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PRIMARY SCREENING OF NEW UNREGISTERED PRE-EMERGENCE VEGETABLE HERBICIDES, 111*

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ABSTRACT

Four new, unregistered candidate herbicides: BAY-NTN-6867, BUBAN-37, CGA-24705 and Th-30843 were evaluated on fifteen direct-seeded food crops. All chemicals were applied at manufacturer's recommended rate, plus one-half and double. At the recommended rate all chemicals were compatible with okra, pumpkin, snapbean, sunflower and sweet-corn; three with pigeon pea and sweet pepper; two with cabbage, cucumber and watermelon, and only one with cantaloupe and tomato. None of the chemicals tested were suitable for lettuce (Head & Leaf) or onion. Weed susceptibility or tolerance to the candidate herbicides are discussed.

INTRODUCTION

The multicrop and multiweed field testing programme under way at the Agricultural Experiment Station of the University of Puerto Rico provides the opportunity for chemical companies to have their new compounds tested under tropical conditions and provides an early preliminary evaluation of new compounds.

The method of testing used is described in detail by Furtick and Romanowski (1967), and has been used successfully in Puerto Rico by Jackson and Sierra (1973, 1974). It consists of planting one row each of the crops to be tested, and then applying the herbicides in bands at right angles to the length of the rows. Band application of the herbicide

is made at the desirable width and recommended concentrations, and may or may not be replicated with the inclusion of as many check plots as considered necessary. Such an experiment was established at the Fortuna Substation, Juana Diaz, Puerto Rico on March 24, 1975, and was terminated on April 21, 1975.

Most of the chemicals tested are new and considered experimental. This paper does not contain recommendations. It is only a report of injury evaluations to a number of crops and of information on control of weed species. Interpretation of these results should be made with this in mind.

MATERIALS AND METHODS

The planting was made on a well prepared field of Paso Seco Sandy Loam (Sand 40.0%, Loam 34.6%, and Clay 25.4%). Soil pH was 7.43, with 2.375 organic matter and a base exchange capacity of 28 meq. per 100 grams.

Planting was accomplished with a Stanhay MK-11 precision seed spacing drill, using the correct size belt for each crop planted and depth depending on species requirement. Planting speed was 2.4 Km./hr (1.5 ml/hr), utilizing a Ford tractor of 300 series as the power source. Seeding was extra heavy to assure a good stand of crop, with a between the row spacing of 0.45 m (1.5 ft.).

One row each of the following crops was included in the test: Hawaii-68 sweet corn, Texas Yellow Grano 502 onion, Market Prize Hybrid cabbage, Romano Bush snapbean, Kaki pigeon pea, Dwarf Long Green Pod okra, Walter tomato, Cubanelle sweetpepper, Borinquen pumpkin, Calhoun Gray watermelon, Gemini 7 Hybrid cucumber, Perlita cantaloupe, Black Seeded Simpson leaf lettuce, Great Lakes R200-95 head lettuce and Mammouth Gray Stripe sunflower.

All herbicides were tested for pre-emergence weed control activity, and applications were made at 3 levels the manufacturer's recommended rate, one-half and double. Materials are expressed as active ingredient per hectare and the rates applied were: BAY-NTN-6867 at 2.5, 4.47, and 8.96 kg (2.0, 4.0 and 8.0 lb); Buban-37 at 2.25, 4.47 and 8.96 kg (2.0, 4.0 and 8.0 lb); CGA-27405 at 0.45, 0.91 and 1.81 kg (1.0, 2.0 and 4.0 lb); and TH-30843 at 0.56, 1.12 and 2.5 kg (0.5, 1.0 and 2.0 lb).

Materials were applied using a Chem-farm Sprayer with PTO pump powered and transported by a Ford 3000 tractor. Four Delvan FS-8-80^o nozzles set to spray a band 1.8 m (6.0 ft) in width were used,

with each nozzle delivering 2865 cc/min at 20 psi. Pressure was maintained using a tachymeter setting of 1500 rpm and a forward speed of 2.4 kg/hr (1.5 ml/hr). Plots were sprayed at right angles to crop rows. Each plot was 12.7 x 1.8 m (42 x 6ft). The sprayer was thoroughly washed using ammonia-detergent solution after each treatment application.

The quality of water for mixing chemicals applied was as follows: pH 6.8, Na 5.45 meq/l, Ca Mg 3.45 meq/l, conductivity of 0.79 mmhos/l, and a temperature of 29.4°C (85°F).

The day was partly cloudy with wind south east at 6.4 km/hr (4.0 mph). Air temperature 30.0°C (86°F). Relative humidity 45%, soil temperature at 5.1 cm (2 in) 31.7°C (89°F).

All irrigation was applied overhead. The first irrigation was sufficient to saturate the field to puddling and then turned off. Water quality of the first irrigation was the same as that used for mixing chemicals. All irrigation was applied as required but to the point of saturation only. Total rainfall for the four weeks duration of the experiment was 2.64 cm (1.04 in), and greatest precipitation, 1.07 cm (0.42 in) occurring 18 days after initiation. Highest temperature was 32.8°C (91°F) and lowest 17.2°C (63°F), with a 28 day mean of 24.5°C (76.4°F).

