# THE RESULTS OF RECENT PRE-EMERGENCE HERBICIDE SCREENING TRIALS IN SUGARCANE, 1970-73

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**Abstract**

The results of nine pre-emergence experiments involving fourteen herbicides used alone or in combination are reported. Herbicide effectiveness on sandy and clay soils was compared, and special attention was given to the degree of grass control. Alachlor treatments (Lasso) were consistently satisfactory, with a mixture of alachlor and atrazine (2 kg a.i. + 1 kg a.i./ha) being excellent.

Sencor (Bayer 94337) was very promising and is suitable for long-term general weed control (over 12 weeks) on all soils at a dose of 2-3 kg a.i./ha. Bladex (WL 19805) and Upjohn 27267 were also effective in some experiments. A number of products were more effective on sandy than on heavier soils. Most treatments gave over 8 weeks control of annual grasses and broad-leaf weeds, but none were acceptable for *Cyperus rotundus* or *C. esculentus* control. None of the products adversely affected the sugarcane varieties used in the experiments.

## Introduction

The use of pre-emergence herbicides has now become well-established in the South African and Swaziland sugarcane industries. Growers are being encouraged to change from using 2,4-D exclusively, to using more effective products in those fields having grass infestations and wherever grasses may become a problem. The suitability of alachlor, as the commercial product Lasso e.c. or Lasso D, for pre-emergence grass control has previously been reported [1,2,3]. But alachlor is not very effective against broad-leaf weeds, and combinations with other herbicides are required for a wider spectrum of weed control.

Screening trials are regularly conducted on selected new products in the search for herbicides or herbicide-combinations that have a longer duration of control, a wider spectrum of activity and which are less dependant on soil type or soil moisture conditions than currently used formulations. This paper contains the results of some field experiments conducted between 1970 and 1973 to compare new pre-emergence herbicides with established weed control treatments.

## Experimental

Eight field experiments were carried out on three different soil forms; a Rensburg, a Hutton and a Fernwood.[4] An additional tray experiment was carried out using a sieved Waldene (a Longlands form). The physical characteristics of the respective soils are presented in Table I.

The techniques of land preparation, herbicide application and weed control assessment were common to all the field experiments. Pre-emergence herbicide treatments were applied immediately after discing or rotavating the sites, which were representative of typical problem areas of the cane belt. Plant cane (NCo 376 and N55/805) was included in the tray experiment and in two of the field trials.

Herbicide treatments were applied overall by means of a gas or lever-operated knapsack sprayer using either "Spraying Systems" floodjets or teejets. The machine was fitted with a constant pressure regulator to ensure uniform spray delivery. Nozzle pressure was constant at 2 bars and the spray volume varied between 320 and 440 l/ha in the different experiments. The soil moisture content at the time of spraying was usually satisfactory for soil-applied herbicides to be effective.

Field layouts were generally of a randomised block design. Treatments were replicated four times and the sprayed plot sizes varied from 0,0024 to 0,0060 hectares. Plots were usually entirely surrounded by unsprayed paths (minimum width one metre) and these proved to be most useful as control areas.

Visual assessments of weed control were made at regular intervals using a scale of 1 (= complete weed

**TABLE I**
**Soil characteristics of experimental sites**

| Experiment | Form | Series | Texture | pH | % O.M. | % Clay | % Silt | % Sand |
|---|---|---|---|---|---|---|---|---|
| I | Rensburg | Phoenix | Blocky clay | 8,2 | 2,8 | 30 | 17 | 47 |
| II | Hutton | Clansthal | Loamy sand | 8,4 | 1,4 | 10 | 4 | 82 |
| III | Fernwood | Fernwood | Grey sand | 6,7 | 1,0 | 10 | 4 | 85 |
| IV | Hutton | Farningham | Clay loam | 4,6 | 8,0 | 53 | 18 | 25 |
| V | Hutton | Farningham | Clay loam | 4,6 | 8,0 | 53 | 18 | 25 |
| VI | Hutton | Clansthal | Loamy sand | 8,0 | 2,0 | 8 | 4 | 86 |
| VII | Longlands | Waldene | Sandy clay loam | 6,1 | 1,6 | 10 | 11 | 60 |
| VIII | Rensburg | Phoenix | Blocky clay | 7,9 | 8,0 | 30 | 8 | 60 |
| IX | Hutton | Clansthal | Loamy sand | 8,7 | 1,3 | 12 | 2 | 84 |

control) to 9 (= no weed control). A score of 4 represented the situation where the weed population was just acceptable and further control operations were not immediately necessary. A score of 5 was just unacceptable. Absolute values varied according to the assessor, but with time a reliable evaluation of a product was obtained. Wherever possible an evaluation by species or species-group (e.g. broad-leaf, grasses) was done. The selective herbicides used frequently altered the pattern and rapidity of succession, and a species or species-group became dominant in the absence of its competitors.

