

The Origin & History of Agriculture

From earliest times human distributions have been correlated with the distribution of plants. The history and development of agriculture is intimately related to the development of civilization. For last 30-40,000 yrs (advent of cromagnon) very little physical evolution is evident in fossil record but there has been tremendous cultural evolution. The advent of stationary human societies and consequent development of civilization were possible only after the establishment of agriculture. Humans did not "put down roots" and remain in one place until they learned to cultivate the land and collect and store agricultural crops. The origin of agriculture provided "release time" for the development of art, writing, culture and technology.

Hunter Gatherers

The earliest humans lived in small bands of several families (up to 50 or so). For over a million years (paleolithic or old stone age) humans obtained food by hunting wild animals and gathering plants. They depended almost completely on the local environment for their sustenance. Such hunter gathering societies existed extensively until 10,000 yrs ago. A few isolated groups continue to this day.

Paleolithic cultures were nomadic by necessity. They wandered as small family groups in search of game and edible plants. Meat was their primary source of **protein, sugars** & many **vitamins** were provided by fruits & berries, **starches** from roots and seed, and **oils** and **vitamins** from nuts. As seasons changed, nomadic peoples moved on to follow game, gathering whatever plants were available as they traveled.

The Beginnings of Agriculture

Agriculture seems to have arisen in temperate regions before it showed up in the tropics; food was available year round in the tropics with less need to migrate with the game. Around 10-12,000 years ago agriculture originated at least 4 separate times in 4 different places:

mid-east	→fertile crescent
China	→Yellow River
Egypt	→Aswan
Central America	→Tehuacan valley

A possible scenario:

1. Nomadic tribes migrated annually in the fall and spring from the foothills of surrounding mountains to nearby valleys following the natural migrations of animal herds. Also, valleys provided the plants needed for food, fiber and fuel during the winter that were not available at higher elevations. In the spring the animals moved back to the foothills and spent summer in cooler locations
2. This cycle was repeated each year. They probably used same routes and same camps each season
3. Each camp had a designated trash heap or compost pile; seeds fruits wastes were thrown there.
4. Plants sprouted in these rich compost beds. As people returned year after year must have noticed and took advantage of fruits and vegetables growing in these beds.

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5. The realization of choice plants growing near camp could have led to experimental "farming". With more and more successes they could have cultivated more and more plants.
6. They became increasingly dependent on such activities. Staying in one place also meant fewer hazards, more leisure time, greater population size and a much more sedentary lifestyle.
7. Such sedentary lifestyle would have promoted other important changes: the accumulation of material goods, a division of labor, not everyone needed to be farmers, people became specialists as potters, weavers, tanners, artisans and scholars
8. Biological evolution was superseded by "cultural" evolution; advanced civilizations rapidly evolved

Earliest Agriculture

The first plants to be cultivated were probably the ones that had been originally gathered by the nomadic tribes, were locally abundant, were easily cultivated, and had other uses besides just as food. In the **Near East barley** may have been the 1st crop domesticated there. Soon followed by **wheat, barley, peas, lentils, vetch**. At the same time **dogs, goats, and sheep** were domesticated. In **China rice, millet, rape, and hemp** may have been some of the first crops, as **cattle, pigs, dogs, and poultry** were domesticated. In the **Tehuacan Valley corn** probably the first cultivated plant. Later **squash, avocado, gourds, beans, and chili peppers** were grown while **dogs** and later **turkeys** were domesticated.

We do know that every important civilization depended on **cereal crops** (grasses such as; rice, corn, wheat, grains) as mainstay of their agricultural base: eg. **millets** (*Setaria*, *Echinochloa*, *Panicum*) were among the earliest grains to be cultivated; eg. in China & SE Asia, **rice** (*Oryza*) was widely cultivated; eg. in Middle East, **wheat** (*Triticum*) was cultivated in hilly regions; eg. **barley** (*Hordeum*) was grown in southern Egypt; eg. **Maize** (*Zea*) was the main cereal crop in the Americas.

Cereal Grains:

The use of wild grass grains and development of more productive strains were central to further development of settled villages and great civilizations. As food plants they have several beneficial traits:

- a. **high yield**: a large amount of grain/acre under cultivation; each grain is **rich in carbohydrates, minerals, fats, vitamins & proteins**
- b. the grains were compact and dry and highly suitable for **long term storage**
- c. grains could be easily **ground into flour** which could be used in a variety of different ways
- d. the stems and leaves (straw) could be **woven or thatched** into **baskets, bedding and housing**
- e. cereal plants easily reproduce by runners increasing yields even more
- f. domesticated animals grazing in these grains would not only have provided meat and hides but would have increased their yield by spreading seeds and fertilizing the crops

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Early Root and Stem Crops:

Many plants with large edible roots and stems were easily cultivated and harvested. They tended to have high levels of nutritious starch and could be easily replanted using leftover pieces of root or stem to provide crops year after year. For example: **cassava** (*Manihot ultissima*) has a thick edible root, tapioca is also made from this plant; **irish potato** (*Solanum tuberosum*) are a modern tuber crop that is easily propagated by "eyes" (buds) on tubers; in Asia **taro** (*Colocasia* sp.) & West Indies, **tannia** (*Xanthosma* sp.) are both known to be early root crops, both have starch rich corms (swollen underground stems) and are easily propagated by buds on the corm.

Later Developments in Agriculture

→ The Romans were using crop rotation, manure, grafting, and experimenting with plant varieties by 200 CE.

→ The **Aztecs** developed sophisticated **irrigation system** (=Chinampas) to expand areas of cultivation and yield (1100's-1300's). The high productivity of the region was a major reason why the Aztecs were able to dominate such a large region in such a short period of time. By the time the Spanish conquistadors arrived at Mexico City in 1519, the Aztec emperor was receiving annual offerings of: 7000 tons of corn, 5000 tons of chilies, 4000 tons of beans, 3000 tons of cocoa, 2 million cotton cloaks, several tons of gold, amber, and other valuables.

→ **Increased population** growth allowed the development of large cities, even in ancient times and the exchange of crop plants worldwide. Continued agricultural advances resulted from **selecting more productive strains** of crop plants

→ **Industrialization** led to large scale agriculture. It greatly increased **areas** under cultivation and greatly increased **productivity/acre**. Today, in industrialized countries, all the food is produced by only 5% of the population. Over 90% of all human caloric intake is provided by commercially grown plants. Of the more than 250,000 known species of plants, only a few species are exploited to any degree with the food plants that were 1st domesticated remaining as our primary staple crops today. Only 6 crops: **wheat, rice, corn, potatoes, yams, & cassava** provide ~80% of the total caloric intake for the world's population. **Tomatoes** and **coffee** are the only two major commercial plant crops that have been developed in the past 2000 years.

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