

Research Note

YIELD OF DIAMANTE AND KINABAYO YAM CULTIVARS GROWN WITH AND WITHOUT VINE SUPPORT ON AN ULTISOL^{1,2}

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J. Agric. Univ. P.R. 81(1-2):67-69 (1997)

Yam (*Dioscorea* sp.) is the most economically important root crop in Puerto Rico. In 1990-91 the production was 10,546 t with a farm gate value of \$8.7 million (Ortiz-López, 1992).

Local yam production has steadily declined since 1980. Factors associated with the decline are low yields, pests and diseases, and production input. Among the production costs, erecting wood-wire trellises for vine support ranks on top, with about 21% of the total cost (Irizarry and Rivera, 1988). To reduce costs in production we recommended cultivars with adaptability to thrive with the vine creeping on the soil (Irizarry and Rivera, 1993). Cultivars with this desirable agronomic trait must have resistance to foliar diseases, particularly anthracnose (*Colletotrichum gloeosporioides*) and leaf spot caused by *Curvularia* spp. and *Cercospora* sp. Previous studies have shown that two *D. alata* yams, 'Binugas' and 'Gunung' possess field resistance to anthracnose (Mignucci et al., 1985; Hepperly and Vázquez, 1989), are high yielders (Goenaga et al., 1989), and can be successfully grown without vine support (Irizarry and Rivera, 1993). In search of other potential cultivars with adaptability to this low input farming system, we evaluated 'Diamante' and 'Kinabayo' (P.I. 390079) yams with and without vine support, with two close in-row plant spacings.

The experiment ran from 20 April 1993 through 20 January 1994 at the Corozal substation of the AES-UPR. The substation is located in the north central region at an elevation of about 200 m. Throughout the experiment, minimum and maximum mean monthly temperatures were 20.7 and 30.4°C, respectively. Mean monthly rainfall was 123.8 mm; pan evaporation, 116.4 mm. During the months of June, August, October and December 1993, and January 1994 evaporation exceeded rainfall by about 50%. To compensate for the moisture deficit, we applied overhead irrigation at the rate of about 25.4 mm every two weeks.

The soil is a Corozal clay (Aquic Tropudults, clayey, mixed isohyperthermic). The top 30 cm of soil had a pH of 5.5, and contained 10.5 mg/kg of available phosphorus (Bray Method 2), and an exchangeable cation capacity of 11.6 cmol (+)/kg of soil.

¹Manuscript submitted to Editorial Board 11 September 1995.

²This paper covers work carried out cooperatively between the Agricultural Research Service-USDA and the Agricultural Experiment Station, University of Puerto Rico (AES-UPR), Río Piedras, Puerto Rico. The authors acknowledge the excellent assistance of Nicolás Díaz and Javier Fuentes, Agricultural Research Technicians, for carrying out the field work.

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Two planting systems (trellises vs. no trellises), two cultivars (Diamante and Kinabayo), and two in-row plant spacings (0.91 by 0.30 and 0.91 by 0.46 m) approximately 35,840 and 23,920 plants per hectare, respectively were evaluated. The treatments were arranged in a split-split plot design with six replications. The main plot (planting system) comprised an area of 7.32 by 7.32 m and accommodated two subplots of 3.66 by 7.32 m. Each subplot (cultivar) was subdivided into smaller plots of 3.66 by 3.66 m, representing the in-row spacings. The sub-subplot contained four raised rows with six to ten experimental plants each, depending on the plant spacing.

Wood-wire trellises were constructed from treated posts 2.1m long, spaced 4.6 m apart in the row and fastened on top with a #10 gauge galvanized wire line. Each trellis line supported the vines of two yam rows.

Both Diamante and Kinabayo yams are introductions. The former arrives in regular shipments from Costa Rica, C A, to supply the local market, and the latter was introduced from the Philippines (Martin and Delfin, 1978).

The soil was plowed and harrowed twice, and pregerminated tuber pieces weighing about 140 g each were planted on top of raised rows. Two months after planting, 2000 kg/ha of a 15-5-15-5 (N, P₂O₅, K₂O and MgO) fertilizer mixture was applied as a sidedressing. The mixture was supplemented with minor elements at the rate of 25 kg/t of fertilizer.

Weeds were suppressed with a preemergence application of Evik^s at the rate of 4.5 kg/ha and with hand weeding. No foliar disease control program was necessary. However, as a preventive measure against soil-borne insects and nematodes, Temik 10G was applied at the rate of 34 kg/ha.

Nine months after planting, the two middle rows of each plot were harvested. Tubers were classified as marketable and nonmarketable. The marketable tubers were counted, weighed and the mean tuber weight and total yield determined. The recorded data were statistically analyzed by using the ANOVA procedure, and the means were compared by Duncan's multiple range test.

Planting system had no significant effect on mean tuber weight and total yield. This finding is indicative that both Diamante and Kinabayo cultivars belong to a selected group of yams that can be successfully grown without vine support, with a close in-row plant spacing. Mean tuber weight for both planting systems was 1.0 kg. Plants grown with vines creeping on the soil averaged 33,244 kg/ha; those with vine supported by wood-wire trellises, 36,890 kg/ha. The 10% yield increase between planting systems was not significant, nor did it offset the cost of erecting wood-wire trellises. Another economic factor involved in growing yam under this low input management system is the natural control of weeds. The aggressiveness of these cultivars when grown with vines creeping on the soil, combined with an effective application of a preemergence herbicide, maintained the field free of weeds during the first four months after planting. Thereafter only one spot hand weeding was necessary to remove postemergence guinea grass from plots with vines creeping on the soil. Two complete hand weedings were necessary to keep plots with vine support free of weeds.

Regardless of the planting system, cultivar had a significant effect on mean tuber weight and total yield. The Diamante yam produced significantly heavier individual tubers (1.1 kg), thus resulting in the superior yielder with 40,340 kg/ha (Table 1).

In-row plant spacing had no significant effect on mean tuber weight and total yield. Tuber size was similar, with a mean weight of 1.0 kg. Both plant spacings averaged 35,067 kg/ha. Since reducing the in-row plant spacing from 0.46 to 0.30 m did not influ-

^sTrade names in this publication are used only to provide specific information. Mention of a trade name does not constitute a warranty of materials by the USDA-ARS or the UPR-AES, nor is this mention a statement of preference over other materials.

TABLE 1.—Comparison of two yam cultivars grown with and without vine support, and using two in-row plant spacings.

Cultivar	Mean tuber weight	Total yield
	kg	kg/ha
Diamante	1.12a ¹	40,340a
Kinabayo	0.89b	29,794b

¹Means followed by the same letter do not differ significantly at the 0.05 probability level.

ence mean tuber weight and total yield, we inferred that both yams should be planted 0.46 m apart in the row to reduce the amount of planting material needed to establish a commercial field.

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