Research Note

FERTILIZATION OF ARRACACHA IN AN ULTISOL[1]

Arracacha (*Arracacia xanthorrhiza* Banc.) or root celery is a lesser known plant with economic value in South America and throughout the Caribbean (Vietner, 1986)[2]. In South America it is cultivated for its edible yellow or cream colored roots. In Puerto Rico arracacha is a specialty crop planted for its corm rather than for its fleshy roots. Local production depends on small-scale farmers concentrated in the center of the island. Tuber yields up to 21,700 kg/ha have been reported at the experimental level (Del Valle et al., 1989)[3], whereas at the farm level 11,000 kg/ha is considered an acceptable yield. This crop develops slowly after emergence and therefore is a poor competitor against weeds. Production can be reduced as much as 50% because of full-season weed interference (Del Valle-González et al., 1990)[4].

Fertilization trials on locally grown arracacha have been scarce. The lack of understanding of the fertilization requirements, especially in low-fertility soils, may have contributed to the limited expansion and yield improvement of this crop. The objective of this study was to evaluate the response of arracacha 'Criolla' to various nutrient combinations.

The experiment was conducted on a private farm in the Barranquitas municipality. The soil was a Humatas series (Typic Tropohumults, clayey, kaolinitic, isohyperthermic), with a pH of 4.9. Soil chemical analyses revealed that available P was 2.54 mg/kg and exchangeable K was 0.28 $cmol_c$/kg. Exchangeable Ca and Mg were 7.66 and 1.06 $cmol_c$/kg, respectively. Before planting, lime was applied at a rate of 4.4 t/ha and incorporated by disking to increase soil pH from 4.9 to 5.5.

Plot size was five 4-m-long rows spaced at 0.67 m. Within the row, plant spacing was 0.33 m, for a density of 45,200 plants per hectare. Eleven nutrient combinations of N, P, K and Mg were evaluated. Nutrient combinations were applied in two equally divided portions at 75 and 144 days after planting. Ammonium sulphate was used as source of nitrogen. Phosphorus was provided as triple superphosphate. Potassium and magnesium were provided as potassium sulfate and Epsom salt, respectively. Weeds were controlled by hand cultivation as needed. Plants were rain-fed.

The experimental design was a balanced incomplete block design with 10 blocks of four plots. Treatments were replicated four times. Stepwise regression procedures were used to determine the association of yield with individual nutrient levels (SAS, 1987)[5]. Yield was regressed to

[1]Manuscript submitted to Editorial Board 17 November 1994.

[2]Vietner, N. D., 1986. Lesser-known plants of potential use in agriculture and forestry. *Science* 232:(5)1379-1384.

[3]Del Valle, R., I. B. de Calony and M. Santiago-Córdova, 1989. Sensory evaluation of Arracacha (*Arracacia xanthorrhiza* Bancroft) cultivars in Puerto Rico. *J. Agric. Univ. P.R.* 73:(3)291-292.

[4]Del Valle-González, R., M. Santiago-Córdova and A. González, 1990. Efecto del yerbicida ametrina como control preemergente de yerbajos en apio (*Arracacia xanthorrhiza* Bancroft). *J. Agric. Univ. P.R.* 74:(3)273-280.

[5]SAS Institute, Inc. 1987. SAS/STAT Guide for personal Computers, Raleigh, NC.

TABLE 1.—*Yield of arracacha 'Criolla' under different nutrient combinations.*

Nutrient combination				
N	P	K	Mg	Tuber Yield
		kg/ha		
0	0.0	0.0	0	19.8[1]
0	39.3	74.7	56	20.4
90	39.3	74.7	56	25.6
135	39.3	74.7	56	29.1
179	39.3	74.7	56	26.2
179	0.0	74.7	56	30.1
179	19.7	74.7	56	29.2
179	19.7	0.0	56	30.4
179	19.7	148.6	56	32.0
179	19.7	0.0	0	30.2
224	39.3	74.7	56	29.3
$LSD_{0.05}$				6.0

[1]Non-fertilized check.

N levels by using nutrient combinations with the same content of P, K and Mg but increasing N.

The lowest yield was obtained in the non-fertilized check (Table 1). The application of 90 kg/ha of N, 39.3 kg/ha of P, 74.7 kg/ha of K and 56 kg/ha of Mg did not significantly increase the yield compared with that of the check. However, when N was increased to 135 kg/ha with the same levels of P, K and Mg, a significant increase in yield was detected. No significant differences in yield were found among treatments with 135 kg/ha of N and those with 179 or 224 kg/ha. Treatments with different P levels and the same content of other nutrients did not differ significantly. The same lack of response was observed for K and Mg.