Technical details of the herbicides used are given in Appendix I.

### Experiments I and II

These were established in Spring 1970 with the same treatments but they differed in respect of weeds and soils (Table I). At both sites the herbicides were applied to a wet soil but, whereas the Phoenix clay remained wet for many days, the Clansthal sand rapidly dried out. A wide range of annual weeds germinated on the clay in addition to the ultimately dominant weeds *Cyperus rotundus*, *Paspalum vaginatum* and *Cynodon dactylon*. On the sand *C. rotundus* and *Setaria verticillata* became dominant.

### Results

The mean visual scores for general weed control, taken from an assessment made 40 days after spraying, are presented in Table II.

### Discussion

Whether alone or in combination with 2,4-D, alachlor (as Lasso e.c. or as Lasso D) gave excellent control of seedling grasses on both the soils, but the growth of the rhizomatous grasses *P. vaginatum* and *C. dactylon* was only slightly checked. Some control of the sedge *C. rotundus* was noted on the continually damp and heavy Phoenix soil. On the Clansthal sand however, the control of this species was poor except in isolated areas where the soil had taken a long time to dry out. Such areas occurred where heavy applications of filter cake (having a high calcium carbonate content) had previously been applied.

When 2,4-D was used alone it failed to give satisfactory pre-emergence control of grasses. The control of broad-leaf weeds by those treatments containing alachlor was unsatisfactory and it was clear that more 2,4-D was required.

### Experiment III

This experiment was carried out on a Fernwood soil at Mount Edgecombe during February, 1972. A hot dry period occurred after the application of the herbicides to a freshly prepared damp soil. A mixed weed population again developed, to be dominated by *C. rotundus*, *Panicum maximum* and *Commelina benghalensis*. *Argemone mexicana* was often an early invader when the effects of the herbicides broke down.

### Results

The mean visual scores for weed control assessed 50 and 90 days after herbicide application are presented in Table III.

### Discussion

The herbicide Sencor (coded Bayer 94337) gave excellent control of annual grasses and broad-leaf weeds, even at the lowest rate tested. But at this rate it was not completely effective on seedlings of *P. maximum*. Although at no time was there any effective control of *C. rotundus*, Sencor did exhibit some control of this problem species.

The most effective herbicide was the experimental product G.S.37430 which, at the rates used on the Fernwood sand, gave industrial-type weed control. U.27267 was very selective and, with the notable exception of *Commelina benghalensis*, controlled most species. Control of the Cyperaceae was also extremely good with U.27267, but much of the credit for this should go to the smothering action of the thick growth of *C. benghalensis*.

Lasso D with atrazine (as Gesaprim 500) outperformed other treatments containing alachlor and gave a longer period of control over a wider range of weeds. No marked differences between 2,4-D and M.C.P.A. were observed and both these two commonly-used herbicides broke down at an early stage

TABLE II

**Mean visual scores of pre-emergence weed control 40 days after herbicide application**

1 = Complete kill
4 = Adequate; just acceptable
5 = Inadequate; just unacceptable
9 = No effect

| Treatment | | | Phoenix soil (Expt. I) | | | Clansthal soil (Expt. II) | | |
|---|---|---|---|---|---|---|---|---|
| Product | Dose (kg active/ha) | Cost (Rands/ha) | Seedling grasses | Broad-leaf weeds | *C.rotundus* | Seedling grasses | Broad-leaf weeds | *C.rotundus* |
| Alachlor + 2,4-D ester* | 2,5+0,8 | 16,80 | 1,0 | 3,0 | 4,8 | 2,0 | 5,3 | 6,4 |
| Alachlor + 2,4-D amine | 2,5+0,8 | 17,40 | 1,3 | 3,0 | 4,8 | 2,0 | 4,8 | 5,8 |
| Alachlor | 2,5 | 16,60 | 1,0 | 3,0 | 5,8 | 1,8 | 6,5 | 7,3 |
| Alachlor + 2,4-D ester** | 1,8+0,6 | 12,00 | 1,8 | 4,8 | 5,8 | 2,4 | 6,5 | 7,9 |
| 2,4-D amine | 3,0 | 3,00 | 6,5 | 5,8 | 7,0 | 8,4 | 6,8 | 8,6 |

