C A R I B B E A N F O O D C R O P S
S O C I E T Y
(C F C S)
XIV th Meeting

Quatorzième Congrès
de la

SOCIETE INTERCARAIBE POUR LES PLANTES ALIMENTAIRES

Guadeloupe — *27 - 29 Juin*

Martinique — *30 Juin - 2 Juillet 1977*

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Nouv. agron. Antilles-Guyane, 3, 3/4, 647-651, 1977.

THE EVALUATION OF NEW UNREGISTERED PREEMERGENCE HERBICIDES ON CABBAGE[°]

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INTRODUCTION

Jackson & Sierra (1973, 1974, 1975) evaluated twenty-five, new enregistered herbicides on fifteen vegetable and grain crops. For cabbage, the results were seven candidate materials that demonstrated none or only slight phytotoxic effect on germination and early-juvenile growth processes. Four were not considered, due to their ineffectiveness in controling either broadleaf and/or grass weeds. The remining three chemicals have demonstrated potential value as herbicides for cabbage growing in the tropics, they are : Buban 27, CGA 24705, and Hercules 2234 (Antor). In secondary trials, Jackson & Sierra (1976) have evaluated Antor on okra, with promising results, and also on "Stonehead" cabbage, Jackson & Sierra (1977).

Selected registered preemergence herbicides for weed control in vegetables have been evaluated, and as a results of this work, DCPA (Dacthal) at 11.8 kg ai/ha (10.5 lb ai/ac) was recommended by Jackson, et al (1972, 1976) and Cibes et al (1974) for weed control in cabbage in Puerto Rico.

The purpose of this paper is to present the effects of Antor, Buban 37, CGA 24705 and DCPA on cabbage *(Brassica oleracede "capitata" "Market Prize")*, and on the weed flora associated with that crop.

MATERIALS AND METHODS

This experiment was established during the spring of 1976, at the Fortuna Substation, Juana Diaz, P. R., on a weld prepared field of San Anton sandy loam. This neutral (pH.7.24), friable, brown soil, consists of sand 39, loam 35, and clay 26 % ; with 2.44 % organic matter, and a base exchange capacity of 26.3 meg/100 g.

The seeding of *"Market Prize"* cabbage was accomplished with a Stanhay MK II precision seed drill, following the recommendations of Eavis (1972). Row spacing was 0.91 m (3 ft) center to center, with a spacing of 25.4 cm (10 in) between seed.

The experimental design was partially balanced incomplete block, with five treatments, and five replications. The herbicides were tested for preemergence

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(°) Paper presented at the XIV meeting of the Caribbean Food Crops Society, Institut National de la Recherche Agronomique (France), Domaine Duclos, Petit-Bourg, GUADELOUPE, F.W.I., June 27-29, 1977. Published with the approval of the Director of the University of Puerto Rico Agricultural Experiment Station as Journal Series n° . 892.

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activity at the following rates : Antor at 2.80 kg ai/ha (2.5 lb ai.ac), Buban 37 at 3.36 kg ai/ha (3.0 lb ai/ac), CGA 24705 at 3.36 kg ai/ha 3.0 lb ai/ac DCPA at 11.77 kg ai/ha (10.5 lb ai/ac), and a no-treatment control. The herbicides were applied immediately after planting, using a PIO-driven Chem-Farm sprayer transported by a Ford 3000 tractor. Overhead irrigation was applied within 24 hours after herbicide applications were completed. Subsequent irrigation was applied as required. To avoid disturbing herbicidal activity, the crop was not cultivated. Other requirements, such as disease and pest control practices were conducted as recommended by the Estacion Experimental Agricola (1976).

Crop stand was evaluated at 21 days after planting, and percentage weed control at 49 days after treatment, was determined by species count in treated and untreated plots. Grid areas sampled were 0.54 m^2 (5.86 ft^2). Species counted in untreated plots were considered 100 percent population for that individual, and plants found in the treated plots were considered as survivors. The percentage control of each species was calculated mathematically.

The crop was harvested in one picking at 90 days after seeding. Well formed heads having weights of 0.45 kg (1.0 lb) or more were classified as marketable, with the balance of the harvest treated as culls.

RESULTS AND DISCUSSION

Percentage crop stand, determined from plant count made 21 days after planting, is shown in table 1. There was no detrimental effect on seedlings that germinated in DCPA treatments, when compared to the no-treatment control. Buban 37, CGA 24705 and Antor demonstrated varying degrees of phytotoxicity, with Antor being most lethal to seedlings. These results are contrary to those previously reported by Jackson & Sierra (1973, 1977), working with "Stonehead" cabbage in the same area and soil series. "Market Prize" cabbage was used in this experiment under discussion, and these results may indicate that there exists a varietal sensibility of cabbage to Antor. Such cases of cabbage cultivar sensitivity to herbicides, has been reported by Wilson (1972).

Total yield, in metric tons/ha is indicated in table 1. The tonnage of the DCPA treatments was significantly higher than all other treatments in the experiment. There was no significant difference between Buban 37 and CGA 24705 treatments, and both were significantly superior in yield to the Antor and notreatment control. The control treatments were not weeded, and inadequate yield was due to light, water, nutrient competition of the crop/weed population. Antor treatments were low yielding owing to the phytotoxicity to seedlings and the abundance of sub-standard heads.

