

Research Note

PERFORMANCE OF HIGH-YIELDING CORN HYBRIDS PIONEER X-306 B AND FUNK'S G-795W AT HIGH LEVELS OF FERTILIZATION IN THE ACID AND RELATIVELY INFERTILE SOILS (ULTISOLS AND OXISOLS) OF PUERTO RICO^{1, 2}

It has been estimated that in tropical Latin America less than 15% of the potentially arable 600 million ha of land is under cultivation. Corn occupies more land than any other cultivated crop in this region. High yielding varieties will be required to attain the productive potential of the soils of this part of the world and to produce enough food for an ever increasing population. These generally require higher rates of fertilizer coupled with the use of improved management practices. Intensive research on corn fertilization in the extensive, acid and relatively infertile soils of the humid Tropics (Oxisols and Ultisols) has been underway for the past 5 years in Puerto Rico. Fox et al.³ reported the results of 15 N-fertilization experiments conducted during 1970-1972 using the tropical hybrid Pioneer X-306. They reported maximum grain yields of approximately 6.3 metric tons/ha (56 cwt/acre). Two other high-yielding corn hybrids were subsequently included in the fertilizer trials: Pioneer X-306 B and Funk's G-795W. The former is an improved selection of Pioneer X-306, a yellow-kernel corn developed in Nicaragua for tropical conditions. In a recent lime experiment (1974) on a Humatas clay (Ultisol) at Orocovis, peak grain yields of 7.7 tons/ha (68 cwt/acre) were obtained. Funk's G-795W is a white-kernel corn widely grown in the Southern United States. In a zinc fertilization experiment with this hybrid on a Coto clay (Oxisol) at the Isabela Substation (1972), the highest grain yields were over 8.7 ton/ha (78 cwt/acre).

The work herein reported was part of a much larger N fertilization experiment. The experiments followed a randomized block design with five replications. Plot size was 5 × 10 m. Both hybrids were planted at the Corozal Substation on a Humatas clay at about 250 m above mean sea level, and at Manatí on a Bayamón sandy loam (Oxisol) at about 83 m above mean sea level. Seeds, sown in late March and early April 1974, were spaced 25 cm within rows 76 cm apart. The corn was harvested in

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³ Fox, R. H., Talleyrand, H., and Boulding, D. R., Nitrogen fertilization of corn and sorghum grown in Oxisols and Ultisols in Puerto Rico, *Agron. J.* 66: 534-540, 1974.

July 1974. The N fertilizer level applied was based on previous experience as to the relative leaching losses of N and mineralization rate of organic matter in these soils, coupled with the estimated yields and potential N uptake of these hybrids. N was applied at the rate of 180 kg/ha. It was sidedressed 1 month after planting at Corozal. At Manatí, it was applied at the same rate, $\frac{1}{4}$ preplant and broadcast and then plowed and disced into the soil with the blanket fertilizer, and $\frac{3}{4}$ sidedressed 1 month after planting. All the plots at each site received a blanket application of 100 kg/ha of P as superphosphate, 100 kg/ha of K as sulfate, and 75 kg/ha of Mg sulfate.

Lime was applied to bring the soil pH to 5.5. Rats were controlled by using Warfarin baits. For insect control, Lannate was sprayed weekly at

TABLE 1—Yield and N-uptake of two corn hybrids at Manatí and Corozal, Puerto Rico

Hybrid	Grain yield (15% H ₂ O)	Stover yield	Grain + stover	Grain stover ratio	Grain N	Stover N
	<i>Ton/ha</i>	<i>Kg/ha</i>	<i>Kg/ha</i>		<i>Kg/ha</i>	<i>Kg/ha</i>
<i>Manatí</i>						
Pioneer X-306-B	6.1	8.0	144	.65	86	58
Funk's G-795W	5.0	4.8	115	.89	69	46
<i>Corozal</i>						
Pioneer X-306-B	6.6	6.2	142	.90	92	50
Funk's G-795W	7.0	5.1	132	1.17	97	35

the rate of 0.5 kg of active ingredient to the hectare. For disease control, Dithane M 45 at the rate of 2 kg of active ingredient to the hectare was sprayed weekly. Dasanit at the rate of 50 kg/ha was applied to control nematodes and soil insects. Lasso, a preemergent herbicide was used at the rate of 4 kg of active ingredient to the hectare. Supplemental irrigation was used when necessary. Plant growth was good at both sites. Data on yield and N uptake are reported from both hybrids at the two locations in table 1.

It is evident that using either of the two hybrids, high corn yields similar to those obtained in the temperate zone are possible in the tropics. At both locations Pioneer X-306 B produced larger plants with smaller ears than the Funk variety. It was practically not affected by the southern leaf blight and its thicker ear husks provided good protection from earworm damage. Yields of Funk's were probably reduced because of a moderate attack from the southern leaf blight at silking stage. Some rotten stalks and ears were noticed and appreciable damage was caused by earworms. Although it appears that this white hybrid has a high grain

yield potential, even higher than Pioneer X-306 B in the Corozal region, it is much more susceptible to insects and diseases. Unless these pests are either absent or controlled by massive spraying of effective insecticide and fungicide, grain yield would probably be considerably less on the average for Funk's than for Pioneer. In other trials this tendency was confirmed. Also, Funk's was affected more by occasional drought and lodging than Pioneer. On the average, Pioneer seems to be more reliable for production under tropical conditions.

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