* Lasso D at 7 l/ha
** Lasso D at 5 l/ha

**TABLE III**
**Mean visual scores of weed control on a Fernwood sand (Expt. III)**

| Treatment | | Days after application | | | | | |
|---|---|---|---|---|---|---|---|
| Product | Dose (units/ha) | Grasses 50 | Grasses 90 | Broad-leaf 50 | Broad-leaf 90 | *C.rotundus* 50 | *C.rotundus* 90 |
| Sencor (Bayer 94337) | 2 kg a.i. | 1,8 | 3,5 | 1,0 | 2,3 | 5,3 | 3,5 |
| Sencor (Bayer 94337) | 4 kg a.i. | 1,3 | 2,8 | 1,0 | 1,5 | 5,8 | 4,3 |
| Sencor (Bayer 94337) | 6 kg a.i. | 1,3 | 3,5 | 1,0 | 2,0 | 3,3 | 4,5 |
| U. 27267 | 2 kg a.i. | 2,5 | 1,5 | 8,8 | 9,0 | 5,0 | 1,3 |
| U. 27267 | 4 kg a.i. | 1,3 | 1,8 | 8,8 | 9,0 | 2,5 | 1,3 |
| U. 27267 | 6 kg a.i. | 1,3 | 1,0 | 8,0 | 9,0 | 2,0 | 1,3 |
| G.S. 37430 | 2 kg a.i. | 1,0 | 1,0 | 1,0 | 1,0 | 3,0 | 3,8 |
| G.S. 37430 | 4 kg a.i. | 1,0 | 1,5 | 1,0 | 1,0 | 1,0 | 2,0 |
| Gesaprim 500 | 2 litres | 6,8 | 8,0 | 3,0 | 2,0 | 7,0 | 4,3 |
| Gesaprim 500 | 4 litres | 4,5 | 5,0 | 1,0 | 1,0 | 6,5 | 4,8 |
| 2,4-D amine | 4 litres | 8,3 | 6,0 | 8,8 | 7,5 | 8,5 | 3,0 |
| M.C.P.A. | 7 litres | 8,0 | 7,5 | 8,3 | 6,8 | 7,0 | 2,3 |
| Diuron | 4 kg | 1,0 | 2,8 | 3,8 | 6,0 | 6,8 | 5,3 |
| Ametryne | 4 kg | 3,5 | 3,5 | 3,0 | 4,0 | 8,3 | 4,5 |
| Lasso D | 5 litres | 2,8 | 3,8 | 6,8 | 8,3 | 7,5 | 4,0 |
| Lasso D + 2,4-D | 5 1 + 2 1 | 2,5 | 3,8 | 5,8 | 8,0 | 6,0 | 4,0 |
| Lasso D + Gesaprim 500 | 5 1 + 1 1 | 1,3 | 2,3 | 3,0 | 2,8 | 4,5 | 3,0 |

and were not very satisfactory. Diuron was slightly more effective than ametryne on grasses, and atrazine used alone was only suitable for controlling broad-leaf weeds.

## Experiment IV

Sencor and alachlor were compared on a Farningham series soil in the Natal midlands. They were compared at two times of the year; namely September and November to represent spring and summer planting periods. The spring treatments were applied on a warm day (air temperature 21°C) which was followed by a prolonged period of extremely cold and dry weather. In contrast the summer treatments were applied on a very cold day (air temperature 12°C) and this was followed by a prolonged period of hot and wet weather.

## Results

The annual grasses *Phalaris angusta*, *Digitaria adscendens*, *D. ternata*, *Paspalum urvillei*, *Panicum laevifolium* and *Setaria pallidefusca* were numerous and broad-leaf weeds were poorly represented. Only wattle (*Acacia* sp.) was present in quantity with a few specimens of *Richardia braziliensis*. Although the Farningham series has very high organic matter and clay contents, alachlor and Sencor at the doses used gave excellent results for both spring and summer applications. The mean scores for grass control are compared for spring and summer sprays in Table IV.

