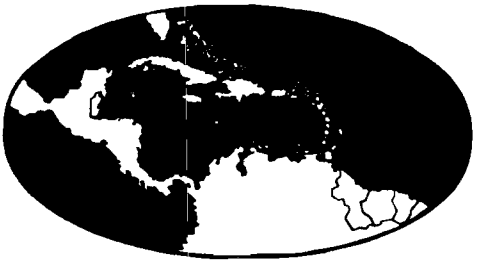
# CARIBBEAN FOOD CROPS SOCIETY



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# TOLERANCE OF TOMATO CULTIVARS TO POSTEMERGENT APPLICATION OF LEXONE (METRIBUZIN)

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## ABSTRACT

One hundred tomato cultivars were direct seeded, and treated with one postemergent application of Lexone at 28 days following the first irrigation. Applications of 0.56, 1.12, 1.68 and 2.24 kg ai/ha (0.50, 1.00, 1.50 and 2.00 lbs ai/ac) of metribuzin was made directly over the plants. Ten days after the application, the observed results were as follows: six cultivars were tolerant to all treatments, while 33 were tolerant up to the 1.68 kg/ha level only. Sixty of the cultivars demonstrated tolerance up to the 1.12 kg/ha level. One cultivar was susceptible to all rates tested.

Seven weed species were encountered, and their response to the postemergent herbicide was: complete kill of *Digitaria sanguinalis, Trianthema portulacastrum, Amaranthus dubius, Phyllanthus niruri, Kallstromea maxima* and *Portulaca oleracea* at all rates. *Echinochloa colonum* was tolerant at 0.56 and 1.12 kg ai/ha level; and susceptible at the 1.68 and 2.24 kg ai/ha rates.

## INTRODUCTION

Eue and Tietz (1970) reported on the development and weed control activity in irish potato of a new compound; 4-amino-6-(1, 1-dimethylethyl)-3-(methylthio)-1, 2, 4-triazin - 5 (4H) - one. This compound is known as metribuzin and is available under the trade names Sencor* and Lexone**, and at present is registered in the United States as a herbicide for weed control in soybean (*Glycine max*).

Since 1969, metribuzin has received much attention as a weed control chemical in horticultural and field crops. Velev and Elenkov (1972) conducted trials in Bulgaria in 1970 evaluating Senkor (metri-

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* Sencor (metribuzin) is the trade name for this compound registered in the US by Chemagro, Division of Baychem Corporation, Kansas City, MO 64120, USA.

** Lexone (metribuzin) is the trade name for this compound registered in the US by E.I. DuPont de Nemours & Co. (Inc.), Wilmington, DE 19898 USA.

Mention of trade names is solely to identify materials and does not constitute endorsement of a particular product.

buzin) as postemergent herbicide on tomato, and found it very effective against weeds and not toxic to the crop at the 0.50 and 0.75 kg/ha level. In France during 1970 and 1971, Michel and Pourcharesse (1972) reported light symptoms of phytotoxicity in certain cases at the postemergent rate of 1.0 kg/ha. Mulder (1972) working at four different trial sites with ten varieties in South Africa found them to tolerate rates of 0.75, 1.0, 1.5 and 3.0 kg/ha. Kampe (1972) found tomatoes display good tolerance, which suggests specific selectivity of metribuzin. Negative results were obtained with post planting application on "Rotkappchen" at 0.50 kg/ha, while "Moncymaker" displayed increasing tolerance with delay in treatment at the same rate. In New Zealand, Fellows (1972), observed no variation in tomato crop tolerance to dosage rate of 1.12 kg/ha as postemergent treatment made between 7 and 28 days after transplant. His tests involved nine cultivars in fifteen locations. Tomato tolerance to metribuzin, applied postemergent, has been acceptable under a wide range of Canadian conditions, and Phatak and Stephenson (1973) mention that slight foliar injury has not been uncommon. Fortino and Splitstrosser (1974) found that 'Heinz 1439' demonstrated more tolerance than 'Campbell 1327' to foliar application of metribuzin at 0.56 kg/ha growing under Illinois field conditions. Zeck, *et al.* (1973) summarises the results of 25 field trials conducted in the United States, indicating that tomato cultivars tested were tolerant to postemergent rates of 1.47 to 1.94 kg/ha (0.60 to 0.86 lb/ac).

Metribuzin is unregistered for tomato and is considered experimental in its application for use on this crop. This paper does not contain recommendations, but is a report of injury evaluation to a number of tomato cultivars and weed species. Interpretation of these results should be made with this in mind.

