

The Importance of Agriculture

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Editors note: This document is an excerpt from a paper by Morrow Agriculture Specialist Enrique Gonsolvo, an answers many questions on agriculture that teams have been asking. Records indicate Dr. Gonsolvo was frozen, but his team or freeze location is unknown.

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Forward

Agriculture is society. Any society group is defined by their agricultural practices. Only in the past hundred years has this link been shattered by modern technology. After society falls, the search for food, shelter, and clothing will again take central importance to the average person's life. This is why it is important for a Morrow team to understand the agriculture cycle.

Common Denominators

All agricultural systems involve the cycle of seasons. Planting occurs at the beginning of the year. For most plants, this is spring, but where you are is a very important consideration. In Canada and New England, planting of most staple crops occurs in May. In Texas and California, planting can occur as early as February. For herders, spring is the time when flocks give birth. In all cases, a good spring is a sign that the crops will be good (which is not always the case), while a tough spring, heavy rains, late freezes, and the like, can delay and even ruin the season's crops. Unless the community is well off, starvation is the result.

Plants in the ground and new born herd animals require care. Summer is the time of weeding and caring. Each day a farmer goes into the fields to tend his or her crop. The tending process is different for each type of agriculture, but it has the same end: protecting the fragile plants from predation by weeds and animals. Most traditional farmers will have a multitude of crops in the ground, as well as a truck garden, a kitchen garden, and a yard for animals. This requires that the farmer have a great deal of farming knowledge. It also means that failure of one crop wont doom the farmer to starvation. The Irish potato famine is the results of "one crop" agriculture. If something kills that crop, everyone starves because there is nothing else in the ground to eat.

Harvest depends on the plant and where the farmer is. In the South, crops that went into the ground early in the year will be ready by July. Those same crops may not be ready until September in Canada. In any case, the farmer has a busy time ahead. With grains it is usually best to leave them in the ground until the very last minute. The longer they are in the ground, the dryer they become, and the better they store. Leave them in too long, and the animals and weather will destroy them. The farmer also can only harvest so much at a time. He or she will have to work all fall to get the harvest in and put down.

Gathering the harvest is not the end. Once the food is off the plants, it must be put down. "Putting down" a harvest means that it is preserved in some fashion for later use. Grains are dried, animal products are smoked and/or dried, root vegetables are cellared in a cool area, and many vegetable crops can be brined or pickled. Higher technology levels allow preservation of more food stuffs. The invention of canning and jarring allows high acid fruit and vegetable products to be kept for a year or more. Pressure Jarring allows properly prepared low acid vegetable to be stored that way as well. (See preserving the harvest).

The winter is a time of recovery. Farm equipment is fixed, new crafts are created, and the farm community concentrates on living until spring. Some communities hunt or fish in the winter, although this is not universal. In the farthest south though, a winter crop can be tended and harvested. Texas and Florida have three growing seasons allowing a third crop to be recovered early in spring.

Types of agricultural communities

Community technology level is easiest to see in the agriculture.

Hunter Gatherer

The lowest technology level is the hunter gatherer. Early genus Homo lived in small family groups or 8-12 individuals, moving over a range of territory in search of food. Often these groups are linked into tribes or clans of over a hundred individuals. Hunter Gatherers are opportunistic feeders, they make use of most if not all food sources available to them. While hunting is important to the group, more than half of the food value they consume comes from plants and small animals that are snared, trapped, or dug up. This means that the hunter gatherer groups are not as vulnerable to famine as more advanced societies.

Hunter Gatherers are materially very poor, which causes them to place a great deal of emphasis on the meaning of possessions. The way a hunter carves their spear, wears their luck charms, and paints their body has a great deal of significance to them. Communication between hunter gatherers and farmers often breaks down because the hunter gatherers assume that every item the farmer possess has inner meaning. A farmer will wear a different shirt, saying that this meeting is different than the last. Humans still follow this pattern in the twentieth century, and can be observed in the Kalahri Bushman of southern Africa and the Inuit of North America.

Dirt Farming

Dirt farming is the lowest technology level of farming. A dirt farm is any plot of land used to grow food crops, so the term could mean any farm, but when it is used to refer to farmers, it usually means low sophistication broadcast seeding (by hand) with limited soil preparation. Dirt farming is not very productive. It is often used by hunter gatherer groups that are in transition to an agrarian or agrarian / herding culture. People who return to the land after disasters often start with simple dirt farming techniques. Other techniques require a great deal of stored wisdom, which is often not available to the new farmer. Half of the colony at Plymouth Rock starved because they chose to dirt farm rather than emulate the natives slash and burn agriculture. Dirt farming depletes the soil rapidly.

