THE USE OF HERBICIDES IN ESTABLISHING IMPROVED PASTURES IN NEW CALEDONIA

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Summary

Profuse weed growth often interferes with the establishment of improved pastures. Trials were conducted to study the specific effects of three herbicides (2,4-D; 2,4-DB; dinoseb) at various rates of application and at two stages of growth (1 to 1½ months and 5 months after sowing).

From these trials it would seem that only dinoseb can control weeds without harming the established sward *(Chloris gayana; Setaria sphacelata; Paspalum plicatulum)* and the companion legume, siratro *(Phaseolus atropurpureus)*. Rates of application for this herbicide would seem to be 0.5 to 1 kg a.i./ha on a young pasture and 1 to 1.5 kg a.i./ha on pastures over 6 months old.

INTRODUCTION

Pasture improvement, which is necessary in New Caledonia to increase the grazing stock, consists of a series of techniques. Often, because of the nature of the original vegetation, but mostly because of unsuitable agricultural practices (late sowing, bad quality seeds, inadequate working of the soil), profuse weed growth can do a great deal of harm to young pastures. Moreover, weeds grow much faster during the winter when the growth of the established sward is slowed down.

As pastures usually contain two or three grasses and one or two legumes, an attempt has been made to select herbicides which, whilst keeping weeds under control as much as possible, do not interfere with the establishment of the grasses and legumes, especially the latter.

METHODS AND EQUIPMENT

DESCRIPTION OF THE FLORA

Grasses and Legumes

The trial carried out at Nakutakoin, in the Dumbea area, was begun on 3 February 1971, after ploughing unimproved land and sowing the following mixed seeds:

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Grasses:

Paspalum plicatulum (3 kg/ha)
Chloris gayana (3 kg/ha)
Setaria sphacelata (3 kg/ha)

Legume:

Siratro (*Phaseolus atropurpureus*) (4 kg/ha)

The seeds were sown in rows with a spacing of approximately 30 cm.

Weeds

The number of crosses after each species indicates the relative profuseness of the plants.

Dicotyledons:	
Sida acuta	++
Sida rhombifolia	+
Triumfetta rhomboidea	+
Ageratum conyzoides	+++
Bidens pilosa	++
Bidens bipinnata	+
Spilanthes acmella	++
Grasses and Cyperaceae:	
Brachiaria reptans	+
Cenchrus echinatus	+
Digitaria adscendens	+
Eleusine indica	+
Panicum aff. *coloratum*	
Paspalum dilatatum	
Paspalum paniculatum	
Rhychelytrum repens	
Cyperus aff. *rotundus*	++
Kyllinga melanosperma	++

It will be noted that, with grasses and Cyperaceae, only *Cyperus* aff. *rotundus* and *Kyllinga melanosperma* can be a problem. It is not intended to deal with control of these weeds in this paper.

But amongst the dicotyledons, profuse growth of *Sida acuta; Ageratum conyzoides; Bidens pilosa* and *Spilanthes acmella* causes considerable concern.

Herbicides Tested

Three herbicides were used because of their selectiveness
P1 — 2,4-D amine salt at the rate of 550 g/litre
P2 — 2,4-DB potassium salts at the rate of 400 g/litre
P3 — dinoseb amine salt 20 at the rate of 200 g/litre

Experimental Design

Herbicides

Each herbicide was used at four rates of application (a.i. per hectare):

P1 — C0 Control — no treatment
C1 0.550 kg
C2 0.960 kg
C3 1.375 kg
P2 — C0 Control
C1 0.400 kg
C2 0.800 kg
C3 1.200 kg
P3 — C0 Control
C1 0.500 kg
C2 1.000 kg
C3 1.500 kg

Stages of Growth on Application

There were two applications for each product and each rate. The first (S1) was applied on 9 March 1971 for products P1 and P3 and product P2 was applied on 16 March 1971, in other words, between 1 and 1½ months after sowing.

The second (S2) was applied on 30 June 1971 on different plots of S1, or 5 months after sowing. A change was made in the concentration of the products at application S2 following observations made after application S1:

P1 — C1 0.200 kg
C2 0.400 kg
C3 0.800 kg
P2 — C1 1.000 kg
C2 1.500 kg
C3 2.000 kg
P3 — No change

Experimental Design

The trial was conducted on two blocks for each combination (different rates for each product). Each block had 12 plots. Each plot had an area of 8.75 m^2 of which 7 m^2 were treated.

Within each block, products P1, P2 and P3 were applied at random. For each of them, applications corresponding to each rate C0, C1, C2, C3 were also randomized. The application was made with a sustained pressure hand-sprayer with a quantity of water of 0.500 l per plot (approximately 700 l/ha).