## MATERIALS AND METHODS

The method of testing employed is described in detail by Furtick and Romanowski (1967). It consists of planting on the flat, one row each of the cultivar to be tested, and then applying the herbicides at right angles over the crop. Band application of the herbicide is made at the desirable width and concentration. Such an experiment was established at the Fortuna Substation, Juana Diaz, Puerto Rico on February 4, 1975, and terminated on March 14, 1975. The design consisted of five treatments, and two replications, with one-hundred cultivars each treatment.

The planting was made on a well prepared field of Paso Seco Clay Loam (clay 31.2%, loam 36.0% and sand 32.8%). Soil pH was 7.13, with 3.01% organic matter and a base exchange capacity of 27 meq. per 100 grams.

Seeding was accomplished with a Stanhay MK-11 precision seed spacing drill. A plain rubber belt was employed with hole size and spacing which planted the seed in clumps of 6-9 seed each, with separation between clumps being 15.2 cm (6 in). Planting depth was 0.63 cm (0.25 in). Planting speed was 2.4 km/hr (1.5 mi/hr), utilizing a Ford tractor of 3000 series as the power source. Crop spacing between the row was 12.7 cm (5 in), this high density planting assured a good crop stand and an ideal canopy of foliage to be exposed to postemergent chemical application.

One row each of 100 tomato cultivars were included in the test, see Table 1.

The first irrigation was made immediately after planting and was sufficient to saturate the field and then turned off. All irrigations were applied as required but to the point of saturation only. Total rainfall for the 28-days growing period prior to the postemergent herbicide treatment was 2.64 cm (1.04 in), with the greatest precipitation, 1.55 cm (0.61 in), occurring at 27 days after planting. Temperatures for this corresponding period was; highest 30.6°C (87.0°F) and lowest being 13.3°C (56.0°F), with a 28-day mean of 23.5°C (74.8°F).

Lexone 50 WP (metribuzin) was tested for postemergent weed control activity and for crop tolerance. Materials are expressed as active ingredient per acre, and the rates applied were: 0.55, 1.12, 1.68 and 2.24 kg/ha (0.50, 1.00, 1.50 and 2.00 lbs/ac).

Herbicide applications were made using a Chem-Farm Sprayer with PTO powered and transported by a Ford 3000 tractor. Four Delvan FS-8-80° nozzles set to spray a band 1.8 m (6.0 ft) in width directly over the crop was used, with each nozzle delivering 2870 cc/min at 20 psi. Pressure was maintained using a tachometer setting of 1500 rpm and a forward speed of 2.4 km/hr (1.5 mi/hr). Plots were sprayed at right angles to crop rows. Each treated plot was 21.97 x 1.83 m (72 x 6 ft). The day was partly cloudy with wind south east at 4.2 km/hr (2.6 mph). Air temperature 29.4°C (85.0°F), and relative humidity 65%. For the ten-day period following postemergent application there was only 0.08 cm (0.03 in) of precipitation, occurring nine days after treatment. Highest temperature 30.6°C (87.0°F), and lowest 16.6°C (61.0°F), with a ten day mean of 23.9°C (75.0°F).

Crop injury ratings, based on reduction in vigor and plant population, were obtained for the entire test on March 14, 1975, ten days after postemergent treatment. The following subjective rating system was employed:

TABLE 1. Direct-seeded Tomato Cultivars Not-susceptible, Tolerant or Death Response to Postemerge application of Lexone (Metribuzin) at 0.55, 1.12, 1.68 and 2.24 kg/ha (0.50, 1.00, 1.50 and 2.00 lbs/ac) Treatment Rates.

