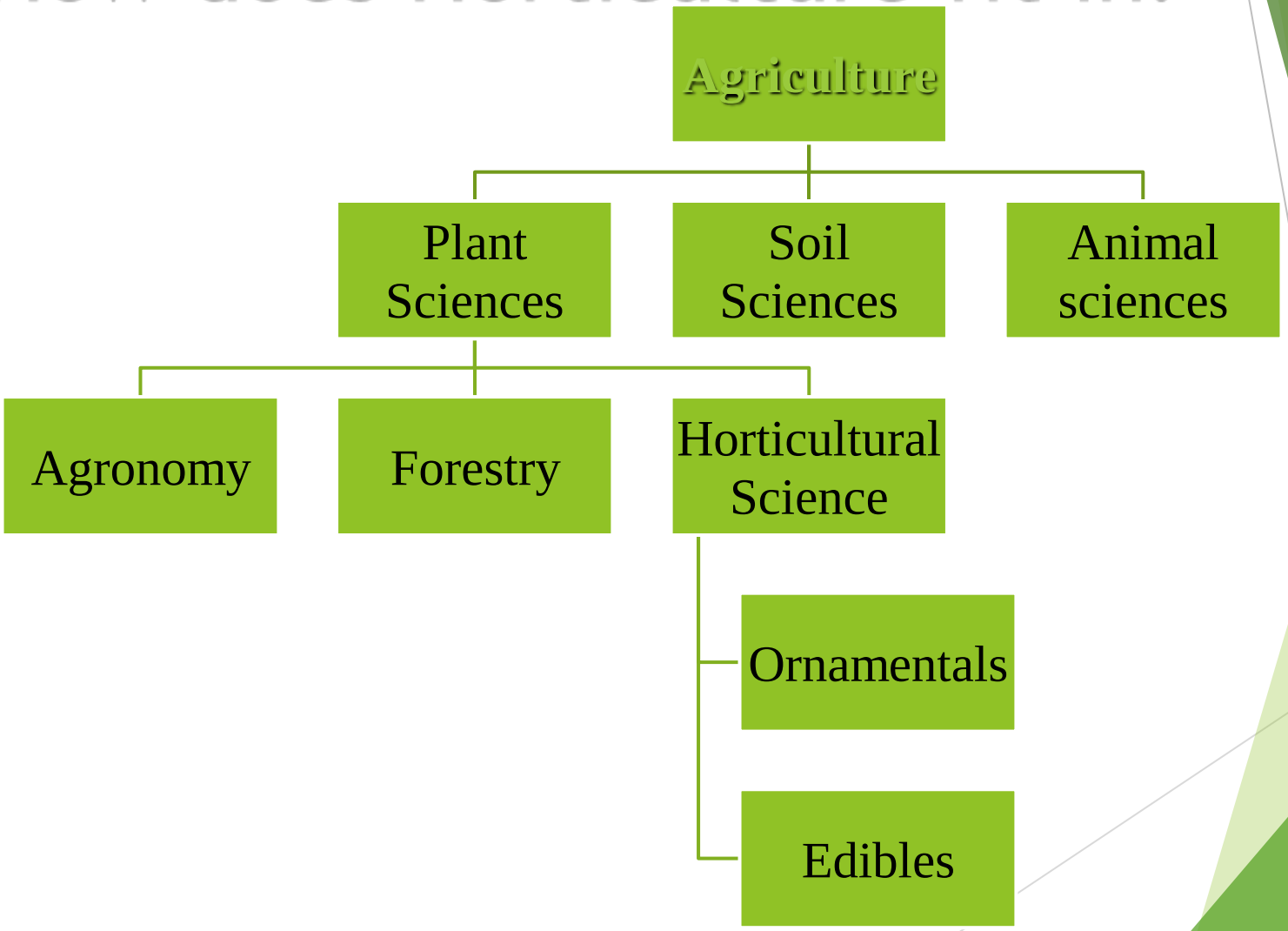
HORT A100

Horticultural Science

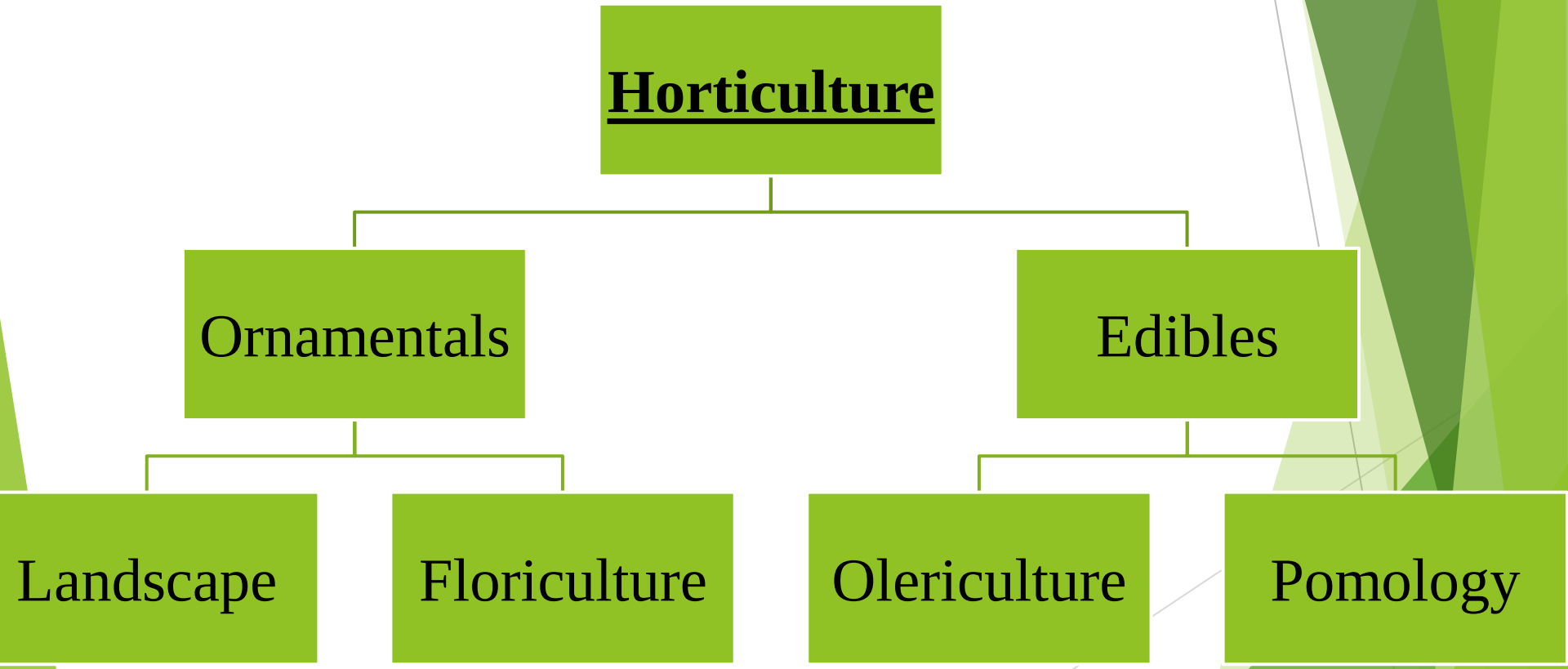
Man and Plants

Growing Plants for Food and Environmental Enhancement

How does Horticulture fit in?



