

# SUCCESSFUL WEED CONTROL

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## Abstract

Successful and economic weed control can only be achieved by the integrated use of chemicals, labour and in some instances, mechanical methods of weed control. In this paper, the situation facing the average grower is described; the costs involved in the various chemical and hand weeding programmes is illustrated and a programmed approach that has proved to be economic and successful during the past few seasons is recommended.

## Introduction

### *The Grower*

Growers on the North Coast and in Zululand who farm on undulating terrain which is not easily mechanizable, tend to rely on hand labour and short term post-emergent chemicals as their main weapons against weeds. These methods were adequate when broad leaf weeds made up the bulk of the weed problem and the trashing of cane was common practice.

The incidence of eldana, lower cutter productivity and drought have resulted in considerably more burning and replanting. The resultant increase in weed germination; a changing weed spectrum involving more grass species; a labour supply which is becoming less plentiful, particularly immediately before and after Christmas; and a limited amount of accommodation available for the labour force, have led to a large number of growers suffering a loss in yields due to competition from weeds.

Growers have been reluctant to change from their post-emergent weed control programmes, partly because they are not familiar with the alternatives, but mainly because they wish to avoid the expense involved in the initial outlay on residual type chemicals.

### *The Weeds*

Weeds germinate in great numbers following the spring rains late in August or early in September. Broad leaf weeds such as *Bidens pilosa* (Black Jack), *Solanum nigrum* (Black nightshade) and *Erigeron* spp are common, together with the annual grass species *Digitaria* and *Eleusine africana*. *Cyperus esculentus* (Yellow watergrass) also appears early in the season. Weed growth accelerates in October and larger numbers of the perennial *Panicum*, *Sorghum* and *Paspalum* species emerge. The growth rates and populations of all weeds increase rapidly in November, December and January, with seeding of perennial grass taking place in December and January. *Rottboellia exaltata* and *Cyperus rotundus* (Purple watergrass) become more common and a problem.

### *The Labour*

Labour-intensive operations begin in September with the fertilizing of fields which were harvested earlier. Planting is begun late in September or October and priority is given to this operation in an attempt to have it completed before Christmas.

Management of trashed or burnt ratoon cane, drainage, herbicide and nematicide applications all require attention from the same labour force from September to December. The demand for labour remains as great after December, when the cutting labour force becomes less productive or less available, and emphasis has to be given to removing the remainder of the cane crop.

Thus the heaviest demand for labour coincides with the period of active weed growth. Manual weeding cannot therefore be relied upon during this period. The shortage of labour and reliance on short term post-emergent chemicals causes varying degrees of weed competition to occur on most farms during November, December and January.

### *Cost of weed competition*

Cane suffers most competition from weeds during its early growth stages. Once canopy is achieved, usually 16 to 20 weeks after cutting or planting under rainfed conditions, little or no further competition occurs (Rocheconste<sup>3</sup>).

Weed competition before cane canopy can be expensive. Experiment Station trials (Anon<sup>1</sup>) indicate that plant cane weeded every 28 days will suffer a 3% loss of yield. Pearson<sup>2</sup> and Thompson<sup>4</sup> report much higher yield losses when weeds compete for a longer period. However, even a 3% loss on the average industry yield of 99 tons per hectare represents a financial loss of R60 per hectare on today's cane prices. The cost of weed competition should be added to the cost of the hand labour used to weed every 28 days. Practical experience in the field has shown that the amount of labour required to weed every 28 to 35 days until canopy, was 55 men per hectare for plant cane and 43 men per hectare for ratoon cane, giving an average of 49 men per hectare. These figures refer to plant and burnt ratoons only, on an average row width of 1,38 metres.

At a cost of R2,50 per man per day, which includes the value of food, housing, medical attention and supervision, the cost of labour would be R122,50 per hectare. To this must be added the value of the yield loss (R60 per hectare), giving a total of R182,50 per hectare.

Having established the total cost of a hand weeding programme, a comparison with alternative programmes can be made.

### *The chemicals*

The chemicals most commonly used are either post- or pre-emergent types.

#### *Post-emergent types*

These chemicals are applied to an established weed population and are often used in combination with other products to broaden the spectrum of weed control. They include diuron and Ametryne with various additions of hormone and contact type chemicals such as MCPA, Actril and Gramoxone. The chemicals are effective against mature broad leaf weeds, *Cyperus esculentus*, early tillering annual grasses and young untillered perennial grasses.

New growth, particularly a second flush of *Cyperus esculentus*, appears several weeks after spraying. Risk of injuring sugarcane in the six to fourteen leaf stage precludes a second application being made and therefore hand weeding is used to prevent weed competition. A further application of a chemical, normally in the form of a contact spray, is carried out when the cane is taller and about to form a complete canopy. At this stage the risk of injuring the crop is low.