| Cultivar | 0.55 | 1.12 | 1.68 | 2.24 | Cultivar | 0.55 | 1.12 | 1.68 | 2.24 |
|---|---|---|---|---|---|---|---|---|---|
| Ace | 1 | 1 | 2 | 3 | Manapal | 1 | 2 | 3 | 3 |
| Arc | 1 | 2 | 2 | 3 | Marglobe Supreme | 1 | 1 | 3 | 3 |
| Atkinson | 1 | 1 | 2 | 3 | Marion | 1 | 1 | 3 | 3 |
| Bradley | 1 | 1 | 2 | 3 | Mecheast 22 | 1 | 1 | 3 | 3 |
| Break O'Day | 1 | 1 | 3 | 3 | Merit | 1 | 1 | 3 | 3 |
| Calmart VNF | 1 | 1 | 3 | 3 | New Yorker | 1 | 1 | 3 | 3 |
| Campbell 17VF | 1 | 1 | 2 | 2 | Orheart | 1 | 1 | 3 | 3 |
| Campbell 28 | 1 | 1 | 2 | 3 | Puckmore | 1 | 1 | 2 | 3 |
| Campbell 52-12 | 1 | 1 | 2 | 3 | Pearson A-1 Imp. | 1 | 1 | 2 | 3 |
| Campbell 1327 | 1 | 1 | 2 | 3 | Peto Mech 11 | 1 | 1 | 2 | 3 |
| Castlemoor 11 | 1 | 1 | 2 | 2 | Pickrite | 1 | 1 | 3 | 3 |
| Castle Pear 237 | 1 | 1 | 2 | 2 | Pink Deal | 1 | 1 | 2 | 3 |
| Castlemech H | 1 | 1 | 3 | 3 | Ponderosa | 1 | 1 | 2 | 3 |
| Castlemech 9 | 1 | 1 | 3 | 3 | Potomac | 1 | 1 | 3 | 3 |
| Centennial | 1 | 1 | 3 | 3 | Red Bush | 1 | 1 | 3 | 3 |
| Chef | 1 | 1 | 2 | 3 | Red Cherry, Lg. | 1 | 1 | 3 | 3 |
| Chico 111 | 1 | 1 | 2 | 2 | Red Pear | 1 | 1 | 3 | 3 |
| Chico Grande | 1 | 1 | 2 | 3 | Roma VF | 1 | 1 | 3 | 3 |
| Chico Rex | 1 | 1 | 2 | 3 | Royal Ace | 1 | 1 | 3 | 3 |
| CPC-2 | 1 | 1 | 2 | 3 | Rutger's | 1 | 1 | 3 | 3 |
| Del Mar | 1 | 1 | 2 | 3 | San Marzano | 1 | 2 | 3 | 3 |
| Dorchester | 1 | 1 | 2 | 3 | Saturn | 1 | 1 | 3 | 3 |
| Early Pak 7 | 1 | 1 | 3 | 3 | September Dawn | 1 | 1 | 3 | 3 |
| ES-24 | 1 | 2 | 2 | 3 | Sioux | 1 | 1 | 3 | 3 |
| ES-58 | 1 | 1 | 3 | 3 | Sun Ray | 1 | 1 | 3 | 3 |
| Fireball | 1 | 1 | 3 | 3 | Supermarket | 1 | 1 | 3 | 3 |
| Floradel | 1 | 1 | 2 | 3 | Traveler | 1 | 1 | 3 | 3 |
| Flomlou | 1 | 1 | 2 | 3 | Tropi Gro | 1 | 1 | 2 | 3 |
| Florida MH-1 | 1 | 1 | 2 | 3 | Tropi Red | 1 | 1 | 2 | 3 |
| Glamour | 1 | 2 | 2 | 3 | UC-90 | 1 | 1 | 2 | 3 |
| Grand Prix | 1 | 1 | 2 | 3 | UC-105J | 1 | 1 | 3 | 3 |
| Heinz 1350 | 1 | 1 | 3 | 3 | UC-134 | 1 | 2 | 3 | 3 |
| Heinz 1370 | 1 | 2 | 3 | 3 | Valiant | 1 | 1 | 3 | 3 |
| Heinz 1439 | 1 | 2 | 3 | 3 | Venus | 1 | 1 | 3 | 3 |
| Highlander | 1 | 1 | 3 | 3 | VF-36 | 1 | 1 | 3 | 3 |
| Homestead Elit | 1 | 1 | 3 | 3 | VF-34 | 1 | 1 | 3 | 3 |
| Homestead 24 | 1 | 1 | 3 | 3 | VF-99 | 1 | 1 | 3 | 3 |
| Homestead FM61 | 1 | 2 | 2 | 3 | VF-109 | 1 | 1 | 3 | 3 |
| Homestead 500 | 1 | 1 | 2 | 3 | VF-198 | 1 | 1 | 3 | 3 |
| H-1706 | 1 | 1 | 3 | 3 | VF-315 | 1 | 1 | 3 | 3 |
| Imperial | 1 | 1 | 3 | 3 | VF-317 | 1 | 1 | 2 | 2 |
| Indian River | 1 | 1 | 2 | 3 | VF-65-433 | 1 | 1 | 2 | 3 |
| Italian Dwarf | 1 | 1 | 3 | 3 | VF-134-1-2 | 1 | 1 | 2 | 2 |
| June Pink | 1 | 1 | 3 | 3 | VF-145 Gus | 1 | 1 | 3 | 3 |
| L - 1626 | 1 | 1 | 3 | 3 | VF-145-21-4 | 1 | 1 | 3 | 3 |
| L-2624A | 1 | 2 | 3 | 3 | VFN-8 | 1 | 1 | 3 | 3 |
| L-2624C | 1 | 2 | 3 | 3 | Wabash | 1 | 1 | 3 | 3 |
| L-2624H | 1 | 2 | 3 | 3 | Walter | 1 | 1 | 3 | 3 |
| L-3000R | 3 | 3 | 3 | 3 | Yates | 1 | 1 | 2 | 3 |
| Manalucie | 1 | 1 | 3 | 3 | Yellow Plum | 1 | 1 | 2 | 3 |