## Discussion

Under the conditions of the experiment all treatments were most effective and gave over 70 days of acceptable grass control. Comparisons showed that

**TABLE IV**
**Mean visual scores of annual grass control in the Natal midlands**

| Treatment | | | Days after application | | | | | |
|---|---|---|---|---|---|---|---|---|
| Product | Dose (kg. a.i./ha) | Cost (Rands/ha) | Spring sprays (31.8.72) | | | Summer sprays (17.11.72) | | |
| | | | 50 | 75 | 100 | 50 | 75 | 100 |
| Alachlor + 2,4-D ester* | 1,8+0,6 | 12,00 | 3 | 5 | 8 | 1 | 3 | 3 |
| Alachlor + Atrazine** | 1,8+0,6 | 16,00 | 2 | 5 | 9 | 1 | 3 | 4 |
| Alachlor + Atrazine** | 2,0+1,0 | 20,00 | 2 | 4 | 8 | 1 | 3 | 4 |
| Sencor | 3,0 | 50,00 | 2 | 2 | 4 | 1 | 1 | 1 |

* Lasso D at 5 l/ha
** Lasso e.c. + Gesaprim 500

summer-applied sprays were relatively the more effective, with the breakdown of weed control occurring only after 120 days. No real differences between alachlor treatments were observed, and for commercial and advisory purposes the cost of the respective treatments should be given primary consideration. But it is worth noting that a single application of Sencor maintained a plant crop weed-free until full canopy developed.

### Experiments V and VI

The herbicides in these experiments were compared on different soils; on the Farningham series soil at Seven Oaks and on a Clansthal sand at Mount Edgecombe. Warm weather and well-distributed rainfall followed treatment application at both sites. Plant cane (N55/805 with 6-7 leaves unfurled, ± 40 cm canopy height) was present in the Clansthal sand experiment at the time of spraying. The pre-emergence treatments were directed across the interrows shortly after they had been cultivated.

### Results

*Cyperus rotundus* and *Panicum maximum* became well established on the sand in addition to annual grasses such as *Setaria sphacelata*, *S. verticillata*, *Digitaria ternata*, *Eleusine indica* and *Paspalum dilatatum*. Annual grasses were dominant on the midlands soil, with *Phalaris angusta*, *Digitaria ternata*, *D. adscendens* and *Paspalum urvillei* being well-represented.

The mean visual scores for grass control are presented in Table V. No phytotoxicity symptoms were observed on the established plant crop from any of the herbicides.

### Discussion

The two soils differed considerably in organic matter and clay contents, and it was interesting that both G.S.37430 and U.27267 were relatively ineffective on the heavier soil. Sencor again proved suitable for grass control on both sites (even at the low dose of 2 kg a.i./ha). Alachlor treatments were also satisfactory, the best results being given by mixtures of alachlor and atrazine. In the midlands experiment *Paspalum urvillei* was recorded as being fairly tolerant to alachlor.

### Experiment VII

A small phytotoxicity experiment was conducted during August, 1972. Selected one-eyed setts of NCo 376 and N55/805 were planted in shallow trays after dipping in a fungicide/insecticide solution. Eight setts were planted in each tray (40 cm × 20 cm × 20 cm deep) and there were three replications of each treatment. The herbicides were sprayed onto the damp Waldene soil immediately after planting.

### Results

Mean shoot lengths thirty days after the sprays were applied are presented in Table VI.

TABLE VI

**Mean shoot lengths of plant cane 30 days after treatment (cm)**

| Treatment | | Cane variety | |
|---|---|---|---|
| Product | Dose (kg a.i./ha) | NCo 376 | N55/805 |
| Sencor | 2 | 8,5 | 6,7 |
| Sencor | 4 | 8,5 | 6,5 |
| U. 27267 | 1 | 8,3 | 5,5 |
| U. 27267 | 2 | 8,0 | 6,8 |
| G.S. 37430 | 1 | 7,2 | 5,5 |
| G.S. 37430 | 2 | 7,4 | 6,1 |
| Alachlor+Atrazine | 2+1 | 6,2 | 5,8 |
| Unsprayed | — | 6,3 | 6,2 |

None of the herbicides produced any phytotoxicity symptoms on the varieties tested, and the growth of sprayed plants was generally better than that of control plants. Unfortunately a weeding was delayed and plants in trays not having complete chemical weed control suffered due to competition for the available moisture.

