CHEMICAL CONTROL OF WILD BASIL (*OCIMUM GRATISSIMUM*) IN NEW CALEDONIA

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Summary

Wild basil *(Ocimum gratissimum)* was introduced into New Caledonia about 1930. This fast-spreading weed is a major threat to the establishment of improved pastures. Dissemination of its seeds, by tractors in particular, during land clearing and preparation, when improved pastures are established, raises a serious weed control problem.

The chemical control trials that were carried out show that this plant is very sensitive to such selective herbicides as 2,4-D, especially when treated young before flowering, at the rate of 1 kg to 1.5 kg a.i./ha. When wild basil is older (mature and in seed), rates must be increased (2 kg to 2.5 kg a.i./ha). It was found that, at these rates, seed germination is inhibited whereas untreated seeds from control plots had a germination percentage of about 75.

In the conclusions a programme of cultural practices and treatments is advocated to avoid heavy control costs before establishing improved pastures. Failing this, preparing the ground would, alone, create a new problem of basil eradication within a very short time, since enough seeds would remain to re-infest the land.

Wild basil (*Ocimum gratissimum*) belongs to the family Labiatae which probably originated in Eastern India and spread to virtually all tropical areas of the globe. It is thought to have been introduced into New Caledonia at the beginning of the century. This fast-spreading weed is a major threat, in particular to the establishment of improved pastures, as the local practice is to clean up natural pastures by means of a rotary cutter every year or every two years to keep down undesirable and non-palatable species. Unfortunately, tractors and other agricultural machines carry the weed seeds that are most likely to re-infest pastures, as is the case with basil.

Furthermore, any programme for the establishment of improved pastures using fodder mixtures (*Paspalum plicatulum, Chloris gayana, Setaria sphacelata, Phaseolus atropurpureus, Glycine*

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javanica, etc.) requires the soil to be conditioned to give the seeds of these grasses and legumes a good start. Frequently, tractors used for soil conditioning (ploughing, harrowing) have been used a few days previously for clearing basil-infested plots, and therefore carry the seeds of this plant to an ideal environment for their growth.

In 1971, control trials in natural pastures were carried out.

METHODS AND EQUIPMENT

Composition of Natural Pastures

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

	Grasses
Cynodon dactylon	+++
Brachiaria reptans	++
Imperata cylindrica	+
	Cyperaceae
Kyllinga sp.	++
Cyperus gracilis	+
	Dicotyledons
Ocimum gratissimum	+++
Desmodium adscendens	++
Desmodium triflorum	++
Stachytarpheta jamaicensis	++
Sida acuta	+
Lantana camara	+
Leucaena glauca	+
Desmanthus virgatus	+
Acacia farnesiana	+
Mimosa pudica	+
Psidium guayava	+
Solanum torvum	+
Ageratum conyzoides	+

Herbicide Tested

In this trial, the only herbicide used was the amine salt of 2,4-D at a rate of 550 g/litre. The rates of application in active ingredient per hectare were:

1 kg (Treatment C1)

1.5 kg (Treatment C2)

2 kg (Treatment C3)

Experimental Design

Applications were made at two stages of growth:

Young basil before flowering (stage S1)

Mature basil (stage S2)

For each stage and each rate of application of the product, there were 4 replicates. All plots had an area of 2 m^2. The trial was conducted at Nakutakoin in the Dumbea area. The applications were made on 10 August 1971.

RESULTS

Global Composition of the Flora before the Application

There were three groups of plants:

Ocimum gratissimum

Grasses and grouped Cyperaceae (G + Cyp.)

Legumes and miscellaneous (Leg. + Misc.)

Table 1 gives the volume of each of these groups. The percentage area multiplied by the mean height gives the volume of vegetation per square metre for each group.