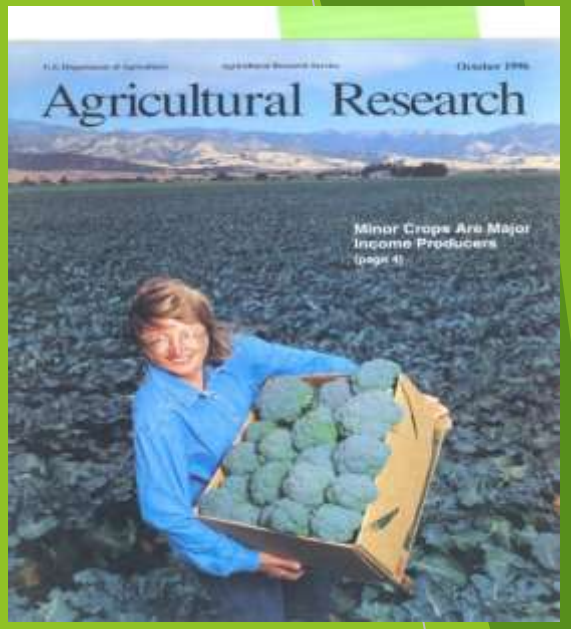
Horticultural Sciences



Edibles

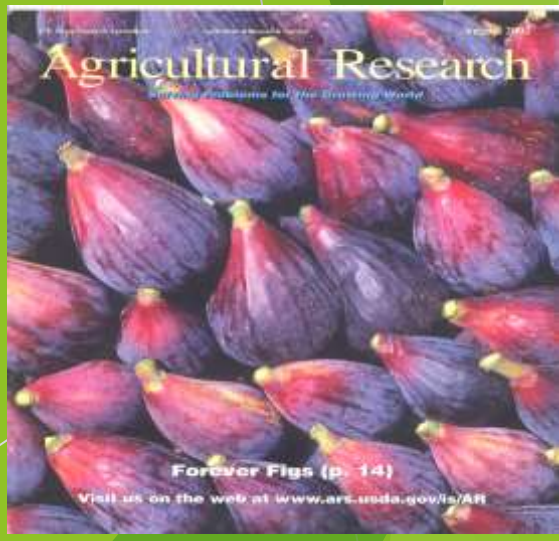
Olericulture

Vegetable Crops



Pomology

Fruit Crops



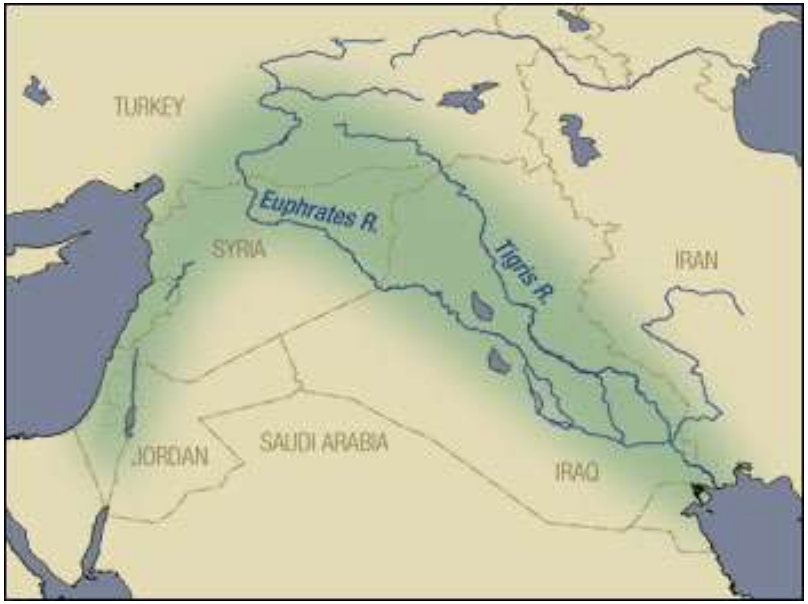
Ornamentals

- Landscape
- Nursery
- Floriculture
- Interior Plantscaping

The History

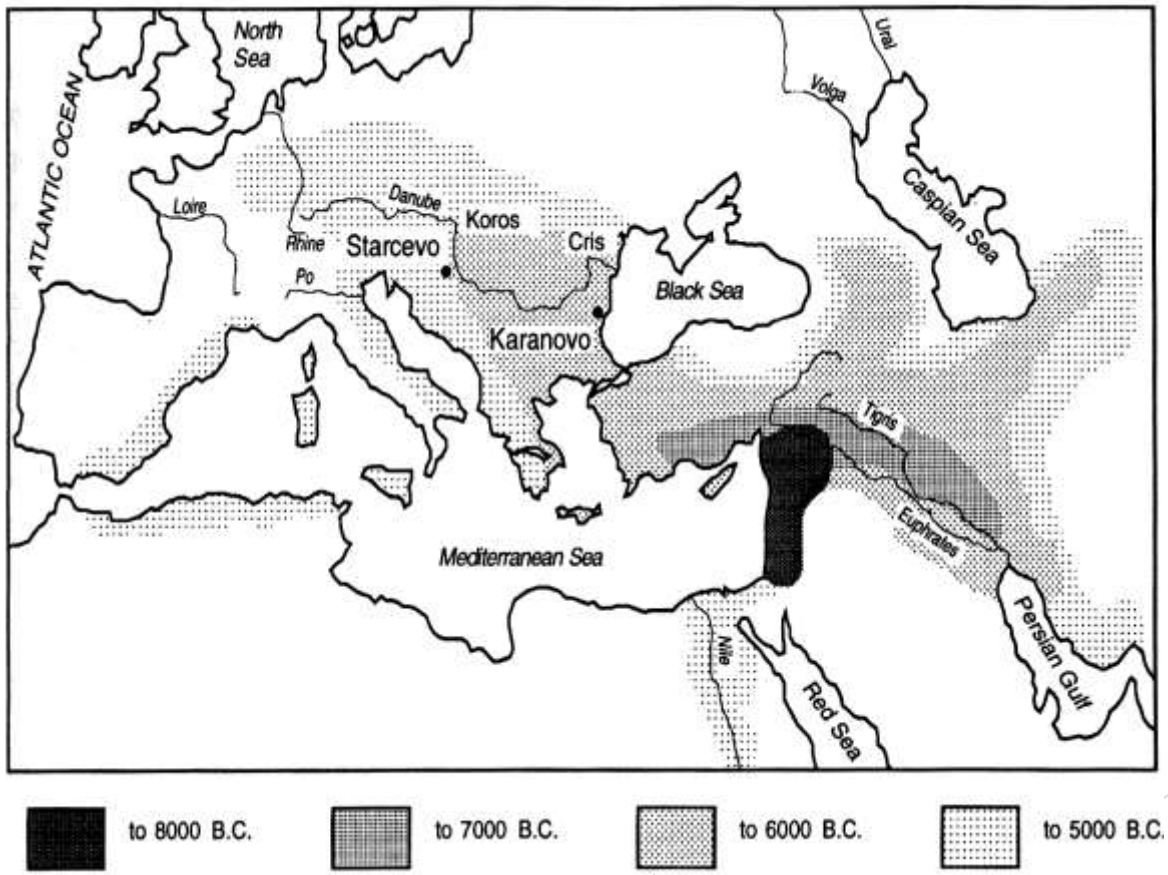
- The Fertile Crescent
- Egyptians, Babylonians, Assyrians
- Roman influences
- The Dark Ages
- The Renaissance
- American Colonial Agriculture
- The Dust Bowl of the 1930's
- The biggest development of the 20th century in farming
- The Ecology movement
- The Green Revolution
- GPS technology
- IPM (Integrated Pest Management) strategies

