

Lectures 14, 15, and 16

Horticulture of Pre-Columbian America

The European encounter with the Americas (“discovery” is presumptuous and Eurocentric)—inspired by a shorter trade route to the spice-rich “Far East”—was probably the greatest event of the “Middle Ages.” It marks a convenient beginning to Modern Times. The New World became the West Indies and the misnomer, a result of ignorance, is carried over to the present to refer to the islands of the Caribbean Sea.

In anticipation of the riches promised by Columbus, Pope Alexander VI had divided the Americas between Portugal and Spain. The line of demarcation, 1494, had been 1090 leagues west of the Cape Verde Islands. At the treaty of Tordesilla, January 24, 1506, the line was moved to 370 leagues west of this point, a miscalculation that gave Portugal rights to India and the Far East alone, but provided a toehold in Brazil, which by chance went over the longitudinal line (Fig. 14-1).

During the first two decades after the “discovery” however, the Americas provided only false hopes. New foods and spices began to trickle out but the enormous riches in terms of gold, silver, and jewels—treasures that had been alluded to by Columbus for the ears of the greedy Spanish—did readily materialize.

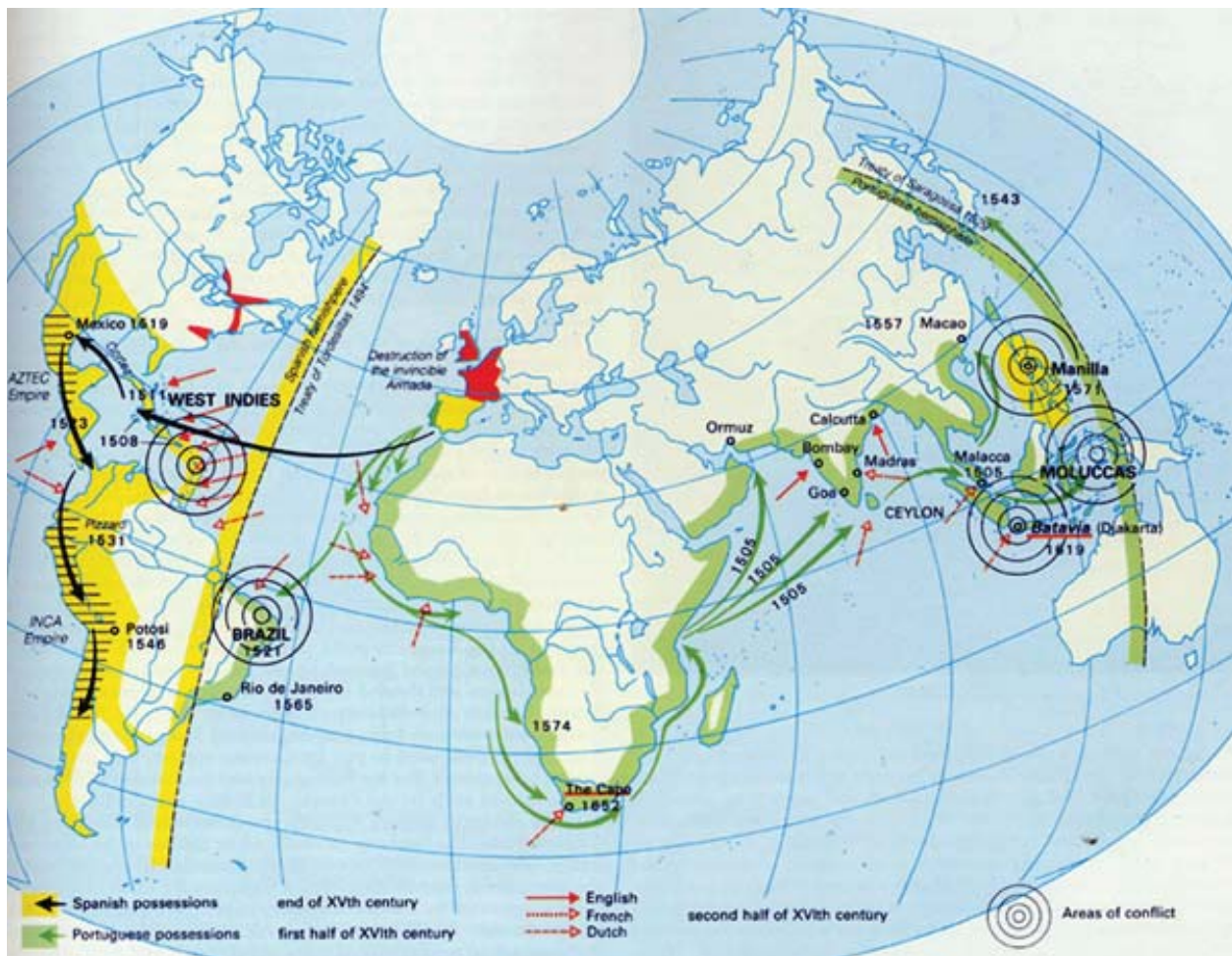


Fig. 14-1. The division of influence between Portugal and Spain by the Treaty of Tordesillas, 1494 and 1506. This treaty recognized Spanish influence in the Americas and Portuguese influence in the Far East but a miscalculation of the precise location of South America resulted in the Portuguese control of Brazil in 1521. Source: Harper Atlas of World History p. 139.

The Spanish confined themselves for 20 years to a small piece of the Isthmus of Panama and the Islands of the Antilles. No riches materialized and America was dismissed as another example of Spanish braggadocio. But on December 9, 1519, the first treasure ship (booty sent by Hernando Cortes, Conqueror of Mexico and Montezuma) arrived from Mexico and the world was changed. It soon became apparent that the New World was not a land of savages but the home of a great civilization.

