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Observations on the Nutritive Value of Teosinte

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Little is known of the nutritive value of teosinte (*Euchleana mexicana*), although it is the closest known relative of corn (*Zea mays*). The kernels of teosinte differ from those of corn in their smaller size and hard, inedible hull. Teosinte has long been grown in association with corn by the indigenous peoples of Central America and Mexico. It is sometimes cultivated as a cattle feed and is also used in human diets in a few localities, particularly as a corn substitute in times of famine.

Four strains of teosinte have been analyzed for several important nutrients. Fat was determined by official and tentative methods of the AOAC (*1*). In the determination of nitrogen, digestion was carried out by the AOAC method (*1*), and distillation and titration as recommended by Hamilton and Simpson (*2*). Microbiological methods employing *Lactobacillus arabinosis* were used for the determination of methionine (*3*), niacin (*4*), and tryptophane (*5*), following the hydrolysis procedure of Wooley and Sebrell (*6*). *Leuconostoc mesenenteroides* was used in the analysis for lysine (*7*). The results, compared with a Guatemalan corn and a high-yielding U. S. commercial hybrid, are reported in Table 1.

TABLE 1

COMPOSITION/100 G OF VARIETIES OF TEOSINTE AND CORN
(Adjusted to 10% Moisture)

	Fat (g)	Nitrogen (g)	Methionine (g)	Lysine (g)	Tryptophane (g)	Niacin (mg)
Teosinte						
(Hulled grain)						
#223*	4.24	3.68	0.58	0.46	0.033	1.05
#35–51†	3.02	3.25	.45	.32	.051	0.78
#33–47‡	—	3.52	.40	.26	.054	1.02
#97–50§	2.26	3.48	.54	.35	.048	0.90
Corn						
(Whole grain)						
#7A–46‖	4.55	1.54	.16	.29	.048	1.58
#99A–115¶	5.06	1.32	0.14	0.35	0.052	2.18

* Collected near Progreso, Jutiapa, Guatemala (alt., 2925 ft), in Nov. 1950.

† Collected at Progreso, Jutiapa, Guatemala, in Jan. 1951.

‡ Collected at Progreso, Jutiapa, Guatemala, Sept. 1947, and grown in Antigua, Guatemala (alt., 4953 ft) in Dec. 1948.

§ Grown in Florida in 1949 and purchased from Reuter Seed Company, New Orleans, La.

‖ Commercial seed of Tiquisate Golden Yellow, a golden-yellow flint corn grown in Antigua, Guatemala, in Oct. 1949 and selected because it is above the average of 23 Guatemalan corns analyzed by INCAP in protein, methionine, and tryptophane.

¶ A commercial hybrid corn obtained from the May Seed Company, Shenandoah, Iowa, in Sept. 1949.

The nitrogen values for teosinte are considerably higher than those for corn. They are also superior to those for other cereals, as, for example, wheat (2.03), rice (1.07), barley (1.44), and oats (2.08) (*8*). Of even greater significance is the correspondingly higher methionine content of teosinte, more than twice that of corn. Methionine is now recognized to be the limiting amino acid in the predominately vegetable diets of most underdeveloped areas of the world (*9*). The peoples of these areas must obtain increased amounts of methionine in their diets, but for basic agricultural, economic, and cultural reasons, this problem cannot be solved entirely by an increase in the production of animal protein (*10*). Therefore, vegetable products, which have a high supplementation value in the mixed diets of these areas and which can be produced readily, are urgently needed. From the data presented teosinte should be further studied as a potential source of vegetable protein of relatively high methionine content.

The amounts of tryptophane and lysine/100 g in teosinte do not appear to differ significantly from those in corn. On the basis of suggested minimum daily requirements (*11*) for these amino acids, the quantity of lysine is probably sufficient even with the increased proportion of methionine in teosinte. Tryptophane, however, must certainly be a limiting amino acid in teosinte protein. This makes the lower niacin content of teosinte listed in Table 1 significant, since an excess of tryptophane is not likely to be available for conversion to niacin. According to the data presented in Table 1, the fat content of teosinte may prove to average somewhat lower than that of corn. Three of the samples listed in Table 1 were also analyzed for their crude fiber content, but no consistent differences were observed between hulled teosinte and whole corn.

Teosinte corn hybrids can be readily obtained, but five such crosses (F_1) analyzed as part of the present study did not differ significantly from corn in their chemical composition although the plants and ears were intermediate in structure and appearance. However, their progeny (F_2) should show marked variation in nutrient composition (*12*). The yield of some plants grown from wild seed in Antigua reached 500 g, although the range of variation was great. This would indicate that the yield per acre of selected seed on good ground is potentially high.

Ground teosinte can be mixed with wheat or corn flours or used alone to make biscuits, tortillas, and other products. In view of the widespread efforts to improve the world supply of protein for human consumption, the relatively high proportions of total protein and methionine in teosinte are potentially important. The direct use of teosinte for food in mixed vegetable diets, as well as the possible improvement of the protein content of corn by hybridization with teosinte and subsequent selection for both yield and nutritive value, should be seriously investigated.

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