The Fertile Crescent

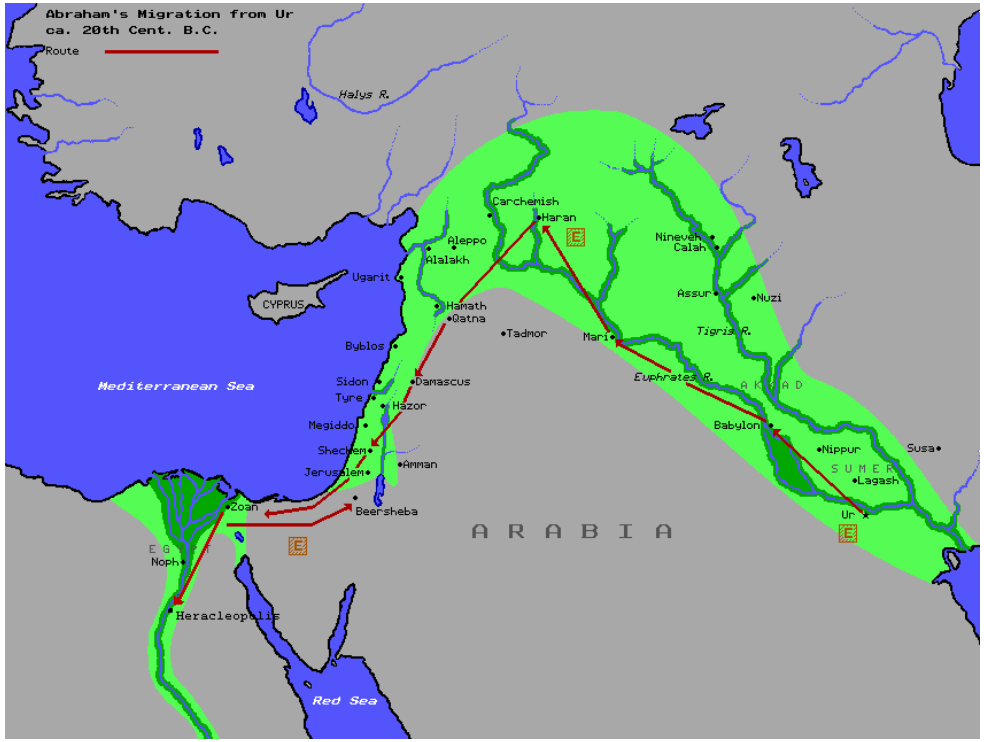


Abundant water and fertile soil provided the foundation for the success of the earliest civilizations like the Assyrians, Babylonians, Akkadians, and Egyptians. Some lasting for thousands of years.

Evolution of the Fertile Crescent



The Bible – The Old Testament



Abraham's Journey

10,000 Years of Horticulture

Early pollination almost 3,000 years ago

FIGURE 1-15. Winged guardian spirit of the Assyrians pollinating blossoms of the date palm. From the Palace of King Ashur-Nasir-Pal II at Nimrud, Iraq (ninth century B.C.E.). [Courtesy Museum of Fine Arts, Boston.]

900 Years BC - Pollinating Dates

Early Irrigation – 700 Years BC

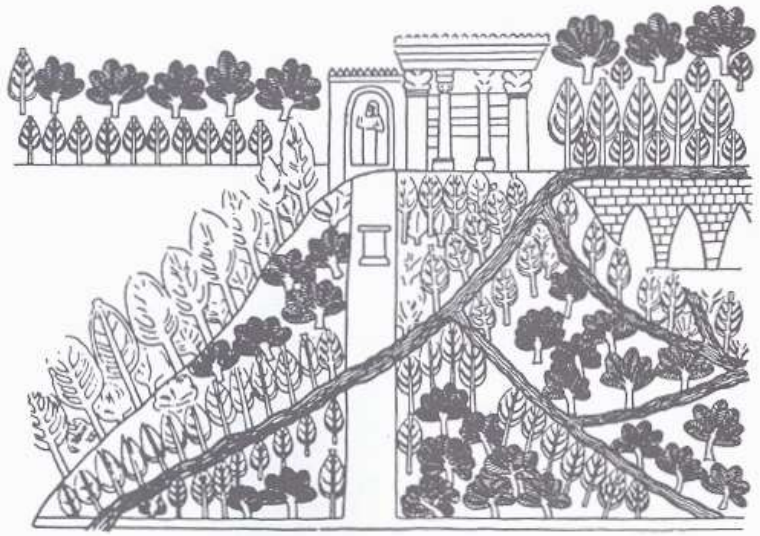


FIGURE 1-12. A royal Assyrian park, watered by streams from an arched aqueduct. From a relief in the palace at Nineveh (seventh century B.C.E.). [From C. Singer, *History of Technology*, vol. 1, Oxford University Press, 1954.]