Three great civilizations were found, known today as **Aztec**, **Maya**, and **Inca**. These were great monumental cultures—similar in many respects to the Egyptian civilization of 2000 BCE—with enormous temples in the form of pyramids, pictorial writing, a system of cities and government, a developed agriculture, a bewildering theology, and a magnificent art. It also had a dark side—slavery, constant warfare, the offering of living human hearts as sacrifice, and cannibalism.

The similarity to the ancient cultures and the mysterious presence of pyramids led to speculation that the New World was populated by one of the lost tribes of Israel and the popular fantasy grew that the New World was connected to the old from biblical times. In fact, the Mormon religion is based on this assumption and much archaeological work is sponsored by the Church of the Latter Day Saints (now Church of Jesus Christ).

Archaeological evidence indicated that the New and Old Worlds are connected—through the Bering Straits—and the peoples of the New World migrated about 50,000 years ago. This, in a way, is ironic for Columbus, in fact, did discover the peoples of the Far East.

AZTEC AGRICULTURE

Aztec (Spanish *Azteca*) is derived from *Aztlan* (“white land”), probably Northwest Mexico, where by tradition the tribe originated. It is also known as *Tenocha* (from *Tenoch*, patriarch) and gave name to *Tenochtitlan* (“stone rising in the water”), a city founded by the Aztecs on an island in Lake Texcoco in the Valley of Mexico (now Mexico City). The Aztecs or Tenochas are also known as *Mexica* which came to be applied to the city of Tenochtitlan and eventually to the modern Mexican nation. The language was *Nahua*, still spoken by about a million people.

The Aztecs arrived late in Mexico, about 1168. They were the heirs of previous cultures, including:

Olmecs (800 BCE–600 CE) Known for huge stone-carved heads (Fig. 14-2).

Name derives from olli (rubber),

Mayas (2000 BCE–1697 CE),

Mixtecs (668–1521),

Toltec-Teotihuaca (200 BCE–900 CE),

Xochicalo (700–1200).