Flood Plain Farming

Sometimes, dirt farming works. Usually, this is because the farms are allowed to flood each year, then are farmed when they are dry. The floods bring rich river soil and cause vegetation to rot in the fields, acting as a yearly source of fertilizer. All of the ancient western and eastern cultural centers relied on flood plain farming. Flood plain farming sometimes causes soil salt content to increase. Saltification of the land takes hundreds of years to take effect, but if it is not stopped, it can result in the land returning to desert. The locations of many ancient cultures can be found by looking for the deserts they created, either from dirt farming, or abuse of other agricultural systems.

Process Farming

Process farming means that farming productivity is increased by some means. There are several types of process

farming, often used with great success by preindustrial cultures.

Slash and Burn- Slash and burn works only with small populations, or in equatorial regions. In rain forest and equatorial jungle biomes, most of the organic material in the ecosystem is locked up in fast growing plants. If the plants are cleared, the soil is unable to sustain agriculture, as all of the biomass was in the plants. To solve this problem, the plants are burned and tilled, allowing a year or two of high productivity agriculture to occur. Afterwards the land must be abandoned. Soil depletion occurs very rapidly with slash and burn agriculture. When a plot is abandoned, another plot is then chosen and burned, while the first plot reverts to jungle (taking around twenty years). This system works well until population pressure forces the farmers to keep plots in use even after their productivity has dropped. With no chance to cycle to jungle, the land will not be able to support the population.

Cunoco- This is raised island agriculture used to farm marsh land. Cunoco agriculture is very labor intensive, and requires a well organized work force, so it is rarely used by home steaders and village based communes. When it is used, it is the most effective style of agriculture known. In Cunoco, an artificial island is formed in a swamp. That island is seeded with a broad range of plants. Traditionally, cunoco agriculture relied on bread fruit and yams, but any combination of water tolerant rich soil plants may be used. Each raised island is surrounded by canal and swamp, which is a breeding ground for fish that can be caught. The islands tend to slump a little each year, so each spring the canals are dredged and the material piled on the islands. This bottom sludge is excellent fertilizer, so the islands can remain productive indefinitely. Cunoco systems typically fail because public turmoil and unrest make it difficult to maintain the islands. Neglected, they quickly slump back into the swamp.

Rotation Farming- Rotation farming is dirt farming that relies on crop rotation and fallow fields to remain productive. Each field is farmed first with a grain, then with a bean, and finally allowed to fallow for two years with a holding crop of clover or alfalfa. Rotation farming can use any combination of crops, as long as the crops have different growing cycles, and different rotation systems are identified by the crop they rely on. The main types are Corn-Squash-Bean (used by North American Indians), Amaranth-Bean (Aztec), Quinoa-Bean (Incan), and Wheat (or barley)-Bean (European-American).

Diversity Farming- Used by many Native Americans, diversity farming is planting of a field with dozens of crops. This makes the field hard to harvest, but means that if disease should strike one plant, there is bound to be a survivor.

Paddy Farming- Based around Rice, Paddy farming is a wetland farming technique used in Asia. In paddy farming, a farmer builds fields separated by dikes, then floods the fields. Rice plants are started near the farmers house, and then transplanted into the fields. Fields may be kept flooded, or they may be drained for harvest.

Orcharding- Farmers rely on long lives tree and vine crops. Orchardring is usually combined with other types of farming by the community, and most orchard growers will have a dirt farm (at least) to support themselves. Orchards require lots of clear land, proper soil conditions, and proper weather. Orchard types include Olive (cool mountains), Grape (cool, hillsides are best), Apple (northern climes), Orange/Grapefruit (southern climes, lost of water), Peach (southern climes with colder winters), and other less common types.

Herding

For years, herding was seen as transition phase between hunter gathering and dirt farming. In reality, herding is an offshoot of dirt farming, and closely attached to it or other more advanced styles of agriculture. While advanced hunter gatherers may follow game (buffalo, elk, etc.) from one hunting ground to another, they supplement their diets with grain and fruit from their environment, and rarely rely on only once animal ². Herders rely on their primary animal for everything. The difference between the herder and the advanced hunter gatherer is in domestication. Herders participate in the herds life cycle, helping birth animals, protecting animals from predation, and moving them to seasonal pastures. Herders are as mobile as their herds, relying on horses, llama, or dromedaries to keep pace with faster moving animals like bison or cows. Unlike hunter gatherers, herders cannot survive without farmers. The "hepuru" were a clan of goat herders that lived in close contact with Canaanite farmers, eventually taking control from the Canaanites and becoming farmers themselves³. There is often a great deal of trading between herders and farming communities.