### Experiments VIII and IX

Commercial fields of newly planted sugarcane (NCo 376 and N55/805) were used to evaluate similar weed control treatments on Phoenix and Clansthal soils. The herbicides were applied over the cane rows soon after planting had been completed. However, *C. rotundus* had already become established on the interrow ridges and paraquat was included in a few treatments as an experimental control measure. As a result of a downpour, Experiment VIII (Phoenix soil) was flooded for a short period some 36 hours after the sprays were applied.

TABLE V

**Mean visual scores of weed control 30 days after herbicide application**

| Treatment | | | Grass control | | *Cyperus* |
|---|---|---|---|---|---|
| Product | Dose (units/ha) | Cost (rands/ha) | Farningham soil | Clansthal soil | Clansthal soil |
| Sencor | 2 kg a.i. | 34,00 | 1,5 | 2,0 | 6,0 |
| G.S. 37430 | 1 kg a.i. | — | 6,1 | 2,3 | 7,3 |
| U. 27267 + 2,4-D | 2 kg a.i. + 1,5 kg a.e. | — | 4,7 | 3,5 | 7,0 |
| Lasso D + 2,4-D | 5 l + 1,5 kg a.e. | 13,50 | 2,3 | 3,3 | 7,0 |
| Alachlor + Atrazine* | 2 kg a.i. + 1 kg a.i. | 20,00 | 2,4 | 2,8 | 7,5 |

* Lasso e.c. + Gesaprim 500

## Results

The grasses *Rottboelia exaltata, Eleusine indica, Digitaria ternata* and *Panicum maximum* with the broad-leaf weeds *Argemone mexicana, Hibiscus trionum, Ipoemia obscura, Commelina benghalensis* and *Portulaca oleraceae* were the main species that developed on the Phoenix soil. *Setaria verticillata, P. maximum, E. indica* and *Sorghum verticilliflorum* developed on the Clansthal soil in association with common broad-leaf weeds such as *C. benghalensis, Amaranthus spinosus, Emex australis* and *Solanum nigrum. Cyperus rotundus* and *C. esculentus* were common on both sites. The mean visual scores for general weed control are presented in Table VII.

## Discussion

None of the promising herbicides produced any phytotoxicity symptoms on the two varieties tested. Zorial caused the development of colourless patches on the cane leaves, as it also did on the weeds, but was not considered to be effective as a weedkiller.

No treatment gave really acceptable control of the Cyperaceae although Sencor did reduce the *Cyperus* infestation on the sands. Sencor was again consistently effective for both grass and broad-leaf weed control, and treatments based on alachlor were also very successful. The advantage of adding atrazine to alachlor for better broad-leaf weed control was especially noticeable in these trials. *Rottboelia exaltata* was tolerant to alachlor. The higher dose of Bladex seemed to have potential for general weed control but Zorial and Napropamid were of little value.

## Conclusions

Alachlor (as Lasso e.c. or Lasso D) consistently gave good pre-emergence annual grass control, but *Panicum maximum* and *P. laevifolium* were often early invaders. *Rottboelia exaltata* and the Cyperaceae were tolerant. Used alone in sugarcane fields alachlor is inadequate, and must be reinforced with either 2,4-D or atrazine to ensure satisfactory broad-leaf weed control. A commercial treatment of Lasso D + 2,4-D (5 litres and 2 litres) at a cost of R13,50 per hectare may be expected to give acceptable general weed control for at least 10 weeks.

Longer periods of control over a wider range of species have been obtained from Lasso e.c. + atrazine mixtures at respective doses of four and two litres per hectare. If atrazine is used in the form of a flowable concentrate (thus avoiding the use of a wettable powder) the treatment cost will be R19,50 per hectare. Such a mixture will be of value in those areas where 2,4-D drift is a danger to susceptible crops such as cotton and citrus. At the doses used experimentally, no symptoms of phytotoxicity have been observed and the products are believed to be safe for use in sugarcane fields.