The eastern part of Lake Texcoco was saline. Salts were kept from **chinampas** (built up “islands” for cultivation) by spring-fed fresh water; aqueducts brought in fresh water as the area enlarged; and dams and dikes to prevent flooding, leaving a fresh water lagoon. If the water flow was too high in an aqueduct, according to one Aztec chronicle, it could only be diminished when the emperor sacrificed some high officials and had their hearts thrown into it (Fig. 14-3).

Aztec herbals (list of plants for therapeutic value) described hallucinogenic plants such as peyote.

Milpa (Maize Fields)

Aztec life revolved around the cultivation of maize (**milpa**). This single grain, maize (Fig. 14-4), made settled life (and civilization) possible. (Maize is the Arawak-Carib



Fig. 14-2. Great stone head of Olmec culture (800 BCE). Source: von Hagen p. 49.

name for our “Indian corn.”) Milpa culture remained unchanged for 3000 years. Milpas were 2–15 miles from dwellings. Forest were cleared, trees burned, large trees rotted. The earth was turned over with a digging stick (*coa*). The maize was planted in March in holes 4 to 5 inches deep. Milpa cultivation was operated as a collective but was not as advanced as Inca agriculture. No fertilizer was used except human feces. [The Incas had bird manure (guano), llama offal, and limited irrigation.]

In temperate zones, beans and squash were put in the same hole—the maize acted as support for the climbing beans. Note: maize and beans complement to form a complete protein; maize alone causes deficiencies in the essential amino acid lysine and beans alone are deficient in the sulfur-containing amino acids (cysteine and methionine). The mixture of beans and tortillas (corn pancakes) make a complete protein food. Beans and maize also complement agriculturally with maize providing a support for beans, and beans, a N-fixing plant providing added nitrogen to the soil.

In April, rains come, prompted by human sacrifice. The Aztecs had little irrigation technology, and thus depended on rain. Unfortunately, the good will of the rain god could only be appeased by his diet of human hearts—requiring prisoners taken in battle. A long peace was a disaster.

Other crops included: sweet potato (warmer valleys), tomato, chili pepper, amaranth (pigweed), pineapple, avocado (ahuacatl), chicle-zapote (chewing gum tree + edible fruit), chocolate (perfumed with vanilla). Chocolate was the drink of the gods (hence its Latin name *Theobroma*) and was so valuable it was used as currency.

Chinampas System

The Chinampas system (Fig. 14-5 and 14-6) predated the Aztecs and became the basis of their agriculture. Maize produced several crops a year. The system maintains fertility for centuries. Note the term “floating gardens,” a misnomer, is a land reclamation scheme involving drainage. It is a system of canals, where mud is used to build up peninsular-like islands. Lake Xochimilco is fed by springs which flow into Lake Texcoco. Each chinampa was 300' × 15' to 20' and a few feet higher than the surrounding water.

Before planting, the **chinampero** (chinampa worker) scoops rich mud from the bottom, loads it in a canoe, and “fertilizes the field.” The chinampa eventually gets too high and must be lowered.

Seed nurseries are near the end of the canal. Mud is spread over water weeds and cut into blocks (*chapines*). A planting hole is “dibbled” in and (human) manure is added. The block is eventually transplanted.



Fig. 14-3. Heart sacrifice on a temple pyramid. (After Codex Magliabechiano 1983:F.70r; drawing by Ellen Cersarski. Source: M.E. Smith, *The Aztecs*, 1996. Blackwell. [Fig. 9.7 p. 223])



Fig. 14-4. Maize, the basic grain of the Americas.

Today, chinampas get 7 crops per plot per year. Two are maize, others may be beans, chile, tomato, amaranth.

Horticultural Deities and Garden Terms

Xilonon—goddess of red corn; festival coincided with ripening harvest of grain.

Centeotl—yellow corn god, worshipped by special priests, old men vowed to silence

Note: *Xoch* = flower

Xochizuetzal—goddess of fertility and flowers

Xochipilli—god of flowers

Xochitla—flower place

Xochichevancalli—humble garden

Xochhitecpanc—walled garden

There are many agricultural deities for which flower offerings and sacrifices were made: e.g. for rain, growing plants, soils. In the fasting month of *Tozoztenti*, no one was supposed to sniff flowers.

