Yam (Dioscorea spp.) is the most important starchy root crop in Puerto Rico. In 1990-91, local production reached 10,546 metric tons with a farm value of $8.7 million. One of the major factors limiting yam production has been the high production cost associated with manual labor for controlling weeds. Recently, chemical weed control has gained acceptance in root crops in Puerto Rico. In recent years research efforts have been intensified in an attempt to provide root crop farmers with efficient and inexpensive weed control options.

Since yam has a relatively long growing cycle, a single preemergence treatment would not provide the required long-term weed control. Therefore, a sequential postemergence herbicide treatment is needed. This paper reports our research findings concerning the use of three preemergence herbicides: imazethapyr (2-[4,5-dihydro-4-methyl-4-(1-methyl-ethyl)-5-oxo-1H-imidazol-2-yl]-5-ethyl-3-pyridcarboxylic acid); linuron [N'-(3,4-dichlorophenyl-N-methoxy-N-methylurea] and lactofen (+)-(2-ethoxy-1-methyl)-2-oxoethyl-5-(2-chloro-4-(trifluoromethyl)phenoxy)-2-nitrobenzoate]. These herbicides were used in sequential application with a postemergence herbicide, paraquat (1,1'-dimethyl-4,4'-bipyridinium ion).

The experiment was conducted at the UPR-Mayagüez Finca Montaña in Aguadilla, P.R. Seed pieces of cv. Habanero yam (Dioscorea rotundata Poir. in Lam) were planted 2 April 1993 in a Coto clay (Oxisol). Soil is pH 7.4; organic matter content, 2.1%; and clay content, 41%. The monthly rainfall in the nearby Isabela area was 22.8 cm, 15.3 cm, 6.9 cm, 6.2 cm, 10.6 cm, 9.9 cm, 10.6 cm, 10.7 cm for April, May, June, July, August, September, October, and November 1993, respectively. Preemergence herbicides used were imazethapyr (Persuit 2AS) at 0.224 and 0.448 kg ai/ha, lactofen (Cobra 240EC) at 0.224, 0.448 kg ai/ha and linuron (Lorox 50W) at 3.36 and 6.72 kg ai/ha. A hand weeded control and a non-weeded control were included. The preemergence was applied 5 April 1993 with a CO₂ pressurized portable sprayer attached to a four-nozzle boom. The sprayer was calibrated to deliver 108 L/ha of herbicide spray. Postemergence applications of paraquat (Gramoxone super) at 0.56 kg ai/ha were applied twice (10 May and 21 June 1993) with a standard knapsack sprayer at 936 L/ha herbicide spray.

Four rows of yams were planted 0.6 m apart in 6.1 x 6.1 m plots provided with drip irrigation. Six weeks after planting, yam plants were trellised to wooden posts 2 m above ground level. Weeds from...
the hand weeded treatment were removed 10 May and 15 July 1993. Weed control and phytotoxicity were recorded periodically. A randomized complete block design with four replications was used. The agronomic practices recommended by the Agricultural Experiment Station for growing yams were followed. Marketable tuber yield was recorded at harvest (19 October 1993). Analysis of variance determined yield differences among treatments. Means were separated with Duncan’s multiple range test at the 0.05 level of probability.

The predominant weed species present in non-weeded control plots were wild poinsettia (Euphorbia heterophylla L.), cow-itch (Mucuna pruriens (L) DC), pigweed (Amaranthus dubius Mart. ex Thell.), morning glory (Ipomoea nil (L) (Willd.) Choisy), large crabgrass (Digitaria sanguinalis (L) Scop.), jungle rice (Echinochloa colona (L) Link), goosegrass (Eleusine indica (L) Gaertn.), johnsongrass (Sorghum halepense (L) Pers.) and purple nutsedge (Cyperus rotundus L.).

Table 1 shows first weed control rating (10 May 1993) for preemergence control of weeds achieved by imazethapyr, lactofen and linuron. Imazethapyr at either rate controlled most of the above-mentioned weeds excellently. Lactofen and linuron did poorly or satisfactorily (40-75%). None of the herbicides tested effec-

TABLE 1.—Effect of preemergence and postemergence herbicide treatments on weed control and tuber yield of yams, 1993.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Overall weed control(^{1})</th>
<th>Phytotoxicity(^{2})</th>
<th>Yield(^{4})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate kg ai/ha</td>
<td>5WAP(^{3}) 9WAP(^{3})</td>
<td>5WAP(^{3}) 9WAP(^{3})</td>
<td>kg/ha</td>
</tr>
<tr>
<td>Imazethapyr 0.224 PRE + paraquat 0.56 POE</td>
<td>90 85 0 0</td>
<td>24,708 a</td>
<td></td>
</tr>
<tr>
<td>Imazethapyr 0.448 PRE + paraquat 0.56 POE</td>
<td>95 90 0 0</td>
<td>21,833 a</td>
<td></td>
</tr>
<tr>
<td>Lactofen 0.224 PRE + paraquat 0.56 POE</td>
<td>40 80 0 0</td>
<td>26,481 a</td>
<td></td>
</tr>
<tr>
<td>Lactofen 0.448 PRE + paraquat 0.56 POE</td>
<td>50 75 0 0</td>
<td>25,931 a</td>
<td></td>
</tr>
<tr>
<td>Linuron 3.36 PRE + paraquat 0.56 POE</td>
<td>60 75 0 0</td>
<td>22,628 a</td>
<td></td>
</tr>
<tr>
<td>Linuron 6.72 PRE + paraquat 0.56 POE</td>
<td>75 80 0 0</td>
<td>23,974 a</td>
<td></td>
</tr>
<tr>
<td>Weeded control</td>
<td>100 60 0 0</td>
<td>21,772 a</td>
<td></td>
</tr>
<tr>
<td>Non-weeded control</td>
<td>0 0 0 0</td>
<td>11,498 b</td>
<td></td>
</tr>
</tbody>
</table>

\(^{1}\)Weed control rating is based on a 0-100 scale, where 0=no effect, 100=perfect control.

\(^{2}\)Phytotoxicity evaluation is based on a 0-100 scale, where 0=no effect, 100=complete effect.

\(^{3}\)WAP=Weeks after planting.

\(^{4}\)Means in a column followed by the same letter are not significantly different at P=0.05 according to DMRT.

tively controlled the purple nutsedge. Nevertheless, the purple nutsedge was not considered a major population. None of the herbicides tested caused crop injury. The second weed control rating (1 June 1993) indicates chiefly the postemergence activity of paraquat. Paraquat was the only herbicide contributing to good control of both broadleaves and grasses at this stage of yam growth.

None of the treatments differed significantly in tuber yield with the exception of the non-weeded control, which was significantly lower than the rest of the treatments (table 1). The initial excellent preemergence weed control provided by imazapyr did not reflect in yield. This could be attributed to the fact that weeds were not controlled by a preemergence herbicide alone. The contribution of a postemergence herbicide was important during the critical period of weed competition in yams which extended from three to four months after planting. Weeds should be kept under control during this critical period. Under tropical climatic conditions preemergence herbicides can provide weed control up to two months. Thus, the sequential application of a preemergence herbicide with a postemergence herbicide is needed to prevent yield reduction.

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