METHOD OF CHECKING THE EFFECT OF HERBICIDES

For each plot a surface count was made, average height was measured, and the volume of each species estimated. These checks were made on 5 to 18 May for applications at stage S1 and from 27 July to 6 August for applications at stage S2.

RESULTS

APPLICATIONS AT STAGE S1

Results of applications at stage S1 are given in Table 1.

TABLE 1: VOLUME OF VEGETATION IN % OF VOLUME OF CONTROL (C0) FOR EACH PRODUCT AND EACH RATE
(Average of the 2 blocks)

	C0	*C1*	*C2*	*C3*
P1 — 2,4-D:				
Active ingredient kg/ha	0.0	0.550	0.960	1.375
Total volume of vegetation % C0	100	96.5	73.0	57.0
Volume siratro % C0	100	28.5	0.0	0.7
Volume weeds % C0	100	18.0	11.5	11.5
P2 — 2,4-DB:				
Active ingredient kg/ha	0.0	0.400	0.800	1.200
Total volume of vegetation % C0	100	103.0	86.0	92.0
Volume siratro % C0	100	12.0	10.6	13.0
Volume weeds % C0	100	130.5	53.5	54.5
P3 — dinoseb:				
Active ingredient kg/ha	0.0	0.500	1.000	1.500
Total volume of vegetation % C0	100	106.5	84.0	68.0
Volume siratro % C0	100	61.5	75.0	19.5
Volume weeds % C0	100	9.5	7.5	2.0

The effect of the three herbicides varies considerably two months after application.

Effect of 2,4-D

The effect of 2,4-D on the total vegetation is highly destructive as the concentrations increase. On the legume siratro, 2,4-D is too strong and kills it when used at high rates. A low rate (0.550 kg) seems sufficient to control the weeds.

Effect of 2,4-DB

2,4-DB has hardly any effect on the total vegetation even at high rates. A significant regression is obtained at the three rates on siratro. Its effect is inadequate on weeds, even at high rates.

Effect of Dinoseb

Dinoseb begins to be effective on the total vegetation at the high rate of application (1.5 kg). It is only really effective on siratro at the higher rate of application. At the low and medium rates of application (0.5 to 1 kg) enough siratro remains. It is highly effective on weeds at low and medium rates of application.

Applications at Stage S2

Results of applications at stage S2 are given in Table 2.

TABLE 2: VOLUME OF VEGETATION IN % OF VOLUME OF CONTROL (C0) FOR EACH PRODUCT AND EACH RATE
(Average of the 2 blocks)

	C0	*C1*	*C2*	*C3*
P1 — 2,4-D:				
Active ingredient kg/ha	0.0	0.200	0.400	0.800
Total volume of vegetation % C0	100	68.7	77.0	70.4
Volume siratro % C0	100	58.7	65.0	72.2
Volume weeds % C0	100	35.6	60.4	66.7
P2 — 2,4-DB:				
Active ingredient kg/ha	0.0	1.000	1.500	2.000
Total volume of vegetation % C0	100	86.0	81.4	87.7
Volume siratro % C0	100	10.6	24.8	14.6
Volume weeds % C0	100	72.0	39.9	38.4
P3 — dinoseb:				
Active ingredient kg/ha	0.0	0.500	1.000	1.500
Total volume of vegetation % C0	100	99.7	70.4	89.6
Volume siratro % C0	100	132.5	89.1	78.3
Volume weeds % C0	100	95.1	25.8	13.7

Effect of 2,4-D

2,4-D is quite destructive on the total vegetation even at low rates of application. It is less destructive for siratro than at stage 1 and therefore does little harm in view of the aggressiveness of that plant. It is quite inadequate on weeds.

Effect of 2,4-DB

2,4-DB has little effect on the total vegetation. It is quite effective against weeds at high rates (1.5 to 2 kg).

Effect of Dinoseb

Dinoseb has little effect on the total vegetation. The effect on siratro is negligible. Only a high rate of application (1.5 kg) will control weeds.

GENERAL CONCLUSIONS

Since the aim is to establish an improved pasture consisting of grasses and legumes, only dinoseb seems suitable.

2,4-D is too destructive at both stage 1 and stage 2. Its destructive effect on siratro at stage 1 is too strong. On pastures established more than 6 months and where there are weed problems, 2,4-D could be used at the low rate of application (0.2 to 0.5 kg).

2,4-DB is not too destructive on the total vegetation but it is too strong for siratro. Its effect on weeds is inadequate.

Dinoseb is very suitable for weed control without damaging siratro significantly. The rates of application should be 0.5 to 1 kg on a young pasture (stage S1) and 1 to 1.5 kg when the pasture is well established (S2).

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