1 = Not-susceptible: No injury to crop plant or reduction in vigor or stand, plants were healthy and actively growing.

2 = Tolerant: Phytotoxic symptoms from which the plant would remain partly retarded or recover, including survivors that would produce a crop of questionable economic value.

3 = Dead: Complete kill in zero to ten days after treatment.

Weed control and susceptibility was determined by species count in treated and untreated plots that were not planted. Grid areas sampled were 3.34 sq. m (36 sq. ft). Species counted in untreated plots were considered 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 100 tomato cultivars and 7 weed species are presented for Lexone (metribuzin) at four concentrations in Tables 1 and 2. Six cultivars demonstrated tolerance, with complete control of caltrop, large crab grass, common purslane, horse purslane, junglerice, niruri and pigweed at the 2.24 kg/ha (2.0 lb/ac) rate.

Thirty-three tomato cultivars demonstrated tolerance to postemergent Lexone (metribuzin) at the 1.68 kg/ha (1.50 lb/ac) rate with control of all weed species, except junglerice which demonstrated slight tolerance.

Sixty cultivars demonstrated tolerance to the postemergent test herbicide at the 1.12 kg/ha (1.00 lb/ac) rate, six of the weed species were controlled completely, junglerice was not controlled.

One cultivar was not tolerant to any of the four rates tested.

Twelve cultivars were not susceptible to damage at the 0.55 kg/ha (0.50 lb/ac) rate and 87 were not susceptible to damage at the 1.12 kg/ha (1.00 lb/ac) level. This tends to indicate that the postemergent potential of metribuzin at the lower rates (0.55 and 1.12 kg/ha)

for weed control in tomato appears most promising; however, it would leave much to be desired when used in geographical areas where *Echinochloa colonum* is considered a problem weed.

**TABLE 2. Weed Susceptability to Postemerge Application of Lexone (Metribuzin) Applied at 0.35, 1.12, 1.68 and 2.24 kg/ha (0.50, 1.00, 1.50 and 2.00 lbs Al/Ac) 28 Days After First Irrigation. Percent Weeds Controlled.**

| Weed Species* | | kg. Ai/Ac | | | |
|---|---|---|---|---|---|
| Latin Name | Common Name | 0.55 | 1.12 | 1.68 | 2.24 |
| *Digitaria sanguinalis* | Large crab grass | 100 | 100 | 100 | 100 |
| *Echinochloa colonum* | Junglerice | 0 | 30 | 70 | 95 |
| *Trianthema portulacastrum* | Horse purslane | 100 | 100 | 100 | 100 |
| *Amaranthus dubius* | Pigweed | 100 | 100 | 100 | 100 |
| *Phyllanthus niruri* | Niruri | 100 | 100 | 100 | 100 |
| *Portulaca oleracea* | Common purslane | 100 | 100 | 100 | 100 |
| *Kallstromea maxima* | Caltrop | 100 | 100 | 100 | 100 |

*Latin and common names after Cardenas, J.; C.E. Reyes and J. Doll, Tropical Weeds-Malezas Tropicales, I.P.P.C, Ore. State Univ., Corvallis, OR 97331 USA.

## SUMMARY

Unregistered Lexone (metribuzin) at four concentrations was evaluated on 100 tomato cultivars. Test duration was thirty-eight days rating the crop and weed for tolerance or susceptibility. Self-explanatory data is summarized in two tables, indicating herbicide effect on crop and weed plants.

## RESUMEN

El nuevo yerbicida Lexone (metribuzin) fue probado en cien variedades de tomate usando cuatro niveles de concentracion. La prueba duro treintiocho dias, evaluandose la resistencia fitotoxica de la cosecha y la susceptibilidad de los yerbajos al yerbicida. Los datos que se explican por si misomos estan resumidos en dos tablas que indican el efecto quimico en los yerbajos y en los cultivares incluidos en el estudio.

## ACKNOWLEDGEMENT

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