Sencor also proved to be a most effective product and outperformed alachlor in all the trials. Giving exceptionally long control of most grasses and broad-leaf weeds under varying conditions of soil moisture and on different soils, the product is suitable for general use in the sugarcane industry. However it did not control the Cyperaceae satisfactorily, and *Panicum maximum* and *Sorghum verticilliflorum* showed some tolerance. The product is considered to be very safe for use in sugarcane, but it is very expensive and at an effective treatment dose of 2 kg a.i./ha (2,8 kg product) will cost R34,00 per hectare. It should nevertheless be noted that in a number of instances complete season-long weed control has been obtained from a single application. Recent post-emergence screening trials[5] show that early post-emergence applications of the herbicide are also very effective.

Sencor has also been reported as being most suitable for general weed control in sugarcane fields in Hawaii.[6]

Other experimental products such as U.27267 and Bladex have shown some promise at one time or another, but unless these can be marketed at a very low cost, they are unlikely to find use in the industry. The product G.S.37430 unfortunately has been withdrawn from commercial manufacture.

**TABLE VII**

**Mean visual scores of weed control on Phoenix and Clansthal soils**

(Assessments made 8 weeks after herbicide application)

| Treatment | | Phoenix (Expt. VIII) | | Clansthal (Expt. IX) | | |
|---|---|---|---|---|---|---|
| Products | Dose units/ha | Grass | Broad-leaf | Grass | Broad-leaf | *Cyperus* |
| Zorial | 2 kg a.i. | 2,3 | 8,3 | 2,5 | 5,3 | 7,8 |
| Zorial | 4 kg a.i. | 4,0 | 5,5 | 2,5 | 4,8 | 6,3 |
| Napropamid | 4 kg a.i. | 4,8 | 7,8 | 2,5 | 5,8 | 7,3 |
| Napropamid | 6 kg a.i. | 3,3 | 8,5 | 2,3 | 5,8 | 5,8 |
| Bladex | 2 kg a.i. | 5,3 | 7,0 | 4,0 | 3,5 | 7,5 |
| Bladex | 4 kg a.i. | 2,8 | 5,3 | 2,0 | 2,5 | 6,8 |
| U. 27267 + 2,4-D | 4 kg + 2 1 | 3,3 | 6,8 | 2,8 | 5,0 | 5,3 |
| Diuron + Paraquat | 4 kg + 1 1 | 3,0 | 5,3 | 2,3 | 3,0 | 6,5 |
| Lasso D + 2,4-D | 5 1 + 2 1 | 2,0 | 5,0 | 2,0 | 2,8 | 7,3 |
| Alachlor + Gesaprim 500 | 4 1 + 2 1 | 3,3 | 2,8 | 2,0 | 2,0 | 6,5 |
| Alachlor + Diuron + Paraquat | 4 1 + 2 kg + 1 1 | 2,8 | 4,5 | 2,0 | 2,3 | 6,3 |
| Sencor | 3 kg | 2,3 | 2,0 | 1,8 | 1,8 | 3,9 |

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**APPENDIX I**
**Herbicides used**

| Approved common name | Trade / Code name | Supplier / Manufacturer | Formulation |
|---|---|---|---|
| Alachlor | Lasso e.c. | Triomf / Monsanto | 480 g a.i./l |
| 2,4-D amine | Fernimine 7 | Triomf / Triomf | 725 g a.e./l |
| M.C.P.A. | Fernimine 4 | Triomf / Triomf | 400 g a.e./l |
| Atrazine | Gesaprim 500 | Ciba-Geigy / Ciba-Geigy | 50% flocon |
| Diuron | Karmex | Agricura / du Pont | 80% w.p. |
| Ametryne | Gesapax 80 | Ciba-Geigy / Ciba-Geigy | 80% w.p. |
| Paraquat | Gramoxone | Triomf / Plant Protection | 200 g a.i./l |
| | Sencor (Bay 94337) | Bayer / Bayer | 70% w.p. |
| | Lasso D | Triomf / Monsanto | * |
| | Zorial (SAN 9789) | Datons / Sandoz | 80% w.p. |
| | Napropamid (R7465) | Union Weedkiller / Stauffer | 50% w.p. |
| | Bladex (W.L. 19805) | Shell / Shell | 75% w.p. |
| | U. 27267 | Tuco / Upjohn | 75% w.p. |
| | G.S. 37430 | Ciba-Geigy / Ciba-Geigy | 80% w.p. |

a.e. = acid equivalent; a.i. = active ingedient; flocon = flowable concentrate
* Lasso D : 1 litre product contains 360 g a.i. alachlor + 120 g a.e. iso-octyl ester 2,4-D.