A Royal Assyrian Park

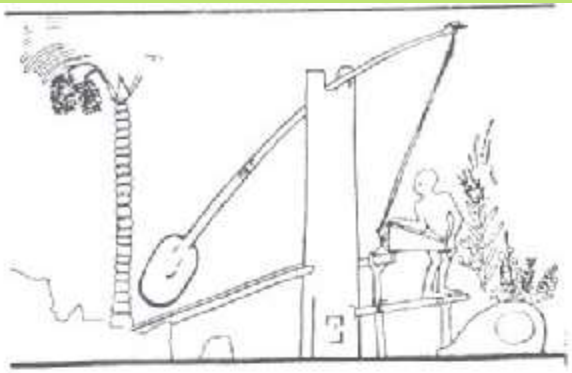
The Hanging Gardens of Babylon

Built by King Nebuchadnezzar II for his wife who missed the lush mountains of her homeland. Built around in 565BC One of the 7 ancient wonders of the world. A man-made mountain of earthen bricks and stone

Egyptian Horticulture

Picking Figs

E



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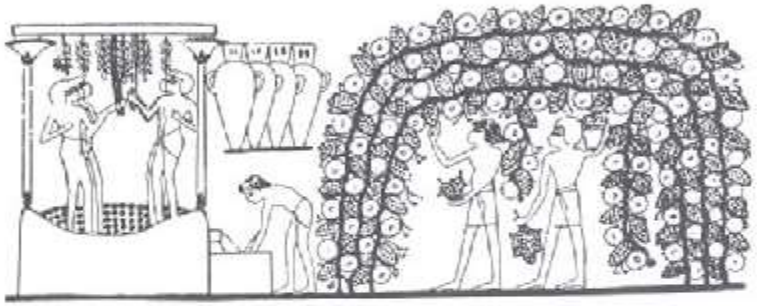
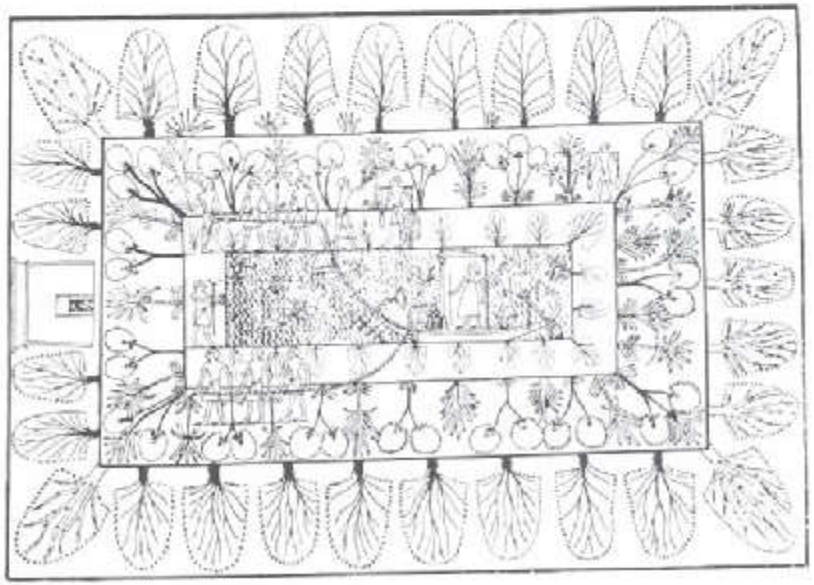
Watering using a Shaduf



G

Harvesting Grapes from an Arbor. Crushing



Formal Gardens with Palms and Acacia trees

Siphoning Wine

Roman Culture

- Grafting and budding
- First Greenhouses "specularium"
- Extensive water systems - Aqueducts
- A Prosperous Roman would have "a place in the country", a *suburbanum* with Fruit orchards, flower and rose gardens.
- Crop Rotation
- Cold storage of fruit

Roman Culture

The Romans were incredible engineers and builders able to move water for miles to support large cities as well as support and expand agriculture