DCPA applications gave significantly larger harvest of marketable tonnage over all other treatments, as shown in table 1. There was no difference between CGA 24705 and Buban 37, and both treatments were higher yielders than the Antor and notreatment control.

There was no significant difference in the average marketable head weights in the DCPA, CGA 24705, Buban 37 and Antor treatments.

Weed control effectiveness of the chemicals evaluated is shown in table 2. A total of then weed species were recorded, with three being grasses. Due to the variation of common names throughout the Caribbean, and for English and Spanish descriptions and illustrations of these species, the reader is referred to Vélez & Van Overbeek (1950), Adams, et al (1968) and Cardenas, et al (1972).

All four herbicides effected very good weed control of all species recorded. *Triathema portolocastrum* demonstrated more tolerance to Andor, Buban 37, and CGA 24705 than to DCPA, However, with a control of 80-85 %, it cannot be considered a problem weed in these treatments.

Table 1. "Market Prise" cabbage. Herbicides used and rates applied showing effect on total, marketable and cull yield. Tons are metric (2,204 6 Lbs) and head weights in Kgs.

Herbicide	Kgs Ai/Ha.	Percent crop Stand	Total yield		Marketable yield		cull yield	
			Tons/ha.	Avg Head Wt. (kg.)	Tons/Ha.	Avg Head Wt. (kg.)	Tons/	Avg Head Wt. (kg.)
DCPA	11.8	95.3	71.1 a(°)	0.68	56.9 a(°)	0.85 a(°)	14.2	0.34
CGA 24705	3.4	78.3	49.3 b	0.63	42.2 b	0.82 a	7.1	0.27
Duban 37	3.4	85.0	53.8 b	0.60	40.8 b	0.78 a	17.5	0.36
Antor	2.8	57.3	28.5 c	0.45	17.6 c	0.73 a	28.5	0.19
Control	0.0	95.0	18.1 d	0.47	4.8 d	0.61 b	13.3	0.32

Table 2. Percent control of broadleaf and grass weeds by four herbicides evaluated on "Stonehead" cabbage

Weed Species	Antor	Duban 37	CGA 24705	DCPA	No treat
Grasses :					
Digitaria sanguinalis	85	100	100	95	0
Echinochloa colonum	100	100	95	90	0
Eleusine indica	100	100	100	95	0
Broadleafs :					
Amaranthus dubius	100	95	95	90	0
Borhaavia decumbens	95	100	95	100	0
Chamaecrysta aeschynomene	95	90	100	100	0
Cleome speciosa	100	100	100	100	0
Euphorbia heterophylla	100	100	100	95	0
Portulaca oleraceae	100	100	100	100	0
Triathema portolacastrum	85	85	80	100	0
Total control Avg.	96	88	96	96	0

(°) Yields followed by a letter in common do not differ significantly at the 1% level

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ABSTRACT

Three experimental preemergence herbicides ; Buban 37(°°°), CGA 24705, and Hercules 2234 (Antor) were tested for their control capability of weeds, and their effect on the yield of "Market Prize" cabbage. For the seven week period following application, the three chemicals were effective as DCPA (Dacthal) in the control of grass weeds. DCPA was superior to the three experimental herbicides in the control of horse purslane (*Trianthema portolacastrum*). All chemicals demonstrated equal capability in the control of other broadleaft weed species. DCPA treatments were significantly higher in marketable tonnage over the other chemicals evaluated. There was no significant difference in yields of the Buban 37 and the CGA 24705 treatments, of which both were significantly higher than the Antor treatment. There was no significant difference in the individual head weights of marketable cabbage of the four herbicide treatments.

RESUMEN

Los siguientes herbicidas preemergentes, a decir ; Antor, Buban 37, CGA 24705 y DCPA, fueron evaluados en repollo "Market Prize" con los siguientes resultados :

La candidad mercadeable de repollo en los tratamientos con DCPA fue significativamente mayor que en los otros tratamientos. No se encontró ninguna diferencia significativa en cuanto al rendimiento mercadeable con los tratamientos de Buban 37 y CGA 24705. Los tratamientos con Antor fueron los mas fitotoxicos en cuanto a la germinacion y el crecimiento juvenil del repollo "Market Prize", resultando en el rendimiento comercial mas bajo obtenido de todos los tratamientos debido a la reduccion en poblacion de plantas y el tamaño bajo de lo normal de las cabezas de repollo. Todos los herbicidas utilizados en este trabajo produjeron muy buen control de las gramineas. Todos los herbicidas demostraron igual capacidad para el control de yerbajos de hoja ancha. El DCPA fue superior a del Antor, Buban 37, y CGA 24705 en el control del yerbajo, verdolaga de hoja ancha (*Triathema portolacastrum*).

(°°°) Trade names are used solely for the purpose of providing specific information. Mention of trade names does not constitute a guarantee or warranty of materials or equipment by the Agricultural Experiment Station of the Univ. of P.R., or an endorsement over other equipment or materials not mentioned.