There were a number of flower festivals:

Rainy season—farmers and florists cooperated in a feast of the earth mother

August—festival of wild flowers

October—farewell to flowers (preceded by 4 days of fasting).

There were elaborate gardens and ceremonies. Cortez was welcomed by chieftains bearing bouquets of various kinds of floral ornament—baskets of flowers woven in the form of a shield, long garlands worn around head and neck, a choice flower at the end of a stick. Dancers pelted each other with balls of flowers.

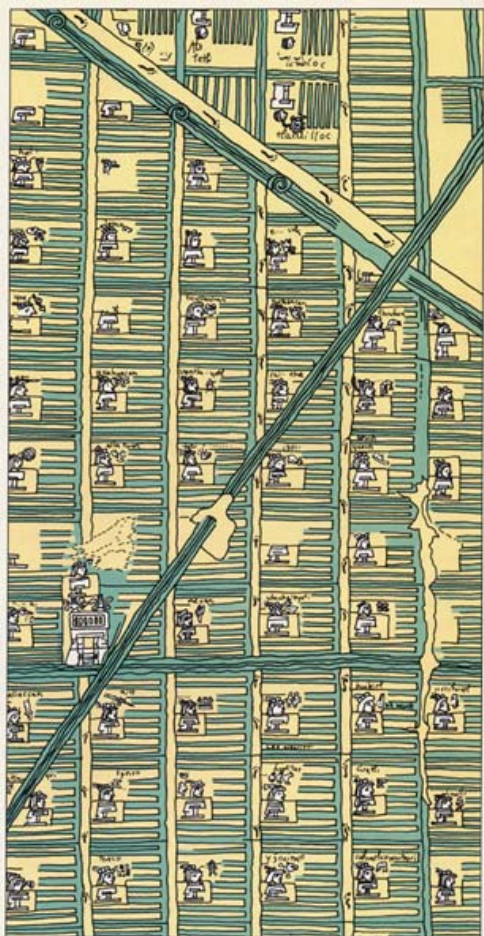


Fig. 14-5. An Aztec plan of a small portion of the gigantic chinampa system—the artificial “island” gardens (“floating gardens”) constructed 2000 years ago in the area of Mexico we now call Mexico City. The major canals were large enough for navigation in flat-bottomed boats. The areas with footprints are paths. The portrait profiles stand for the homes of the farm owners with names in hieroglyphics and some translated into Roman letters by a Spanish scribe.

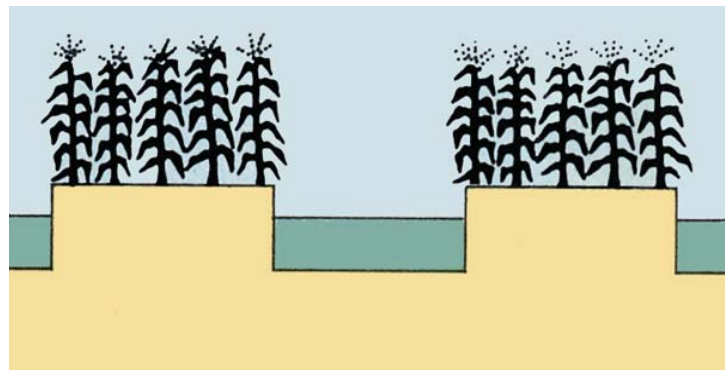


Fig. 14-6. A cross section of the raised, arable areas in the chinampa, each about 15 to 30 feet wide. Weeds, sediment and mud are piled on top of each “island,” and the roots of plants, maize in this case, and trees, help keep the mounds from crumbling.

MAYAN AGRICULTURE

Maize was the basis of Mayan civilization. **Yum Kaax**, the maize god, was illustrated as a youth wearing maize in his headdress.