Medieval Times

476AD – 1453AD (977 years)
Dark Ages/ Middle Ages

OF THE APPLE-TREE

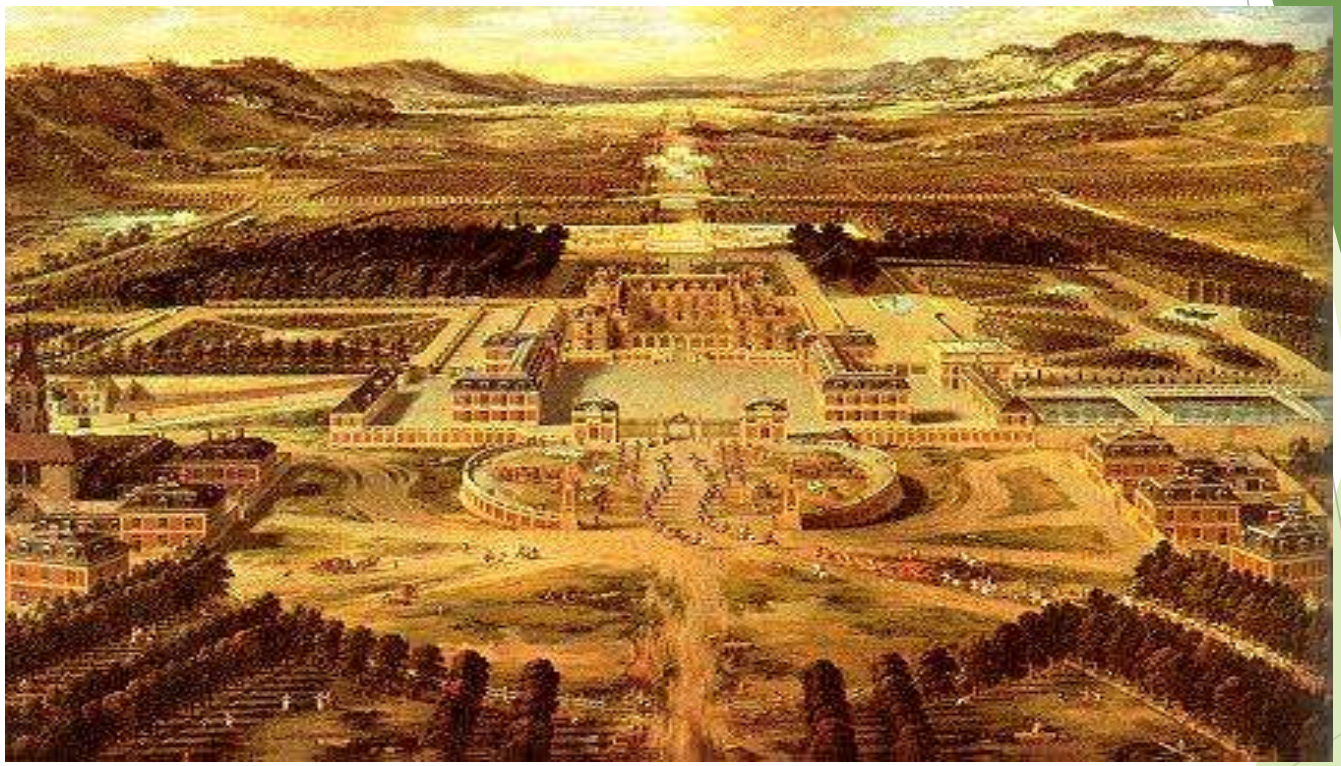
The Apple-tree

The Apple-tree which is most in request, and the most precious of all others, and therefore called of *Homer*, the Tree with the goodly fruit, groweth any where, and in as much as it loveth to have the inward part of his wood moist and sweatie, you must give him his lodging in a fat, blacke, and moist ground; and therefore if it be planted in a gravelly and sandie ground, it must be helped with watering, and batling with dung and smal mould in the time of Autumne. It liveth and continueth in all desireable good estate in the hills and mountaines where it may have fresh moisture, being the thing that it searcheth after, but even there it must stand in the open face of the South. Some make nurceries of the pippins sowne, but and if they be not afterward removed and grafted, they hold not their former excellencie: it thriveth somewhat more when it is set of braunches or shoots: but then also the fruit proveth late and of small value: the best is to graft them upon wild Apple-trees, Plum-trees, Peach-trees, Peare-trees, Peare-plum-trees, Quince-trees, and especially upon Peare-trees, whereupon grow the Apples, called Peare-maines, which is a mixture of two sorts of fruits: as also, when it is grafted upon Quince-trees, it bringeth forth the Apples, called Apples of Paradise, as it were sent from heaven in respect of the delicatenesse of their cote, and great sweetnesse, and they are a kind of dwarffe Apples, because of their stocke the Quince-tree, which is but of a smal stature.

Monastic Gardens

During the dark ages in Europe the monks were the scientists of the day. Most new uses for plants and farming practices were practiced and documented by the church.

The Renaissance and Horticulture

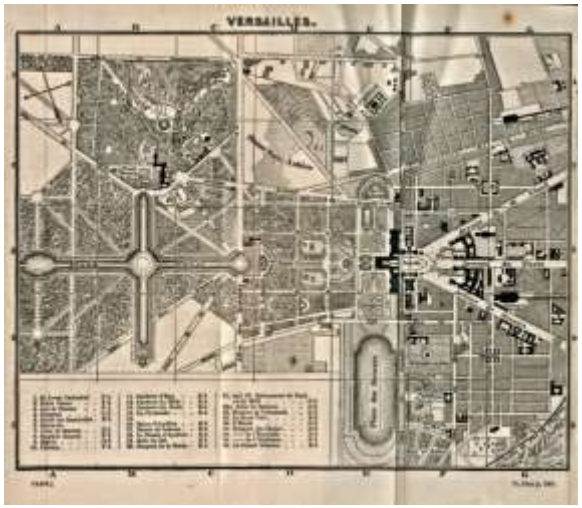


King Louis XIV “The Sun King” built the palace of Versailles considered today to be the best example of **Landscape Architecture** in history with 1,000 fountains along with extensive formal gardens.

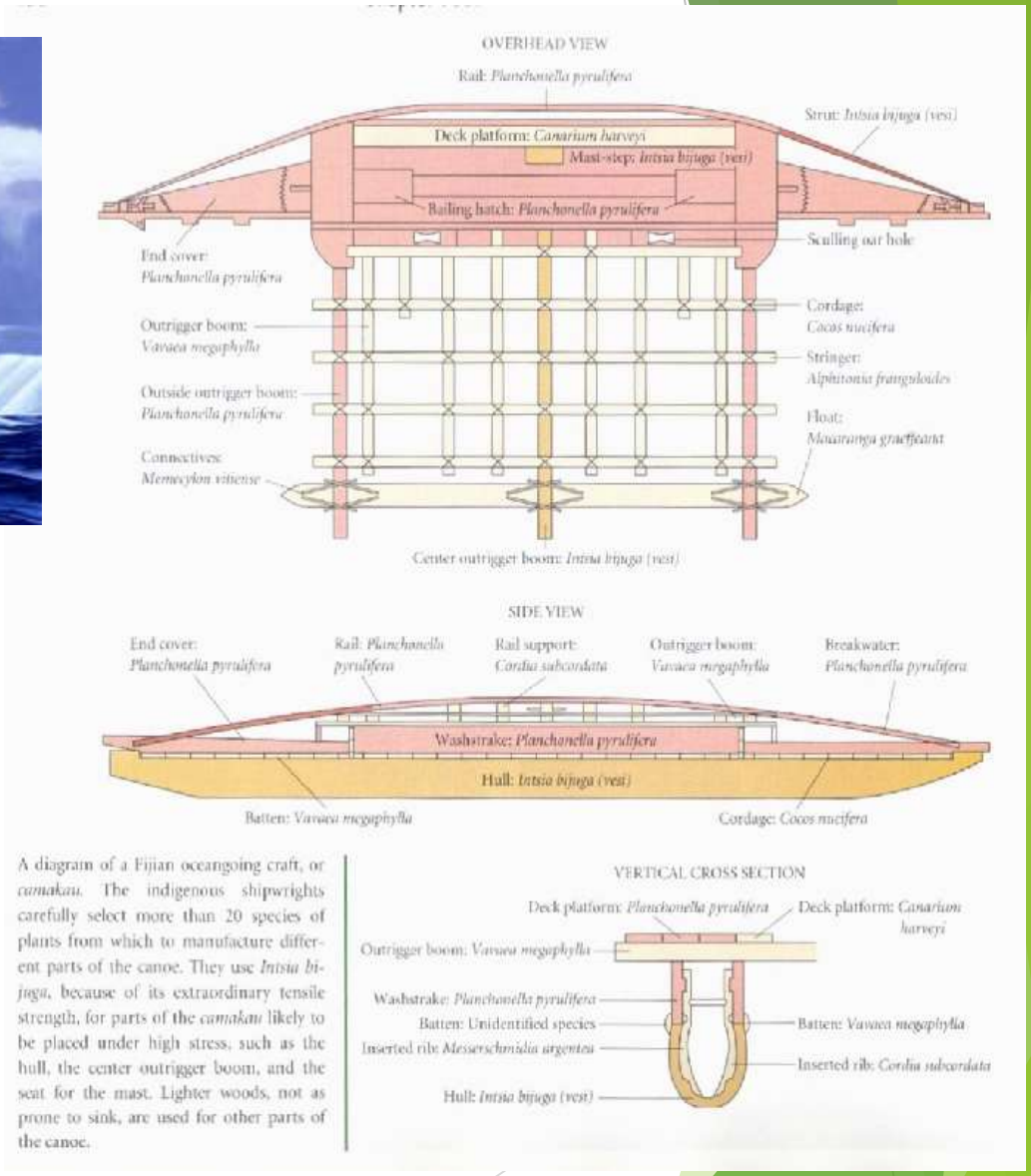
One of the biggest changes during the Renaissance

- Man began to value plants and the gardens surrounding buildings as much if not more than the buildings themselves

The Palace of Versailles



Over 20 species of wood with extremely different characteristics made for a lightweight durable fast outrigger canoe to facilitate the expansion of Polynesia. Being excellent navigators as well as having a deep understanding of the local trees and the wood from those trees



North America

Cahokia - **"City of the Sun" 1100 – 1200 AD**

Had more people living there than were in London at the same time. Resides in present day Illinois