#### *Pre-emergent types*

These chemicals are applied before or soon after weeds have emerged and are used in combination with other products to broaden their spectrum of control and to allow

**TABLE 1**  
Chemical treatments and labour requirements needed for cane to reach full canopy with little or no weed competition

POST-EMERGENT TREATMENTS	Cost
1. Diuron + Actril .. .. .	R46,75
Hand weeding .. .. . 32 man days	R80,00
2. Diuron + Actril .. .. .	R46,75
Hand weeding .. .. . 20 man days	R50,00
Diuron + Gramoxone .. .. .	R39,75
1st weeding required 7-10 weeks after planting or cutting	R126,75
<b>PRE- AND POST-EMERGENT TREATMENTS WITH RESIDUAL CONTROL</b>	
	Cost
1. Dopax .. .. .	R68,15
Diuron + Actril .. .. .	R46,75
Hand weeding .. .. . 15 man days	R37,50
1st weeding required 10-12 weeks after planting or harvesting	R152,40
2. Lasso + 2,4-D + Gramoxone .. .. .	R72,55
Diuron + Actril .. .. .	R46,75
Hand weeding .. .. . 18 man days	R45,00
1st weeding required 8-10 weeks after planting	R164,30
3. Velpar + diuron .. .. .	R62,20
Diuron + Actril .. .. .	R46,75
Hand weeding .. .. . 15 man days	R37,50
Used on burnt ratoons only	
1st weeding required 10-13 weeks after harvesting	R146,45
4. Sencor + diuron .. .. .	R89,20
Diuron + Actril .. .. .	R46,75
Hand weeding .. .. . 11 man days	R27,50
1st weeding required 10-13 weeks after harvesting	R163,45

**TABLE 2**  
Rates of products used

3 litres Gesapax 500 + 1,25 litres Actril DS
2,5 kg diuron 80% WP + 1,25 litres Actril DS
2 kg diuron + 2 litres Gramoxone
2 kg Sencor + 2 kg diuron
6 litres Lasso EC + 2 litres 2,4-D + 1 litre Gramoxone
6 litres Dopax
0,6 kg Velpa + 2 kg diuron

more flexibility in the timing of their application. They include Sencor, Dual, Lasso and Velpar. Although these chemicals are intended primarily to kill weeds before they germinate, the addition of hormone, translocated and contact type chemicals such as diuron Ametryne, Gramoxone, and Actril allow the application of the combination to be delayed and applied, with very good effect to young emerged weeds. Control or setback of these weeds is achieved and the residual activity of the chemicals is extended.

The chemicals are effective in preventing the germination of broad leaf weeds and annual and perennial grasses, but are usually ineffective against watergrass (*Cyperus* spp) and a second weed control operation is necessary four to eight weeks later. Because the weed population is 80 to 90% watergrass, with only a few broad leaf weeds and grasses, a post-emergent treatment is very effective. Hand weeding is then done before the cane canopies.

**Integrating hand and chemical control**

During the past eight seasons records of chemical treatments and the associated labour requirements before canopying, were kept. These are presented in Table 1. An application cost of R15 per hectare per application has been added to the cost of the chemicals.

No distinction between diuron and Gesapax or Actril DS and MCPA is suggested, but for simplicity only one product or the other is considered in each instance. The difference in cost per hectare is minimal. The rates at which chemicals are used in terms of kilograms or litres of commercial product per hectare are presented in Table 2.

There is a significant difference in cost in favour of post-emergent chemicals. Residual type chemicals are favoured not in terms of cost but rather in terms of the number of labourers required. Each chemical treatment or programme requires follow-up weeding to prevent subsequent weed competition, and as illustrated, the post-emergent programme requires more labour than the pre-emergent programme. It is the availability of labour that should determine the choice of the chemical programme and not the cost of the chemical treatments. An initial saving may produce an expensive final result.

The grower is aware of the bulk of his planting and ratooning programme before the season begins and should plan his chemical programme accordingly.

**Discussion**

Due to uncertainty in the availability of labourers for hand weeding during the planting period, a pre-emergent, residual type of programme is recommended for use on plant cane and burnt ratoon fields. Each example given in Table 1 allows two to three months of crop growth to take place before labourers are required for weeding, and then in numbers available to most if not all growers. The extended period of chemical weed control allows the bulk of the planting to be completed before December, leaving time to clean the farm before the Christmas period. In addition, the period of most intensive weed competition, ie the first eight to 12 weeks, has been safely covered.

The correct timing of the initial applications is very important when using the combinations and rates mentioned in Table 1. A pre-emergent or very early post-emergent application usually results in the germination of watergrass three to five weeks after spraying whilst a delayed application could result in poor control of certain grass species, hence competition and a high demand for labour.

It has been found that by adding a half to one litre of Actril DS to the Dopax, Velpar and Sencor treatments, the control of emerged weeds and the flexibility in the timing of applications are significantly improved. The improved post-emergent effects allows a full flush of watergrass to germinate before treatment and control. The second flush of watergrass has a reduced population and the true post-emergent treatment can be delayed by a further two or three weeks.

The overall effects are improved weed control and reduced amount of hand labour required for weeding.

**Conclusion**

A successful weed control programme should include the integrated use of chemicals and hand labour. The timing of both methods of control are important to achieve the maximum benefits. A chemical programme based on residual type chemicals for use on plant cane and burnt ratoons has been found to be the most successful.

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