Cultivation System

Trees were felled and burned, and the earth was turned over with a digging stick (fire hardened). Each person was allotted plots (land was communal property) which was hand weeded. Stalks were bent at harvest to deter birds, grain was preserved in storage bins and underground granaries (**chultunes**) (Fig. 14-7). Water was provided from reservoirs and wells, but there was no wheel and, thus, no efficient way of raising water. There was no beasts of burden.

The yield was deduced from present day statistics for subsistence agriculture: 12 acres/farmer = 168 bushels (14 bu = 784 lb./acre). Consumer uses of 6.6 lb./maize/year for a family of 5 plus some livestock = 43 bu/year. Thus 190 days of labor gives 125 bushel surplus. Ancient Mayans had less land per farmer but no livestock. The surplus made the building of temple cities possible.

Other Mayan crops: beans, squash, pumpkin, chili pepper, sweet potato (pale), sweet cassava, chicham (turnip-like), papaya, avocado, achiote (source of food color), gourds for bowls, balche (strong alkaloid for mead), hemp for fiber, cotton, sapodilla (chewing gum tree, also used for blowguns, adhesives), copal, Brazil wood, palms, cacao.

Drought was the great impediment. Rainfall was abundant in some zones but the soil is porous. During a drought, cities were abandoned (some suspect a virus disease of maize may also have been a factor). Deep wells could have been the solution. In 1464, a disaster occurred including drought, followed by locust swarms (so thick that the weight broke off tree limbs), followed by hurricane.

INCA (ANDEAN) AGRICULTURE

Refer Prescott's *History of the Conquest of Peru*. In 1531, Pizarro with 180 men and a few horses (3) and cannon took Atahualpa prisoner. He was ransomed for gold but eventually killed. This was one of the most terrifying sagas of the encounter between the conquistadors and the New World Civilizations.

The basis of society was the farmer-soldier (as in Rome). First fruits were given as a religious offering to the local shrine (*huaca*). The seasonal working of Inca farmlands is illustrated in a series of monthly drawings (Fig. 14-8) by a Peruvian of Indian-Spanish descent, who sent the drawings to the King of Spain in the 1580s as part of a treatise on Inca life. It begins in August (late winter) and is labeled with a mixture of Spanish and Quechuan words.

Many of the local crops can be identified in pottery (Fig. 14-9). Staples include potato (*Solanum tuberosum*) and maize. Peru is the center of origin for potato. Tubers were preserved to a freeze dried product (**chuñu**) by continued freezing combined with squeezing the tubers by walking on them.

Maize was called *sara* by Incas. The many types included:

- sweet corn = choclo
- parching corn = kollo sara
- fermentation (chicha) = saraaka
- hominy = mote

Note: the large kernel corn of the popular "Corn Nuts" is a variety of Inca maize from Cuzco.

Quinoa, a chenopod, is a spinach-like plant where the dry seed is consumed as a grain (as it not a grass, it is considered a pseudocereal). It is still consumed in South America and is now being reconsidered in the United States and Europe and may have industrial prospects because of its unique starch properties.

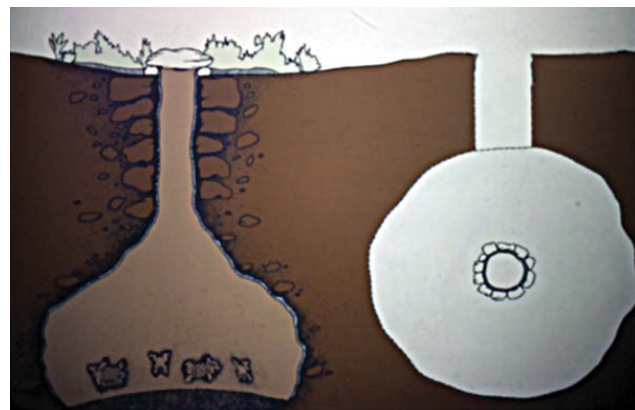


Fig. 14-7. Underground granaries called chultunes.