Colonial Agriculture

Hudson River Valley 1700's

- **During American Colonial Times one farmer fed 4 others**
- **Today one farmer feeds 130 others.**
- **This fertile Valley was responsible for early food security for the early New England American colonies**

The Dust Bowl of the 1930's

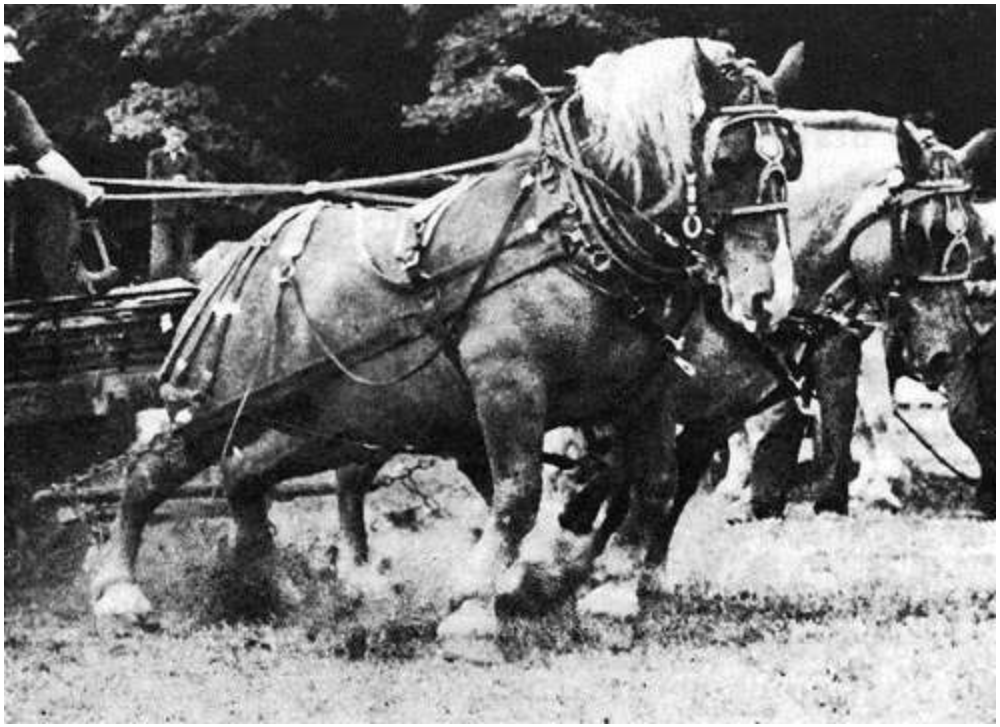
Deep rooting Prairie grasses removed and replaced with shallow rooting grain crops

Many of the scarce trees were taken down and used for barns and fence posts

When the Soil Blows away

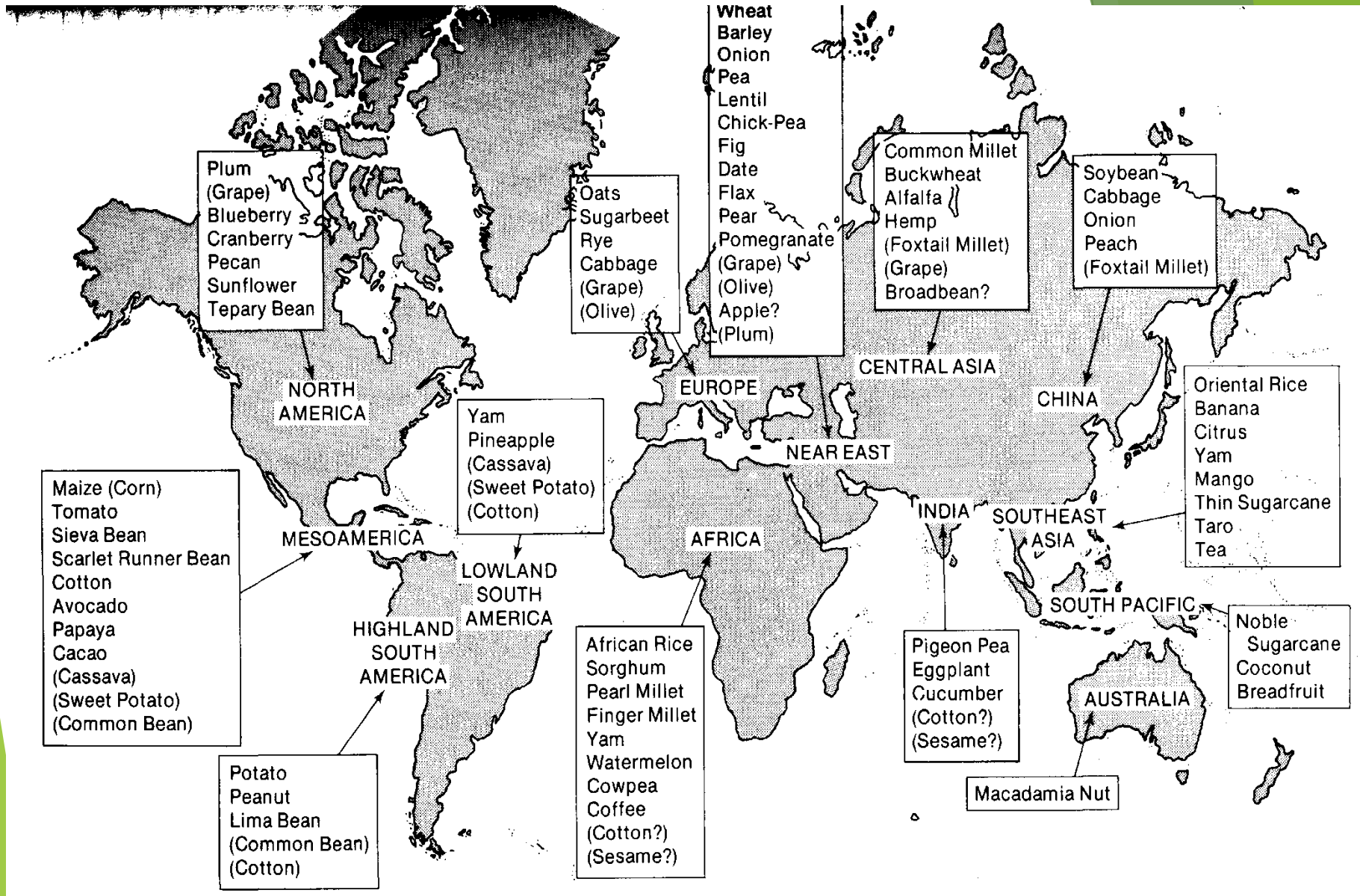
4 years of drought followed by severe winds blew poorly managed soils away devastating farms