Crop injury ratings, based on reduction in vigor and stand, were obtained on the entire test on April 21, 1975, four weeks after pre-emergence treatments. The following subjective rating system was employed:-

- 1 = No injury to crop or reduction in stand.
- 2 = Slight injury, visual symptoms to herbicide damage from which the crop plant would recover.
- 3 = Moderate injury, severe phytotoxic symptoms from which the crop plant may or may not recover.
- 4 = Severe injury, herbicide damage to an extent that crop plant could not survive and yield a marketable crop.
- 5 = Dead, complete kill.

Weed control and susceptibility was determined by species count in the treated and untreated plots. Grid area sampled was 2076.3 cm² (324 in²). Species counted in untreated plots were con-

sidered 100 percent population for that specie, and plants encountered in treated plots were considered representative as survivors. Tolerance was calculated mathematically.

RESULTS AND DISCUSSION

Ratings on 15 crop and 6 weed species are presented for 4 chemicals in Tables 1 and 2. BAY-NTN-6867 demonstrated selectivity for sweetcorn, snapbean, pumpkin, watermelon and sunflower, with control of caltrop, crabgrass, goosegrasse, horse pursland, pigweed and jungle rice at recommended rate of 1.81 kg (4.0 lb).

Buban-37 at 1.81 kg (4.0 lb) showed selectivity for sweetcorn, snapbean, pigeon pea, pumpkin and sunflower, while it satisfactorily controlled all 6 weed species.

CGA-24705 at 0.91 kg (2.0 lb) was selective for sweetcorn, snapbean, pigeon pea, and sunflower and controlled all 6 weed species.

TH-30843 at 0.45 kg (1.0 lb) demonstrated the greatest spectrum of selectivity of materials tested. It appears ideal for sweetcorn, snapbean, pigeon pea, okra, pumpkin, watermelon, cucumber and cantaloupe, and controlled all weeds except horse purslane.

Due to the variation of common names throughout the Caribbean the reader is referred to Velez and Van Overbeek (1950), Adams, *et al.* (1968) and Cardenas, *et al.* (1972) (for an English or Spanish description of species, common names and illustration of plants encountered).

SUMMARY

Four new unregistered pre-emergence herbicides were evaluated on fifteen food crops. Duration of the test was twenty-eight days for rating the crop and weed plants for resistance or susceptibility. Self-explanatory data is summarized in two tables, indicating chemical effect on crop and weed-plants.

RESUMEN

Se probaron cuatro nuevos yerbicidas en quince cosechas. La prueba duro veintiocho dias en donde se evaluo lar resistencia fitotoxica de la cosecha y la susceptibilidad de los yerbajos a los yerbicidas. Los datos, que se explican por si mismos, estan resumidos en dos tables que indican el efecto quimico en los yerbajos y cosechas.

TABLE 1. Primary Screening of New and Unregistered Herbicides, III. Effect of Chemical on Crop Germination and Early Growth up to 28 days after Treatment. Material rates are kg AI/ha.

Food Crop	Herbicide	BAY-NTN-6867		Buban-37		CGA-24705		TH-30843					
		2.25	4.47	8.96	2.25	4.47	8.96	1.12	2.25	4.47	0.56	1.12	2.25
Sweet corn		1*	1	2	1	1	1	1	1	2	1	1	3
Onion		3	5	5	2	5	5	5	5	5	2	4	5
Cabbage		1	4	5	1	2	5	1	2	3	1	3	5
Snapbean		1	1	1	1	1	1	1	1	1	1	1	1
Pigeon Pea		1	3	4	1	1	3	1	1	2	1	1	1
Okra		2	2	3	1	2	5	1	2	3	1	1	3
Tomato		3	4	5	1	2	3	1	3	5	2	4	5
Sweet Pepper		1	2	5	1	2	5	2	3	4	1	2	3
Pumpkin		1	1	2	1	1	2	2	2	4	1	1	1
Watermelon		1	1	3	1	3	4	2	3	4	1	1	1
Cucumber		1	2	3	2	3	4	1	3	4	1	1	1
Cantaloupe		2	3	5	1	2	3	2	3	4	1	1	2
Leaf lettuce		5	5	5	3	5	5	5	5	5	5	5	5
Head lettuce		5	5	5	5	5	5	5	5	5	5	5	5
Sun flower		1	1	1	1	1	1	1	1	2	1	2	3

* Crop ratings: 1 - No injury, 2 - Slight injury, 3 - Moderate injury, 4 - Severe injury and 5 - Dead.

TABLE 2. Primary Screening of New and Unregistered Herbicides, III. Control of Prevalent Weed Species Encountered. Materials are kg AI/ha.

Weed specie	BAY-NTN-6867		Ruban-37		CGA-24705		TH-30843					
	2.25	4.47	8.96	2.25	4.47	8.96	1.12	2.25	4.47	0.56	1.12	2.25
<i>Digitaria sanguinalis</i>	94	96	100	100	100	100	100	100	100	100	100	100
<i>Echinochloa colonum</i>	100	100	100	100	100	100	100	100	100	100	100	100
<i>Eleusine indica</i>	100	100	100	100	100	100	100	100	100	100	100	100
<i>Trianthema portulacastrum</i>	93	98	100	94	100	100	63	92	100	15	19	95
<i>Amarantus dubius</i>	100	100	100	100	100	100	93	100	100	100	100	100
<i>Kallstromia maxima</i>	100	100	100	100	100	100	100	100	100	100	100	100

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