August. In a symbolic ceremony, the Inca emperor and noblemen turn over the first earth in a sacred field, while three women bow and the empress offers corn beer.



September. With an ornate digging stick, a farmer punches holes into which a woman scatters corn seeds. The Incas believed women planters ensured successful crops.



October. Wearing a wolfskin to look more formidable, and carrying a sling and a noisemaker, a boy tries to scare birds and a skunk from the sprouting fields.



February. To keep hungry foxes, deer and birds from eating up the swelling ears of corn, a woman creates a frightening din by beating incessantly on her drum



March. As the harvest ripens, birds attack the corn with renewed appetite, but the young boy, with his sling and stick, is once again on hand to scare them away.



April. A thief skulking along the rows of ripened corn can do even more damage than a hungry llama; the farmer, at watch before the fire, remains oblivious of his presence.

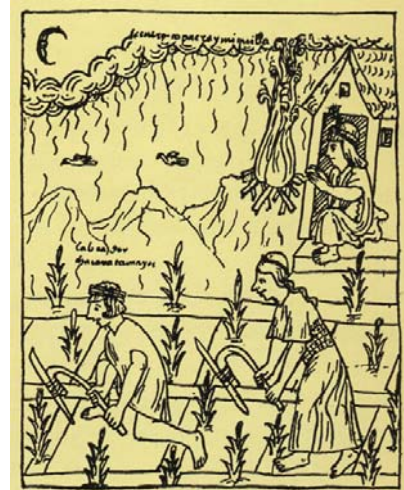
Fig. 14-8. A calendar of Inca agriculture presented to the King of Spain in 1580. Source: Leonard, First Farmers.



November. A woman irrigates fields with water from a small reservoir. The Incas depended on irrigation in this month of little rain when the rivers often dried up.



December. To plant potatoes, one woman inserts the tubers into a hole in the earth made by the man, while another stands by to smooth the soil with a cultivating tool.



January. Wielding primitive hoes, a couple cultivates its fields in the rain. Another farmer sits before a fire and keeps a sharp eye out for crop robbers.



May. Harvesttime brings a division of labor. While a man cuts stalks, his female helper carries bundles of them on her back to the field where she lets them dry.



June. With the aid of a digging stick and a hoe, a man and woman root potatoes from the ground. Another woman transports them in heavy sacks to a storage place.



July. At the end of the harvest, potatoes are brought by llama to a state warehouse and placed there. The emperor could distribute surplus food in time of need.

Fig. 14-8. (continued) A calendar of Inca agriculture presented to the King of Spain in 1580. Source: Leonard, *First Farmers*.



Fig. 14-9. Peruvian ceramic jars in the form of A. peanut, B. potato, C. squash. Source: Leonard, *First Farmers*. 1973. D. Cacao god, Source: Indianapolis Museum of Art. E and F. Maize, Source: M. Eubanks. G. Cacao pod, Source: Leonard.

Fig. 14-10. A foot plow or tacla. Source: Leonard, *First Farmers*, 1973



Amaranth (Kiwicha)