Mechanical Farming

Mechanical farming uses machinery, either animal or chemical powered, to aid in harvest of crops. While most farms use simple tools such as the plow to prepare soil, mechanical farming adds machines to every phase of farming. Mechanical farming was first made possible by Jethro Tull, a British inventor that found a mechanical method of getting seeds into the ground. He called it the seed drill, and it sparked a revolution in agriculture. With mechanical aids a farmer was able to tend more land, and become more productive. This lowered the price of agriculture products, allowing more people to survive outside of agriculture. While not as productive as some of the traditional high intensity farming methods [1](#), it led to an explosion of cities.

Chemical Agriculture

All systems use fertilizer of some sort, usually compost or plant husks. Chemical Agriculture occurs when artificial chemical fertilizer is used to boost yields of crops. Using hybrid plants and large chemical inputs, Chemical Agriculture is the most resource intensive, but the highest yielding agriculture system. Chemical agriculture systems can also be very damaging. Once a farm has been under intensive chemical cultivation for ten or more years, earth worms and other soil builders are killed off and cannot get into the soil. This means that a chemical farmer cannot usually convert back to traditional methods of farming. To make matters worse, hybrid seeds are usually F1 hybrids. F1 hybrids usually fail to produce a healthy second generation [4](#). A farmer who buys hybrids cannot save seeds for the next year, they are tied to seed companies, who sell only a few brands of seeds. This means that a farmers neighbor is likely planting the same seed as he or she is, making disease a potential problem.

Cash Cropping

In broad terms, cash cropping is producing bulk agricultural products for market. Most cash crops are luxuries, such as tobacco or indigo. Here list of potential cash crops:

Cotton- for clothing

Flax- to make linen

Hemp- for rope and intoxicants

Olives- for oil

Beats or cane- for sugar

Herbs- for food additives

Medicinals- for medicine, both quack and real

Patent- quack nostrums that run the gambit from increased sexual power to growing hair on a bald head

Saving the Harvest

Once the crop has been collected, it either has to be used, preserved, or it spoils. While many low technology farming techniques allow large yields, saving those yields is a difficult proposition. These are the ways harvest are saved.

Common Storage- Many plants can be stored in a cool cellar for several months. "Root cellars" refer to basement storage places for root vegetable: potatoes, onions, carrots, beets, and cabbage can all be stored for several months in a cool cellar. Common storage is usually a northern climates activity. In southern climates, higher water tables, humidity, and lack of suitable basements make this activity difficult. Common storage techniques include "barrel storage" where vegetable are put into a hay fill barrel and then buried in a shallow trench, Bin storage, where a bin pierced by holes keeps animals out of the food but allows cold to preserve them, and garden storage, where cold hardy plants are mulched with hay and allowed to stay in the garden until needed.

Bulk Storage - Used for dried grains and beans, bulk storage occurs in silos, bins, or caves. Bulk stored grains are usually allowed to dry on the plant, are separated from the chaff, then placed into storage areas. Corn, quinoa, amaranth, beans, wheat, barley, chia, and rice are all bulk storage grains.

Fermentation- Many agricultural products can be fermented. High sugar products turn into wines or vinegars, low sugar products turn into beers. Beer making actually predates bread making by several centuries. Archeologists suggest now that bread was invented to give travelers a way of making beer on the road. The earliest written word for bread actual means "beer-loaf" or "loaf that makes beer". Low technology fermentation processes typically do not produce high alcohol content - ancient beers probably had half the alcohol of modern beer. Most beers did not use carbonation, the yeast that causes carbonated soda to dissolve in beer must be added during the beer making process. Both beer and wine have important vitamins and mineral that make them essential parts of early diets. People without beer were said to suffer "headaches, body aches, and ailments of all kinds". This is because early town based societies relied on food from granaries and common storage. Beer for an early society acted like a "vitamin supplement" assuring health (if not abused). Vinegar is an important product in other forms of storage, used primarily to raise the acid level of pickled and jarred vegetables.

Curing- Vegetables and some meats can be soaked in a solution of salt (called brine) for long term storage. Brined foods are not edible "as is". They must be rinsed to reduce their salt level. Because of this, brined vegetables often find their way into stews, where the salt acts as a spice for the meal. Brined meats such as salt pork are edible as is, but also usually end up in stews. Curing can be combined with drying and smoking to make cured meat products that will last several years is hung in a dry place.

Krauting- Certain vegetables, such as cabbage and turnips, can be cured in a low salt brine, and then left for fermentation. The fermentation process raises the acid level of the vegetable, allowing it to be in covered containers for a year or more. In cold countries, krauting is an important source of winter nutrition, Unlike dried fruit sauerkraut and sauerbraten retain a significant amount of vitamin C.

