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Poster #6

Response of Taro var. Lila or Bun Long to Levels of Supplemental Irrigation

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ABSTRACT.
Production of taro (*Colocasia esculenta*) throughout the Caribbean Basin has been drastically reduced as a consequence of the taro leaf blight. Traditional variety Lila (known as Bun Long in Hawaii) is very susceptible to the blight. In the short term there is interest in the production of Lila under drip irrigation, a system under which blight incidence tends to be lower. The objective was to provide practical information in regard to growth, yield, corm quality and the minimum irrigation requirement for taro Lila grown under upland conditions and under the presence of the blight. Three irrigation treatments were evaluated: rainfed and supplemental irrigation based upon Class A pan factors of 1.0 and 1.3. Providing Lila with supplemental irrigation of at least 1.0 ET resulted in increased growth. Irrigation was non significant for stand. There were no differences for corm fresh weight, nor in plant dry weight or harvest index between plants subjected to 1.0 and 1.3 Class A pan factors. This study suggests that to obtain a Lila crop under upland conditions and under the presence of the leaf blight water to be applied by irrigation should replace at least that lost through evapotranspiration.

KEYWORDS. *Colocasia esculenta*, upland taro, irrigation

INTRODUCTION

Production of taro (*Colocasia esculenta*) throughout the Caribbean Basin has been drastically reduced as a consequence of the taro leaf blight (*Phytophthora colocasiae*) (Mendez et al., 2005; Ortiz et al., 2007). Before the blight, over 95% of taro production in Puerto Rico was under wetland conditions. Traditional variety Lila –highly regarded for its table quality- is very susceptible to the blight (Rosa-Márquez et al., 2006). Lila is identical to the Hawaiian variety Bun Long (Schnell et al., 1999). Blight-tolerant varieties from Hawaii, currently under evaluation in Puerto Rico, appear not to have the culinary characteristics preferred by consumers in the Caribbean.

Work done before the blight shows Lila is adapted to cultivation under upland conditions (Goenaga, 1995). Thus, in the short term there is interest in the production of Lila under drip irrigation, a system under which blight incidence tends to be lower. The objective was to provide practical information to farmers in regard to growth, yield, corm quality and the minimum irrigation requirement for taro Lila grown under upland conditions and under the presence of the leaf blight.

MATERIALS AND METHODS

The experiment was conducted from May 2007 to January 2008 at Gurabo, Puerto Rico. Plots consisted of a 9.2-m-long x 0.61-m-wide bed. Suckers were planted 0.46 m apart in a double row within the bed. There were 40 plants per plot. A drip irrigation line was placed on the surface along the center of each bed. Three irrigation treatments were arranged in a randomized complete block design with eight replications. Treatments were rainfed and supplemental irrigation based upon Class A pan factors of 1.0 and 1.3. The plants were subjected to treatments from 67 to 237 days after planting. Treatments were applied Monday, Wednesday and Friday. Except for irrigation, management practices followed standard procedures. Samples were taken 123 and 231 days after planting. Harvest was performed at 243 days after planting. Corm fresh weight was recorded at harvest. Harvest index was calculated from plants sampled at harvest.

RESULTS AND DISCUSION

Early and mid season: Mild infection of the taro leaf blight was present throughout the crop cycle. Rainfall received by the plants totaled 1493 mm. Goenaga (1995) reported maximum leaf area index for Lila at 117 days after planting. With this information, we chose to sample 123 days after planting. At 123 days, irrigation was significant for leaf area, plant dry weight and plant height (a visual indicator of growth) (Table 1). As expected for a variety adapted to wetland conditions, providing Lila with supplemental irrigation of at least 1.0 evapotranspiration (ET) resulted in increased growth (Table 1). Up to 123 days into the cropping cycle, irrigating with 1.0 ET or 1.3 ET made no difference in growth (Table 1).

Late in the season: Irrigation was non significant for stand (average 78%) thus indicating that no effect was observed in the number of plants completing the crop cycle. As for 123 days, at 231 days into the cropping cycle, irrigation was significant for plant dry weight. Rainfed plants had significantly less dry weight than those irrigated (Table 2). Under leaf blight pressure, irrigation increased Lila's corm fresh weight (Table 2). Corm fresh weight is an indicator of yield. However, there were no differences for corm fresh weight, nor in plant dry weight or harvest index between plants subjected to 1.0 and 1.3 ET treatments (Table 2). Average fresh corm weight of 479 and 542 g obtained with 1.0 and 1.3 ET treatments, respectively (Table 2), tend to be lower than those preferred by consumers of Lila (900-1,000 g). This study does not provide evidence that irrigation based upon 1.3 ET resulted in better performance than irrigation based upon 1.0 ET (Table 2). A pan factor of 1.0 means that the water applied to the plants replaces that lost through calculated evapotranspiration; this amount is considered the theoretical optimum (Goenaga et al., 2004).

Having a limited access to drip irrigation infrastructure and water, tuber farmers in the Caribbean have to make decisions on whether to produce taro or another aroid crop such as cocoyam (*Xanthosoma* spp.). This study suggests that to obtain a Lila crop under upland conditions and under the presence of the leaf blight, water to be applied by irrigation should replace at least that lost through evapotranspiration. Taro production under upland conditions is commercially efficient when corms are adequate for the market. Corm quality characteristics are of paramount importance because in the Caribbean taro is primarily grown for table use. We made an informal assessment of quality with corms harvested from this study, an assessment which includes taste, texture and acridity. Corms evaluated tend to be similar in eating attributes to those grown under wetland conditions. However, fine tuning for field management is needed for increased corm size.

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Table 1. Leaf area, dry weight and height of taro plants at 123 days after planting as affected by irrigation.

	123 Days After Planting		
Irrigation	Leaf Area	Plant Dry Weight	Plant Height
	- sq.cm/plant -	- g/plant -	- cm -
Rainfed	1751 b [1]	70 b	22 b
Rain+1.0 ET [2]	4729 a	152 a	39 a
Rain+1.3 ET	3870 a	137 a	42 a

[1] Means within columns separated by LSD ($P \leq 0.05$).
[2] ET stands for evapotranspiration.

Table 2. Plant dry weight and harvest index and corm fresh weight of taro plants affected by irrigation.

	Plant	At harvest		Theoretical
	Dry Weight	Harvest	Corm Fresh	Yield for
Irrigation	at 231 days	Index	Weight	23,900 plants/ha
	- g/plant -		- g/corm -	- t/ha -
Rainfed	94 b [1]	0.39 b	215 b	5.1
Rain+1.0 ET [2]	305 a	0.44 ab	479 a	11.4
Rain+1.3 ET	288 a	0.53 a	542 a	12.9

[1] Means within columns separated by LSD ($P \leq 0.05$).
[2] ET stands for evapotranspiration.

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