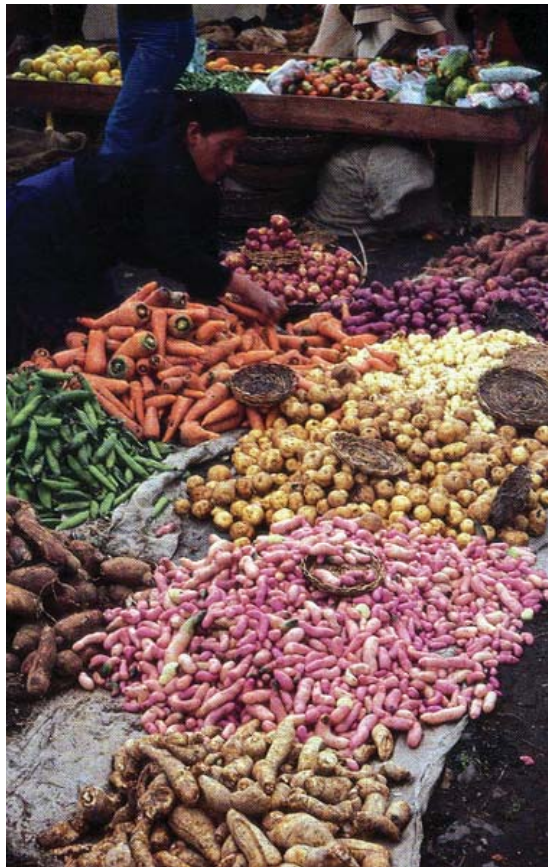
Potato



Ulluco



Oca



Inca crops in a market in Ipiiales, Columbia



Peppers



Nunas



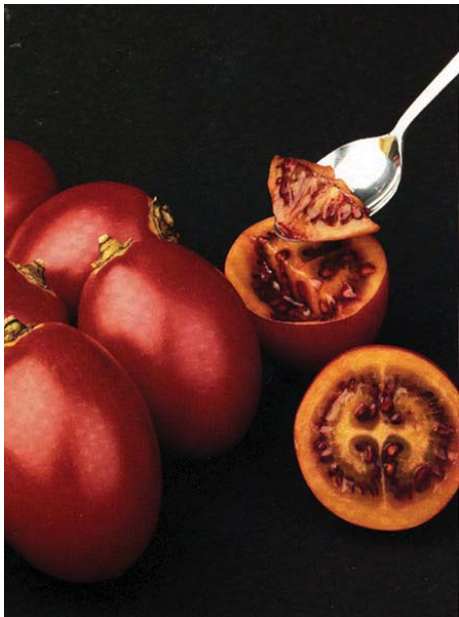
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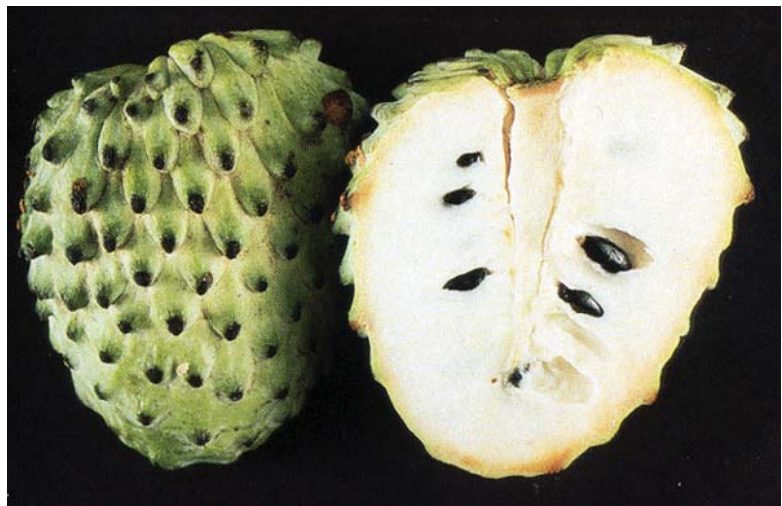
Tomatillo



Naranjilla



Tamarillo



Cherimoya

Amaranth, another pseudo-cereal, is now having a revival in the United States. Because of a religious association, the Spanish prohibited the culture of amaranth but it was introduced into India and is now a substantial crop there.

Many other fruits and vegetables included: chili pepper, tomato, beans (Lima and *Phaseolus*), squash, pumpkins, wild gherkins, papaya, avocado, cherimoya, guava, granadilla (passion fruit), chocolate, peanut, manioc, pineapple, soursop, sweetpotato.

Cultivation was based on deep valleys.

Terracing still exists after more than 500 years

Irrigation highly developed, based on diverting streams, canals, water reservoirs

Implement: digging stick or “foot plow” called **tacla** (Fig. 14-10), sometimes bronze-tipped

Pest Control: boys disguised with wolf skins scared away predators with noise makers and sling shots (See Fig. 14-9, October).

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