Drying- Foods are dried either by the sun, or by application of low heat for prolonged periods of time. Sun drying of many plants is not possible in northern climates, but is common in areas with warm falls. The most common sun dried food crops are grapes, peppers, tomatoes, and cherries. Heat dried foods are less common due to use of valuable fire wood. Most heat dried foods are high fat meats like fish. Any fruit, vegetable, or meat can be dried though.

Pickling- When grape or apple vinegar is available, produce and some animal products can be pickled. Pickling is a process of raising the acid level of the vegetable by adding vinegar and spices. Pickled farm products covered by vinegar and kept in a cool place can last a year or more. Pickled fruits, called relishes, often provide an excellent vitamin supplement.

Jamming- Some fruits, most notable apples, contain enough of a plant protein called pectin to be preserved for several months if they are heated and excess water is boiled off. With lower pectin fruits, either pectin or massive quantities of raw sugar are added to the fruit to preserve it. Jamming is rarely a significant source of nutrition.

Canning and Jarring- Canning and jarring is a relatively young form of food preservation that requires a large input of energy and careful attention to detail. When food is canned, it is heated to kill germs, then placed into a can or jar which is sealed and heated for as long as an hour. High acid foods like tomatoes can be jarred in boiling water. Low acid foods are heated at 240 degrees, a temperature that is only possible when water is under pressure. Sauerkraut and jams are often canned or jarred safely in boiling water. Without electricity, home canning is very hard, and likely to result in

spoiled food (causing fatal botulism).

Community and the Farmer

Farmers are the first link in any society. In general, anything that adversely affects the farmer, will adversely affect the society's long term stability. In medieval Europe, land rents collected by nobles to support their personal wars caused farmers to flee their lands. This caused production on the noble's farms to drop, requiring a raise of taxes, causing more peasants to flee the farms. Revolts like the Peasants' Revolt, the Huguenot revolt, and the French revolution occurred because farmers and other bases of the agricultural chain saw no choice but to throw away their lives or starve.

Any community of farmers need some services. These include grist mills to grind dried food, blacksmiths to repair complex tools, and other artisans that relieve a farmer of occasional chores and allows them to concentrate on farming. While many people love the idealistic notion of homesteading (self sufficient farming), in reality, homesteading is rarely successful without support from society.

1 A combination of Crop Rotation and Intercropping agriculture allowed the Aztec capital of Tenochtitlan to have half a million people living in it, the largest city in the world at the time it was "discovered" by westerners. These "backwards" people (as Cortez described them) had an agricultural system that was unmatched in western experience, only to be topped by the diversity planting of the Incas. Both systems came with a price. To support the Incan Agricultural system, Incan government was one of the most repressive of human record, although the average person was not much worse off than the European serfs. The Aztec system was kept alive by a very proactive military that terrorized other nations and used captives wholesale as a food source for religious ceremonies (although human consumption did not represent a significant source of nourishment for the average Aztec farmer, unlike many New Guinea tribes which relied on "long pig" to a significant extent.

2 Inuits are an exception. While most hunter gatherers rely on local plants, Inuits live in areas devoid of most vegetation.

3 Many anthropologists have recorded the effect that herder-farmer wars have on populations. While early farmers had female based nature deities, herders often develop male based thunder and weather deities. When one society takes over the other, they often "marry" their deities, with the winners deities holding positions of power. Many Morrow writers have speculated on the effect of disaster and the return to early agriculture forms on religion.

4 Seed developers sell F1 hybrids on purpose. A plant breeder looking to create a stable species of plant with new characteristic breeds dozens of plants together over a period of years until a stable plant line displaying the desired characteristics proves itself over several generations. These hybrid are said to breed true. Seed companies, however, were disturbed that farmers would save seeds and replant them the next year (a practice that predates seed companies by about twenty thousand years). To stop this practice, they began to offer only F1 hybrids. F1 (or first generation) hybrids often display improved characteristics of both parent plants, but the genetic line is not stable. Plants sired by the F1 seeds are often unable to reproduce, or not very hardy. Often, seed companies breed in recessive genes like sterility and poor productivity to the their F1s. These recessive remain hidden in the sold seed, but have a high probability of expression in later generations. After a continent wide disaster, farmers who use F1 seeds wont be able to replant, their seeds will fail, causing famine. Worse, many seed companies are now breeding plants that can survive only in combination with certain chemicals, sold only by the seed company. Even if the seeds are saved, they cannot survive except in the presence of these chemicals, which require large chemical plants to produce. While many organic and traditional farms sell seeds that breed true, the available stock of seeds is small compared to land under cultivation. By year +5 after a disaster, North American agriculture will lose 90% of its capacity.