Developments in horticulture and plant agriculture	Years ago	Historical era
Gene transfer	Today	
Gene synthesis		
Genetic code deciphered		Space exploration
Structure of the gene (DNA) discovered		
Isolation of phytochrome		
Mechanical harvesting		
Plastic films		
Radiation preservation		
Polyploid and mutation breeding		
Organic phosphate pesticides		
Chemical weed control		
Tissue culture		Controlled release of atomic energy
Auxin research		
Respiration cycle discovered		
Plant virus studies		
Hybrid corn		
Photoperiodism discovered		
Gasoline-powered tractor		
Concept of essential elements		Successful air flight
Bailey's *Cyclopedia of Horticulture*		
Plant nutrition investigations	100	
Beginnings of agricultural chemistry		
U.S. Agricultural Experiment Stations		
Morrill (Land Grant College) Act		
Mendel discovers laws of heredity		American Civil War
Origins of plant pathology		
Modern plow		
Reaper		
Canning of food		American Revolution
Gardens of Versailles		
Discovery of microscope		
Importation of plant species		Discovery of America
Rebirth of botanical sciences		Beginnings of modern science
Monastery gardens	1000	Norman conquest of England
Herbals		Dark Ages
Roman gardens		Roman civilization
Legume rotation		Birth of Christ
Botanical works of Theophrastus		Golden Age of Greece
Fruit cultivars		
Hanging gardens of Babylon		
Grafting		
Irrigation		Egyptian civilization
Domestication of crop plants		
Beginnings of agriculture	10,000	Neolithic Age



The invention of the gasoline powered tractor was the biggest change to agriculture by far in the 20th century. This mechanization increased crop production and reduced labor significantly as well as changing the relationship between man and his beloved horses forever.


A group of farmers getting together with their horse and mule teams to build roads in central Michigan circa 1910
William Harlow



Where various foods originated

Plants and Medicine

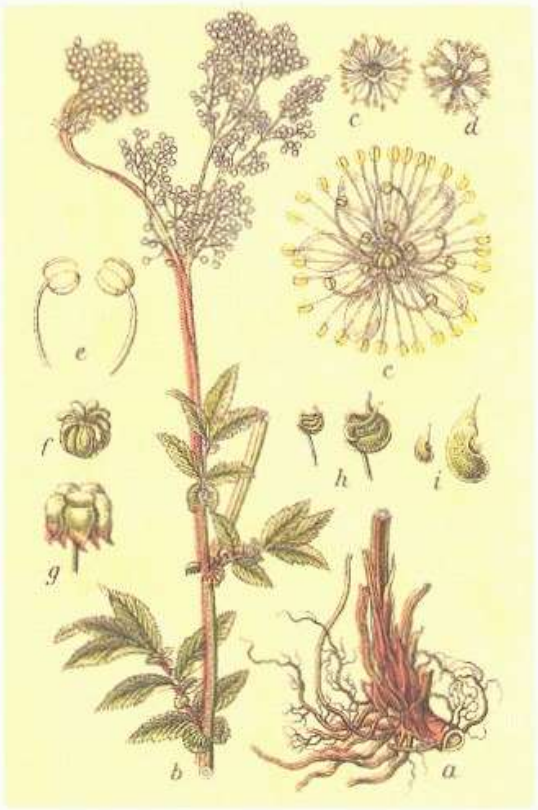
English folk healers prescribed the foxglove plant, *Digitalis purpurea*, to treat dropsy, a condition caused by inadequate pumping action of the heart.

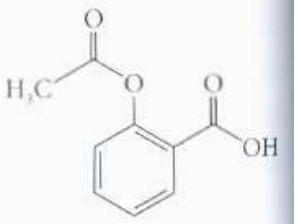
Foxglove, ***Digitalis purpurea*** **became the source for the first heart medication widely used.**

Fifty Drugs Discovered from Ethnobotanical Leads *(Continued)*

Drug	Medical Use	Plant Species	Family
Papaverine	Antispasmodic	*Papaver somniferum*	Papaveraceae
Physostigmine	Glaucoma	*Physostigma venenosum*	Fabaceae
Picrotoxin	Barbiturate antidote	*Anamirta cocculus*	Menispermaceae
Pilocarpine	Glaucoma	*Pilocarpus jaborandi*	Rutaceae
Podophyllotoxin	Condylomata acuminata	*Podophyllum peltatum*	Berberidaceae
Proscillaridin	Cardiac malfunction	*Drimia maritima*	Liliaceae
Protoveratrine	Hypertension	*Veratrum album*	Liliaceae
Pseudoephedrine	Rhinitis	*Ephedra sinica*	Ephedraceae
Psoralen	Vitiligo	*Psoralea corylifolia*	Fabaceae
Quinidine	Cardiac arrhythmia	*Cinchona pubescens*	Rubiaceae
Quinine	Malaria prophylaxis	*Cinchona pubescens*	Rubiaceae
Rescinnamine	Hypertension	*Rauvolfia serpentina*	Apocynaceae
Reserpine	Hypertension	*Rauvolfia serpentina*	Apocynaceae
Sennoside A,B	Laxative	*Cassia angustifolia*	Caesalpiniaceae
Scopolamine	Motion sickness	*Datura stramonium*	Solanaceae
Stigmasterol	Steroidal precursor	*Physostigma venenosum*	Fabaceae
Strophanthin	Congestive heart failure	*Strophanthus gratus*	Apocynaceae
Teniposide	Bladder neoplasms	*Podophyllum peltatum*	Berberidaceae
THC	Antiemetic	*Cannabis sativa*	Cannabaceae
Theophylline	Diuretic, asthma	*Camellia sinensis*	Theaceae
Toxiferine	Surgery, relaxant	*Strychnos guianensis*	Loganiaceae
Tubocurarine	Muscle relaxant	*Chondrodendron tomentosum*	Menispermaceae
Vinblastine	Hodgkin's disease	*Catharanthus roseus*	Apocynaceae
Vincristine	Pediatric leukemia	*Catharanthus roseus*	Apocynaceae
Xanthotoxin	Vitiligo	*Ammi majus*	Apiaceae

Take Two Asprin and ……





Aspirin
(Acetylsalicylic acid)

From the late 60's through the early 70's, Seeing the first pictures of our world from the outside in gave rise to the idea of the "Space ship Earth" and the need to protect her. The Ecology movement had begun.

You develop an instant global consciousness, a people orientation, an intense dissatisfaction with the state of the world, and a compulsion to do something about it. From out there on the moon, international politics look so petty. You want to grab a politician by the scruff of the neck and drag him a quarter of a million miles out and say, "Look at that, you son of a bitch."

— Edgar Mitchell, Apollo 14 astronaut

"It made me want to come home and break down any barriers and any hostilities and try to be this mediator between people to say, Look, we've got this one planet that we're existing on, and if we don't get our acts together, we're going to kill ourselves and we're going to decimate the planet at the same time," Melvin says.
"What can we do now," he asks, "to make sure that we have a 2068 for our Earth?"

