Research Note

LEAF AREA INDEX RELATED TO WEED SUPPRESSION IN UPLAND TARO[1]

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Reduction of pesticide use is an important consideration for the conservation of natural resources. However, herbicide use is a tool for optimum crop productivity. Reduction in plant spacing, accompanied by increased leaf area, has been associated with weed suppression, thus reducing the need for weed control (Berkowitz, 1988; Swanton and Weise, 1991). In Puerto Rico, ametryn is the only registered preemergence herbicide for weed control in root crops. Therefore, alternative weed control practices are needed. The objective of this study was to evaluate the relationship between leaf area index of upland taro (*Colocasia esculenta* var. esculenta) and weed density and growth.

The experiment was established February 1996 in a soil of the Corozal series (Aquic Haplohumults) with a 20% slope. Soil pH was 5.28 and organic matter content was 2.46%. The local cultivar Blanca was used. In cultivated *Colocasia* spp., leaf area depends on sett size and plant spacing (Waaijenberg and Aguilar, 1994; Shih and Snyder, 1991).

TABLE 1.—*Weed density in taro planted under upland conditions.*

Weed	Density[1]
	plants/m^2
Eleusine indica	9.7
Digitaria sanguinalis	9.1
Echinochloa colona	5.0
Commelina diffusa	3.2
Macroptilium lathyroides	3.0
Portulaca oleracea	2.4
Chamaesyce hirta	2.1
Cyperus rotundus	1.5

[1]Weed density of 0.5 plants/m^2 or less: *Momordica charantia*; *Mimosa pudica*; *Emilia sonchifolia*; *Cynodon dactylon*; *Oxalis* spp.; *Amaranthus dubius*; *Leptochloa filiformis*; *Panicum maximum*; *Cassia obtusifolia*; *Lepidium virginicum*; *Brachiaria purpuracens*; *Ipomoea* spp; *Euphorbia heterophylla*.

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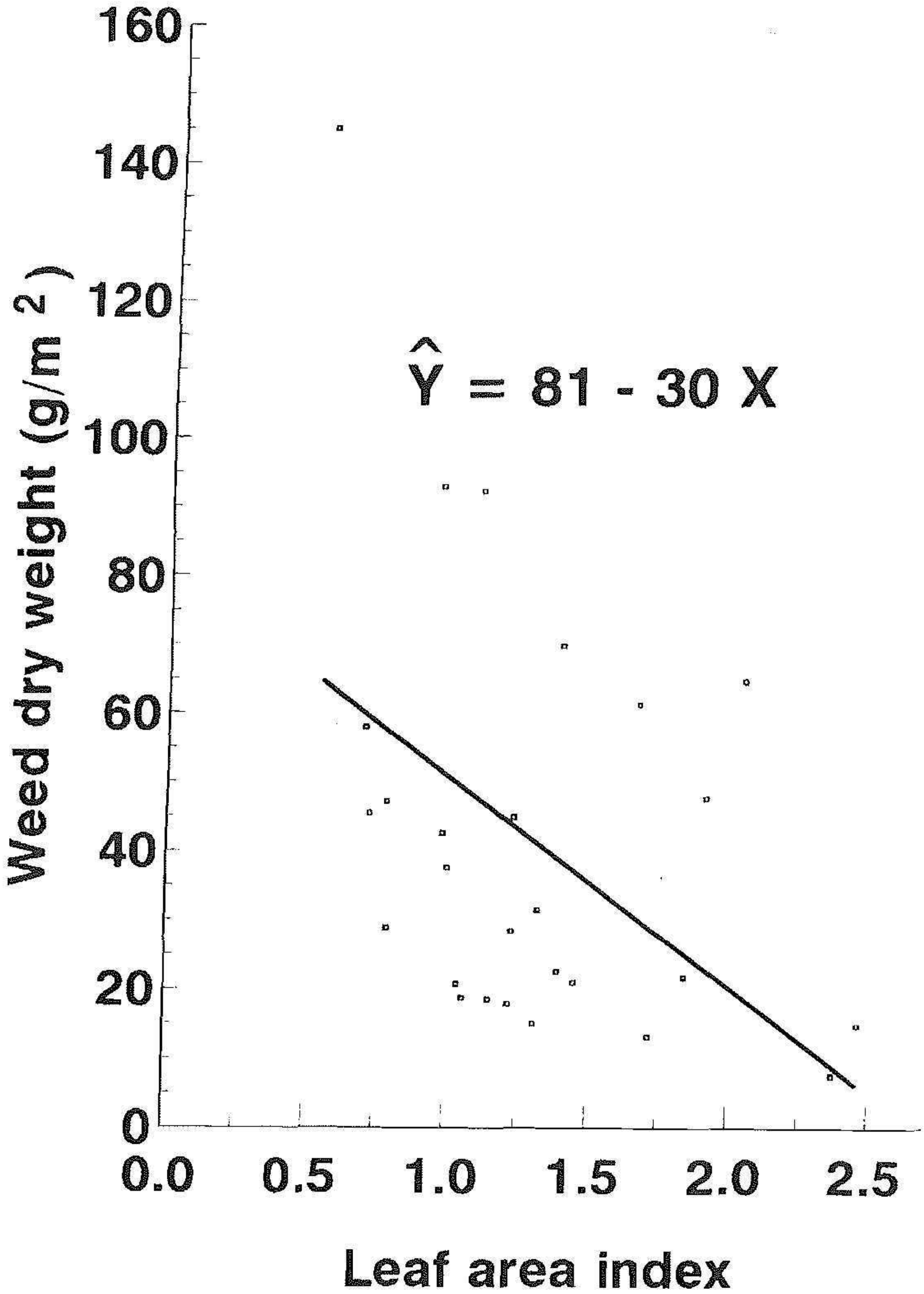

FIGURE 1. Relationship between leaf area index and weed dry weight in upland taro at 113 days after planting.

Therefore, to achieve different leaf area indexes, we planted setts of different sizes (57 to 144, 170 to 227, and 284 to 340 g/sett) in combination with stand density (17,928; 23,930; and 28,704 plants per hectare) following a 3 × 3 factorial arrangement. Three replications were used. Plots were three 6.1 m-long rows spaced at 0.91 m. After planting, standard management practices were used (Estación Experimental Agrícola, 1997). A month after emergence, all plots were hand-weeded; thereafter, weeds were not controlled.

At 113 days after crop emergence, weeds were identified and counted in six 0.13 m^2 quadrats that were randomly sampled from each plot. Weeds within two quadrats were harvested for above ground dry weight. Two taro plants (including suckers) per plot were sampled for leaf area. Area was determined by using an electronic area meter. Leaf area index (LAI) was calculated by dividing leaf area by the ground area occupied by the taro plants. Weed dry weight and counts were regressed to LAI.

Grasses were more common than broadleaves (Table 1). Taro LAI varied from 0.5 to 2.5 (Figure 1). The maximum LAI coincided with that reported by Goenaga (1995) for the Blanca cultivar. There was no significant regression between LAI and individual weed species density or total weed density. However, a significant negative relationship between LAI and weed dry weight was detected (Figure 1). Low leaf area indexes were related to higher weed dry weight. For *C. esculenta* var. antiquorum (eddoe), Waaijenberg and Aguilar (1994) reported that reduction of LAI resulted in increasing weed growth and interference. Results of this study indicate that rapid leaf area development and canopy cover are important considerations in an integrated weed management system for taro production under upland conditions.

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