The mean heights before treatment were:

S1		S2	
Ocimum	40 cm	*Ocimum*	85 cm
G + Cyp.	10 cm	G + Cyp.	10 cm
Leg. + Misc.	5 cm	Leg. + Misc.	10 cm

TABLE 1: VOLUME IN DM^3 PER M^2 BEFORE APPLICATION

Plots and Blocks	*I*	*II*	*III*	*IV*	*Total*	*Mean*
S1-C1:						
Ocimum	210	160	240	200	810	202
G. + Cyp.	20	40	30	40	130	32
Leg. + Misc.	12	7	4	5	28	7
S1-C2:						
Ocimum	240	220	240	260	960	240
G. + Cyp.	35	40	36	30	141	37
Leg. + Misc.	3	3	4	3	13	4
S1-C3:						
Ocimum	160	240	300	260	960	240
G. + Cyp.	50	20	14	20	104	26
Leg. + Misc.	3	5	5	5	18	4.5
S2-C1:						
Ocimum	280	380	490	280	1430	375.5
G. + Cyp.	50	40	20	50	160	40.0
Leg. + Misc.	10	5	5	5	20	6.2
S2-C2:						
Ocimum	380	700	700	700	2480	621.0
G. + Cyp.	40	1	3	0	44	11.0
Leg. + Misc.	5	10	5	10	30	7.5
S2-C3:						
Ocimum	280	400	300	420	1400	350.0
Leg. + Misc.	50	40	52	35	177	44.2
G. + Cyp.	10	2	5	5	22	5.5

Effect of 2,4-D on the Vegetation

Young Basil (S1)

A check on 19 September 1971 on the treated plots showed that basil was completely destroyed at the C1 rate. There were a few green leaves at the base of the stems.

At the C2 rate, all stems were completely destroyed down to the base. The same results were obtained with the C3 rate.

It seems therefore that when 2,4-D is applied on young basil (before flowering) a rate of 1 kg to 1.5 kg a.i./ha is sufficient to destroy it.

Mature Basil (S2)

The same control on 19 September 1971 showed that, applied at C1 and C2 rates, 2,4-D is ineffective. At the C3 rate (2 kg a.i./ha) basil was almost totally destroyed.

In August 1972, the remaining vegetation on plot S2 was checked and results are given in Table 2.

TABLE 2: VOLUME IN DM^3 PER M^2 ONE YEAR AFTER APPLICATION

The figures in parentheses show volumes before application.

Ocimum	*G + Cyp.*	*Leg. + Misc.*
S2-C1 111 (375.5)	163 (40.0)	14 (6.2)
S2-C3 54 (350)	195 (44.2)	10 (5.5)
S2-C2 235 (621)	126 (11)	107 (7.5)

From these figures it would seem that the rate to be applied, to keep basil sufficiently in check, should be at least 2 kg a.i./ha.

Effect of 2,4-D as Germination Inhibitor

At stage S2 basil seeds were taken from plants one month after application and from plants on non-treated control plots. These seeds were sown in a germinator. After 28 days, germination was 76% for seeds from control plants and nil for seeds from plants treated with 2,4-D.

The inhibiting effects of 2,4-D on germination are worth mentioning as they do not seem to have been reported before and, when pastures are treated on a large scale, 2,4-D could reduce considerably the spread of basil in natural pastures.

CONCLUSIONS

Chemical control of wild basil is possible and in established pastures 2,4-D is recommended. Maximum effectiveness is obtained with rates of 1 kg to 1.5 kg a.i./ha on young basil; prior use of a rotary cutter to clear old vegetation, and an application of 2,4-D about two months after that, seems an efficient control technique.

For improved pastures establishment, however, if the grazier intends to sow mixed grazing seeds on land infested with basil, there is no need to apply a herbicide before conditioning the soil and sowing since soil conditioning will assist existing seeds to germinate and control measures will still be required at a later stage.

After emergence (1 to 2 months), pastures can be treated with 2,4-D at the rate of 1 kg a.i./ha to control basil and other weeds. To prevent new pastures from becoming infested, soil conditioning implements (specially tractors) should be cleaned before use. Patches of basil should be removed by mechanical means (rotary cutter) before flowering.

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