



United States Department of Agriculture

PLANTING AND PRODUCTION GUIDE

'CHAPINGO' MEXICAN TEOSINTE

Zea mexicana



Figure 1. Chapingo Mexican teosinte

Release Information: Seeds of Mexican teosinte *Zea mexicana* (Schrad.) Kuntze (synonym *Zea mays* L. ssp. *mexicana* (Schrad.) Ittis) were collected in the central part of Mexico, near the city of Chapingo in the State of Mexico. The Texas Agricultural Experiment Station introduced this accession into the United States. Seeds were distributed to the Tall Timbers Research Station in Tallahassee, Florida. Lewis Yarlett, who was then the State Range Conservationist for the Soil Conservation Service (now Natural Resources Conservation Service), obtained a seed sample from Tall Timbers and provided it to the USDA, NRCS Brooksville Plant Materials Center (PMC), where it was evaluated under the accession number 422162. The PMC released this accession as 'Chapingo' Mexican teosinte in 1995.

Description: Mexican teosinte is closely related to and resembles maize or Indian corn (*Zea mays* L.), but teosinte plants branch to produce several stems (tillers), whereas most modern corn varieties are single-stemmed. It is an annual grass that can grow 6- to 13-foot tall (rarely to 16-foot). The stems have prop roots at the base, like maize. The sword-like leaves are 23-48 inches long and 2-3¼ inches wide. Male and female

flowers are borne in separate structures on the same plant. Male flowers, are held in a branched flower cluster (tassel) at the top of each stem. Female flowers are in elongated, unbranched spikes borne in the leaf axils along the upper portion of the stems. The flower spikes are surrounded by leafy structures, somewhat like those that enclose ears of corn. Each fruit case contains 3 to 8 triangular, tough, glossy seeds that are about ¼ inch long. They are arranged linearly, end-to-end and when mature each seed splits away from the others on the spike.

Conservation Use: Chapingo Mexican teosinte provides a long-term food supply for several types of wildlife. Deer forage on the young growth and the hard-coated seeds persist on the ground providing birds with a late-season food supply. A vigorous stand of teosinte provides cover for both deer and turkeys. It can be used as a summer forage source for livestock, and the stalks can be harvested and used for fodder and silage. It can also be used as a summer cover or green manure crop. Chapingo seeds shatter when ripe and it will voluntarily reseed in areas where planted. Seeds may possess some level of dormancy.



Figure 2. Cattle grazing in field of Chapingo Mexican teosinte

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Adaptation: Chapingo Mexican teosinte requires a long growing season with high temperatures to produce seed. It is a short-day plant that will not flower until the day length is less than 12 hours in length. Potential growing areas are therefore limited to areas of the southern U.S. that have 200 or more growing days prior to frost for seed to mature. For best results, plant on fertile soils ranging from somewhat poorly drained to well-drained. Plant establishment and seed production will be limited on very dry sites unless irrigation is applied.

Establishment of Production Fields: In Florida, planting from April to June provides ample growing days for seed production; later planting dates lead to smaller plants and less seed. However, because April and May are often dry, irrigation may be required. In other parts of the southern U.S., irrigation may not be necessary because spring rainfall rates are higher. The planting area should be plowed or rototilled and thoroughly disked to remove weed competition and then packed to produce a firm seedbed. No-till drilling has not been tested for this release but may be successful if weeds are well controlled with herbicides prior to planting. Row plantings result in more robust plants and higher seed production per acre. **Broadcast seeding is not recommended for seed production fields.** The recommended seeding rate is 8-10 pounds of seed per acre. Correct plant spacing is critical for maximum seed production (Table 1).

Table 1. Effect of plant spacing on Chapingo Mexican teosinte seed production*

Spacing Sq. Ft./Plant	Seed Yield Gram/Plant	Yield Per Acre Basis Pounds
3	4.9	157
6	8.9	142
12	24.3	194
24	57.1	228

*Planting was made in 1988 at the Brooksville Plant Materials Center in Kendrick fine sand and fertilized with 300 lb/ac 10-10-10 at planting. Plants were dry when harvested and seed shattering was high. The "ears" were shredded giving the impression of heavy feeding by birds.

