weed, nutgrass.

Further reading

The article by Kylie May entitled "A committed approach is necessary for nutgrass control" (The Australian Cottongrower, May - June 1994, pg 47 - 50), gives a good description of how one grower has developed a successful nutgrass control program.

My article from the 1992 Australian Cotton Conference (pg. 191 - 196) entitled "Nutgrass, a problem weed: a review of the literature", also provides a good explanation of the nutgrass problem and the tools available for nutgrass control.