Sweet Corn *(Zea mays L. convar. saccharata Koern.)*

French: Mais sucré; Spanish: Maiz dulce; Italian: Mais dolce; German: Zuckermais

Under Tropical/Subtropical Conditions

Crop data

In the tropics field maize is more commonly grown as a vegetable than sweet corn, because most sweet corn varieties have been developed for long days in northern latitudes. However, sweet corn hybrids suitable for the tropics are now available (including several from Hawaii).

The crop can be grown in a wide variety of soils if they are naturally fertile or can be made fertile with appropriate fertilizers and/or organic manure. Optimum mean day temperatures are around 25° C. Temperatures in excess of 35° C can severely damage pollination, especially if accompanied with moisture stress from just before silk development extending through pollination. For crops grown in bright daylight conditions, an acceptable plant density is 60 000 per ha. Density should be less when extended periods of cloudy weather can be expected after full canopy development.

Nutrient demand/uptake/removal

The following table shows the generally high nutrient requirements for high yields of sweet corn; only Ca is low compared with many other crops. The requirements for nutrient quantity (and concentration) removed in a crop are similar to field maize. N and K contents are specially high, which explains the high fertilizer requirements.

Nutrient uptake/removal - Macro- and micronutrients (Zn)							
Yield	**kg/ha**						
	N	**P2O5**	**K2O**	**MgO**	**CaO**	**S**	**Zn**
20 t fresh weight	208	60	228	25	42	14	0.21
Source: Fox, 1973; Daigger & Fox, 1971; and others							

Plant analysis data

Plant analysis data - Macro- and micronutrients (Zn) (good plant nutrition and fertilizer practices)							
Crop status	**% of dry matter**						
	N	**P**	**K**	**Mg**	**Ca**	**S**	**Zn**
Concentration* near maximum yield	2.7	0.26	2.25	0.15	0.56	0.24	0.0024
* Data are means of several sources including Chapman, 1966; Lorenz & Maynard, 3rd ed; Fox et al., 1964; Daigger & Fox, 1971; Fox, 1973. If data specifically for sweet corn were not available, data from field maize in Hawaii (Rashid & Fox, 1992) or from field maize grown on a highly weathered soil in Georgia, USA (Hargrove, 1985) were used to construct the data. In most cases extrapolation from lower to a higher yield was necessary.							

Fertilizer recommendations

Fertilizer used/recommended						
Area or soil conditions	Source	kg/ha				
		N	P2O5	K2O	S*	Zn**
Brazil (General)						
Sao Paulo	Van Raij et al., 1985	75	50	41	20	5
Minas Gerais	Lopes, 1989	60	80	50	-	-
Florida, leached mineral soils, irrigated	Hochmuth & Hanlon, 1989	90	121	120	-	-
Hawaii (General) low organic matter, otherwise fertile	Nakagawa, 1957	80	101	96	-	-
Maximum yield	Fox, 1973	220	101	96	10	10
Production Guidelines (General)	Valenzuela, 1991	103	96	110	-	-
* Apply with the N at about 10 % of the rate. ** Apply infrequently, only when needed, to Zn deficient soils.						

The N fertilizer requirement for maximum yields, as given for Hawaii (and it is the same in Nebraska, USA) is 220 kg/ha N. This is almost identical with N uptake given for an excellent (20 t/ha) crop. Any decrease in the rate of N fertilizer applied will diminish yields in a linear manner. This suggests that the usual fertilizer N recommendation is much below the optimum level. N should be given as a split application, one-quarter to one-half either before or at planting; and, depending upon the likelihood of N leaching and the visual appearance of the crop, the remainder in one or two applications up to approximately 40 days after germination.

Many soils will provide a substantial portion of the P required, but in the humid tropics most soils will not supply P in adequate concentration, especially at the seedling stage. Thus, an application of P near the seed is usually beneficial for early seedling vigour. The above recommendation for Sao Paulo, Brazil is for a soil of medium resin-extractable P status (7 to 15 mg/l P). The recommendation is doubled for soils with 0 - 6 mg/l and halved for soils with > 40 mg/l. The Florida recommendation is based on soils very low in P. Florida soils generally have low P absorbing capacities.

K is taken up in large quantities. Soils, however, even in the humid tropics, usually supply a substantial part of the K requirement. How much, can usually be estimated by soil analysis. The Brazil recommendation assumes a soil of medium exchangeable K status (1.6 meq/l). If exchangeable K exceeds 3 meq/l the recommendation is decreased by one half and if < 0.07, the recommendation is doubled. K is usually applied before or at planting except when leaching is severe as in the case of sandy soils or highly weathered soils which have little cation exchange capacitiy and little weatherable K minerals. In such cases the fertilizer K requirement approaches the amount of K removed in the crop; and the fertilizer is applied in split dressings like N.

The crop is among those most sensitive to Zn deficiency. Calcareous and strongly alkaline soils of the semi-arid tropics are suspect, as are also the highly weathered soils of the humid tropics. Eroded soils and low organic matter soils are at greatest risk. Zn uptake is very low; thus the effects of a substantial Zn application of 10 kg/ha Zn may persist for several years.

S deficiency is a greater problem than is generally recognized in the tropics. The crop is susceptible especially in the young growth stages. Many subsoils of the humid tropics contain much absorbed sulphate but it may be difficultly available or positionally unavailable. Rainwater contains sulphate. If the S concentration is <l mg/l, deficiency can be expected. If S deficiency is confirmed, apply S at 5 to 10 % of the N requirement.

Further reading

DAIGGER, J.L.; FOX, R.L.: Nitrogen and sulfur nutrition of sweet corn in relation to fertilizer and water composition. Agron. J. 63, 729-730 (1971)

VALENZUELA, H.: Sweet corn production guidelines. Dept. of Horticulture, Univ. of Hawaii, Honolulu, Hawaii, USA (1991)