

Research Note

HERBICIDES AND PLASTIC MULCH IN YAM (*DIOSCOREA ALATA*)¹

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Among root and tuber crops, yam (*Dioscorea* spp.) is the most important starchy root crop in terms of gross income in Puerto Rico. Yam production in 2002-03 was estimated at 72 t for a farm value of over \$3 million (Dept. of Agric., 2003). A major factor limiting yam production and acreage is the cost of weed control (Cortés and Beale, 1984). Weed interference in yam may reduce yield up to 47% (Liu et al., 1990). Because of the high cost of labor for hand weeding, it is important to develop other alternatives for weed control, such as the use of herbicides and cultural practices. Since yam has a relatively long growing cycle, a single preemergence treatment usually does not provide the required long-term weed control, particularly when planted without vine support. Therefore, sequential postemergence herbicide treatments are needed. Liu et al. (1994) determined that the use of imazethapyr, lactofen, or linuron as preemergence herbicides, followed by paraquat, gave good weed control in yam. The objective of this experiment was to compare the use of herbicides and plastic mulch for weed control in yam.

A field experiment was established at the Juana Díaz Substation 20 March 2002. Plots were four beds 6.09 m long and 1.5 m wide each. Tuber pieces of yam cv. Diamantes weighing between 113 and 227 g were planted 30.48 cm apart on top of the beds. All plots were drip irrigated as needed. Yam was grown without vine support. Four treatments were evaluated in a randomized complete block design with four replicates. Treatments were 1) plastic mulching and paraquat at 0.56 kg ai/ha postemergence (POE); 2) conventional (no plastic) with ametryn at 6 kg ai/ha preemergence (PRE), recommended practice; 3) conventional with clomazone at 1.12 kg ai/ha PRE; and 4) conventional with dimethenamid at 1.68 kg ai/ha PRE. Plastic mulch was installed one day before planting. Preemergence herbicides were applied one day after planting with a portable CO₂-pressured backpack sprayer delivering 187 L/ha. Visual ratings of weed control and weed count were recorded five weeks after herbicide applications. Four and five months after planting, all conventional plots received one hand hoeing and one post-emergence application of clethodim at 0.22 kg ai/ha. Two and three months after planting, plots with plastic mulch received one application of paraquat at 0.56 kg ai/ha between rows of plastic. Yams were harvested ten months after planting (30 January 2003).

Predominant broadleaf weeds were small spider flower (*Cleome gynandra*) and horse purslane (*Thrianthema portulacastrum*); the grasses were junglerice (*Echinochloa colona*) and goosegrass (*Eleusine indica*). In addition, there was purple nutsedge (*Cype-*

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TABLE 1. *Effect of herbicide treatments on weed control and weed count in yam five weeks after planting at Juana Díaz Substation.*¹

	Rate kg ai/ha	Weed control		
		Grasses	Broadleaves	Cyperus
----- % -----				
Plastic and paraquat	0.56 POE ²	100	100	100
Ametryn	6.00 PRE ²	83	88	69
Clomazone	1.12 PRE	100	98	89
Dimethenamid	1.68 PRE	71	80	55
	LSD (0.05)	NS ⁴	NS	NS

	Rate kg ai/ha	Weed density		
		Grasses	Broadleaves	Cyperus
----- no/m ² -----				
Plastic and paraquat	0.56 POE	0	0	0
Ametryn	6.00 PRE	5	6	35
Clomazone	1.12 PRE	5	3	5
Dimethenamid	1.68 PRE	25	11	13
	LSD (0.05)	16	NS	NS

¹Weed control and weed count percentages were estimated by visual ratings.

²POE denotes postemergence and PRE denotes preemergence.

⁴NS denotes non significant at $P < 0.05$.

rus rotundus). Five weeks after planting, no differences were found among treatments for weed control rating (Table 1). As for weed density, no differences were found among treatments for broadleaves and nutsedge. However, ametryn and clomazone reduced

TABLE 2. *Effect of herbicide treatments on yam yield and number of tubers at the Juana Díaz Substation.*

	Rate kg ai/ha	Marketable yield		Non-marketable yield	
		kg/ha	no/ha	kg/ha	no/ha
Plastic and paraquat	0.56 POE ¹	9,707	7,405	2,099	7,024
Ametryn <i>fb</i> ²	6.00 PRE <i>fb</i>	8,076	9,148	2,469	8,984
clethodim	0.22				
Clomazone <i>fb</i>	1.12 PRE <i>fb</i>	10,423	10,509	2,025	8,059
clethodim	0.22				
Dimethenamid <i>fb</i>	1.68 PRE <i>fb</i>	7,113	7,460	2,029	9,855
clethodim	0.22				
	LSD (0.05)	NS ³	NS	NS	NS

¹POE denotes postemergence and PRE denotes preemergence.

²*fb* denotes followed by.

³NS denotes non significant at $P < 0.05$.

junglerice and goosegrass density. None of the treatments affected yield or number of tubers (Table 2). Average marketable and non-marketable yields were 8,829 kg/ha and 2,155 kg/ha, respectively. The average numbers of marketable and non-marketable tubers were 8,630 and 8,480 tubers per hectare, respectively.

Yield obtained with use of plastic mulch was similar to that with conventional planting system (no plastic mulch). Data from this experiment indicated that dimethenamid could be an alternative herbicide for yam. In further evaluations, it is important to compare the cost of herbicide application with that of plastic mulch.

LITERATURE CITED

- Cortés, J. A. and A. J. Beale, 1984. Efecto de la competencia de las malezas en el rendimiento final del ñame Habanero (*Dioscorea rotundata* Poir) Proc. 19th Annual Meeting Caribbean Food Crops Society, pp. 146-154.
- Department of Agriculture of Puerto Rico, 2003. Ingreso bruto y neto de la agricultura de Puerto Rico 2002-03. Oficina de Estadísticas Agrícolas, Department of Agriculture, Santurce, P.R.
- Liu, L. C., J. Cardona and M. de L. Lugo, 1994. Sequential herbicide application in yams. *J. Agric. Univ. P.R.* 78:177-180.
- Liu, L. C., M. Santiago and A. González, 1990. Further evaluation of herbicides in yam (*Dioscorea* sp.). *J. Agric. Univ. P.R.* 74:221-227.