The Ecology Movement

- From the 1960's through the Early 70's
- Youth driven movement (part of the counterculture)
- Coincided with the space race. Most astronauts became environmentally and globally consciences when first seeing our blue planet from far away and those living repeat the importance
- EPA Environmental protection agency started in 1970
- https://www.youtube.com/watch?v=j7OHG7tHrNM

“The Green Revolution”

Norman Borlaug “Father of the Green Revolution”
In a field of High Yield Rice

- Started in the 1950’s (still influences agriculture today)
- Involved the development of high yield grains
- Benefited poor overpopulated countries
- Estimated to have saved over a billion lives
- Changed farming practices worldwide
- Using fertilizers and irrigation as part of production has a potential downside
-

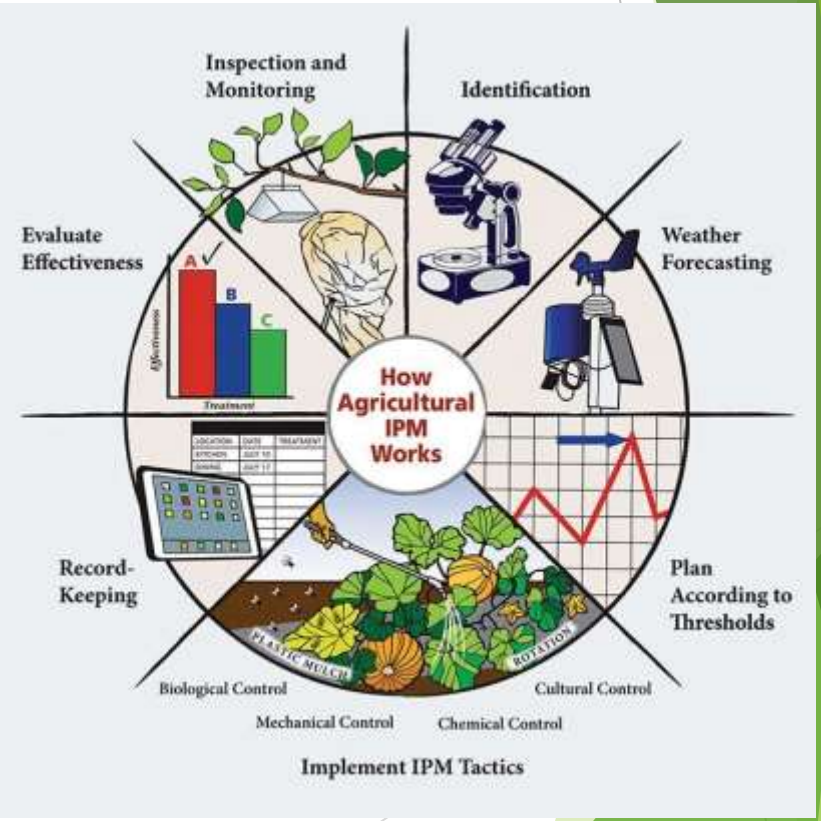
Modern Agriculture

What will it look like?

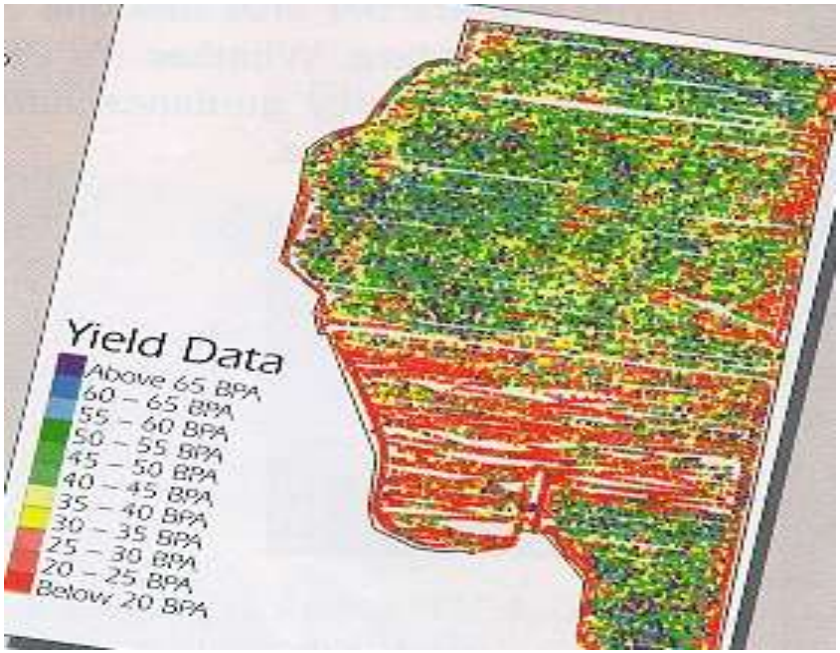
Vertical Growing Lab

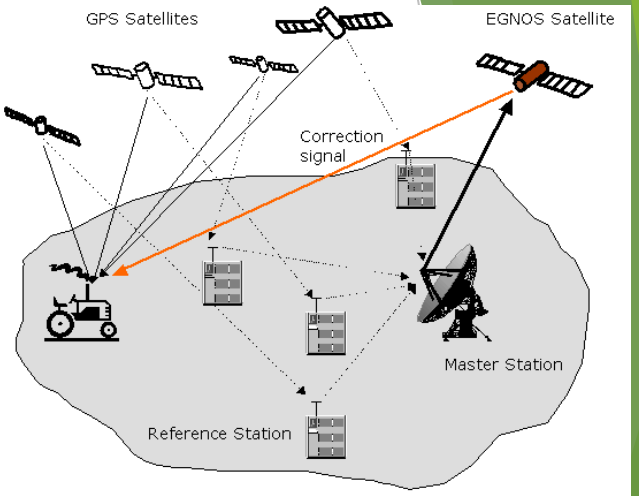
Integrated Pest Management

IPM (Integrated Pest Management) uses all available information to help make strategic decisions to reduce pest damage without undermining the natural ecosystem.



GPS Technology





Each pass over the field records yield data in BPA that shows where fertilizer should be applied the next time avoiding overfertilization and Excess Nitrogen pollution of waterways and eventually the oceans

Buzz words…

- Fertile Crescent
- Olericulture
- Pomology
- Specularium
- Monastic gardens
- Palace of Versailles
- Floriculture
- Ecology Movement
- The Green Revolution
- The Dust Bowl
- Integrated Pest Management - *IPM*
- GPS technology
- The Gas-powered Engine

What You Need to Know

- Be able to Describe or define the buzzwords.
- What was the significance of things or events like the fertile crescent, the Renaissance, the Dust Bowl, or the Green Revolution, Gasoline powered engine, to man and his relationship with plants as food and for beautification