Teosinte as a Grain Crop

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Several people have questioned whether teosinte could be a useful grain crop because its seed are tightly encased in a hard, woody cupulate fruitcase (image), suggesting that ancient peoples would have been incapable of freeing the grain from this casing (See Beadle 1972; Iltis 2000). I don't accept this argument because I believe that these ancient Mexicans were incredibly inventive and intelligent individuals capable of solving this problem. Moreover, they had an incentive to find a way to use teosinte grains since teosinte has a rather large grain compared to other wild cereals. The earliest archaeological corn, which is some 6,000 years old, has grains that are free of the fruitcase, indicating that selection for edible grain happened very early (Benz). So if the ancient Mexicans were using teosinte for grain, how much yield could they have obtained?

To estimate the yield of teosinte, I harvested the seed from 14 randomly chosen plants from one of my teosinte plots on Molokai Island in 2003. I thrashed each plant against a plastic tarp to free the loose fruitcases, and then abraded the stems some more by hand to free seed bound tightly in the leaf sheaths. I did not attempt to recover all the seed from each plant. If I had to guess, I would say I might have recovered about 50% from the average plant. I recovered an average of 1030 fruitcases per plant with a range from 235 to 2471. The average yield per plant was 36.6 grams of fruitcases with a range from 6.7 to 93.1 g. The average weight of the fruitcases was 33.3 mg with a range of 23.4 to 37.7. This average value for fruitcase weight is on the low end of the range for teosinte as anticipated for teosinte of southern Guerrero (Wilkes 1967; Sanchez et al. 1998).

About half the weight of the fruitcase is composed of the grain, so the average plant yielded 18.3 grams of grain (or flour) and the best plant yielded 46.6 g. The yield over all of my plot was 467 kg/hectare, a value that is not too far off yields of 1000 to 2000 kg/hectare of early US open pollinated maize varieties (Troyer and Mascia 1999). Considering that I may only have recovered 50% of the seed, I think it clear that teosinte, even before its "improvement", had substantial yield potential for a wild plant.

Could teosinte provide enough yield to feed a small group of ancient peoples? Beadle (1978) estimated that a family of five could collect a metric ton of teosinte seed in three weeks. For a family of five to obtain 25% of their calories from teosinte grain, would require about 0.7 metric tons of grain (Hillman and Davies 1990). This translates to 1.5 hectare plot or 40,000 plants based on my planting density and yield. Considerable fewer plants and less space would be required if ancient teosinte farmers recovered a higher percentage of the seed from the plants than I did. [Undoubtedly, they were better farmers than me.] Anthropologists, Kent Flannery and Bruce Smith (letters to the author) have estimated that a community in Mexico at the time of maize domestication would have had 25 to 50 members at most. This group would require 7.5 to 15 hectares or 200,000 to 400,000 teosinte plants, using my data. This is very close to Flannery's (1973) estimate of 5 to 10 hectares of teosinte to support a group of this size. His yield estimate for teosinte was 627 kg of grain per hectare where teosinte grew in fallow

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cultivated fields in Mexico (Flannery 1973). Beadle's, Flannery's and my estimates all concur that teosinte is a high yielding plant with the potential for a small plot to support an ancient community.

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