Results of the stepwise regression procedures indicated that changes in tuber yield were associated more with N (R^2 = 0.40) than with any other nutrient at the levels used in this study. There was a positive linear relationship ($P \leq 0.01$) between tuber yield and N (Figure 1). The results of this study suggest that successful commercial arracacha production in this soil depended upon N fertilization. The optimum N level, under the conditions of this experiment, appeared to be 135 kg/ha.

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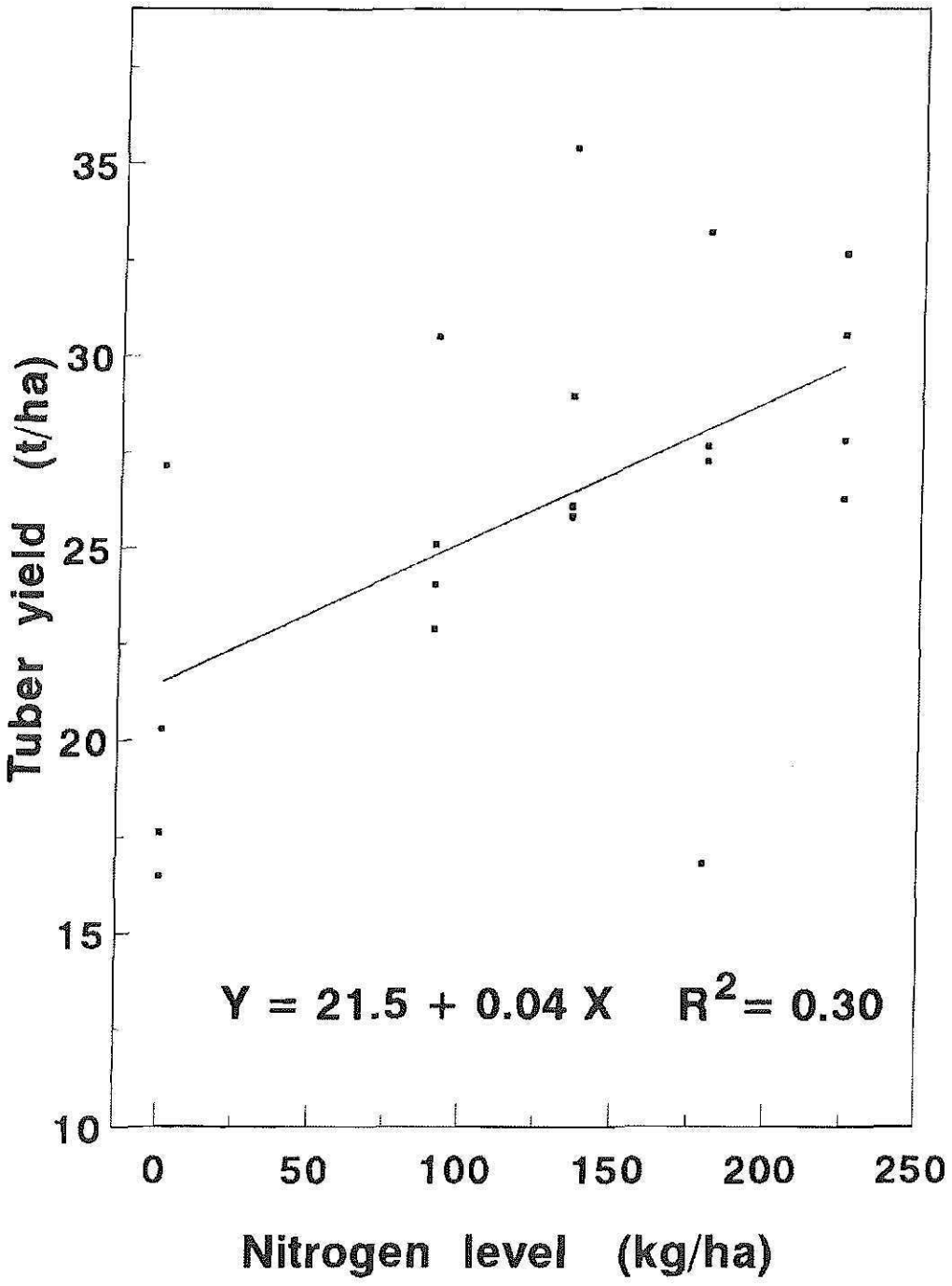

FIGURE 1. Yield of arracacha to increasing levels of nitrogen fertilization.