Because Mexican teosinte produces tillers, each plant can cover an area of 16 square feet. When the space between plants is reduced, plants grow taller and the production of tillers decreases. Since female flowers and "ears" are produced on each tiller, the number produced by each plant declines when the plants are crowded, reducing the amount of seed produced per plant. Another issue when harvesting taller plants with a combine is that the seed scatters as the stalks are cut, resulting in a large amount of seed loss. Chapingo Mexican teosinte seeds can be planted with a commercial row crop planter, such as those that would be used to plant field corn, set at a minimum of 36-inch row spacing. Seeds should be placed at a depth of 1-2 inches.



Figure 3. Chapingo Mexican teosinte fruit cases or "ears"



Figure 4. Mature seed of Chapingo Mexican teosinte

Management of Production Fields: Early growth of the seedlings is fairly slow, but once established, plants grow quickly. PMC research has shown that plant height can be controlled with clipping. Clipping a dense stand of Chapingo plants to 6-inches when it reached a height of 3-feet, reduced plant height at harvest from 16-feet to 13.5-feet and seed yield increased by 60 percent. Additional clippings further reduced plant height, but also had an adverse effect on seed production. If the field is to be clipped, only a single clipping is recommended. In Florida, this clipping will be done in early June if the

field is planted during the recommended planting window of April to May. Chapingo Mexican teosinte plants require approximately 112 growing days (above 50 degrees Fahrenheit) to permit tasseling and pollination in Florida.

For maximum seed production, fertilizer should be applied at planting and supplemented during the growing season according to soil test results. Follow local university recommendations for seed production of annual grain crops. There are no herbicides specifically labeled for production of Mexican teosinte. Weeds can be mechanically controlled with cultivation until tillers are formed and the canopy begins to close. The PMC noted few problems with insects or diseases.



Figure 5. Harvesting Chapingo teosinte with a combine

Seed Harvesting/Processing: Seed is harvested in Florida in late October to mid-November. The plants should not be allowed to dry thoroughly prior to harvest, because much seed will be lost to shattering and herbivory. The proper harvest time can be determined by opening several “ears” in the field and checking for seed ripeness. When ripe, the seeds will turn dark tan to brown. When at least 80 percent of the seed appear mature, then the field can be harvested. **A combine must be used to harvest the seeds.** Any type of combine header that is used to harvest grain crops can be used. When we harvest Chapingo seed at the PMC, our combine is set close to the recommended settings for

harvesting barley (*Hordeum vulgare* L.). The PMC obtained seed yields of 100 to 500 pounds per acre (average 240 pounds per acre) from field plantings in Florida.

The harvested material should be allowed to dry thoroughly before processing. At the PMC, we use a Clipper seed cleaner (A.T. Ferrell Company, Bluffton, IN) for initial cleaning of the seed. Our seed cleaner is an older model that uses two screens. To clean Chapingo Mexican teosinte, we use a 15 round hole screen on the top and a 7 round hole screen on the bottom (<http://www.atferrell.com/equipment/clipper/screens>). The Chapingo seeds pass easily through the holes in the top screen and larger pieces of debris will run over the screen and be removed. The lower screen does not allow filled teosinte seeds to pass through, but other smaller seeds and trash that pass through are removed. Seed size can vary from year-to-year, so screen sizes may need to be adjusted if the seed is larger or smaller than typical. The air is set to wide open to blow light chaff and debris out of the seed lot as it passes over the lower screen. It generally takes several runs with the cleaner at these settings to remove chaff, trash, and other seeds from the seed lot. At the PMC, we final clean the seed using a gravity separator to remove any remaining waste and to improve the quality of the seed lot by removing any empty Chapingo seed that do not contain a mature embryo. A fractionating aspirator can be used instead of a gravity separator for the same purposes.



Figure 6. Cleaned seeds of Chapingo Mexican teosinte

Establishment for Restoration/Conservation Use: Seed should be planted in the spring when sufficient rainfall is expected for establishment. In Florida, planting should be delayed until June, when the rainy season begins. Recommended site preparation is the same as for seed production fields; the area should be plowed and thoroughly disked and then packed. Seeds should be broadcast at a rate of 10-12 pounds per acre, then the site should be shallowly disking for soil coverage and rolled. Research at the Tall Timbers Research Station indicate

that burning the plants in the fall stimulates seed germination the following spring. Disking and packing the field in the spring (March) will also stimulate germination of volunteer plants.

Additional Information: Contact the USDA-NRCS Brooksville Plant Materials Center, 14119 Broad Street, Brooksville, FL 34601 (352) 796-9600, FAX (855) 465-7547.

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