UF/IFAS Extension

The Journey to Sustainability Begins with Education

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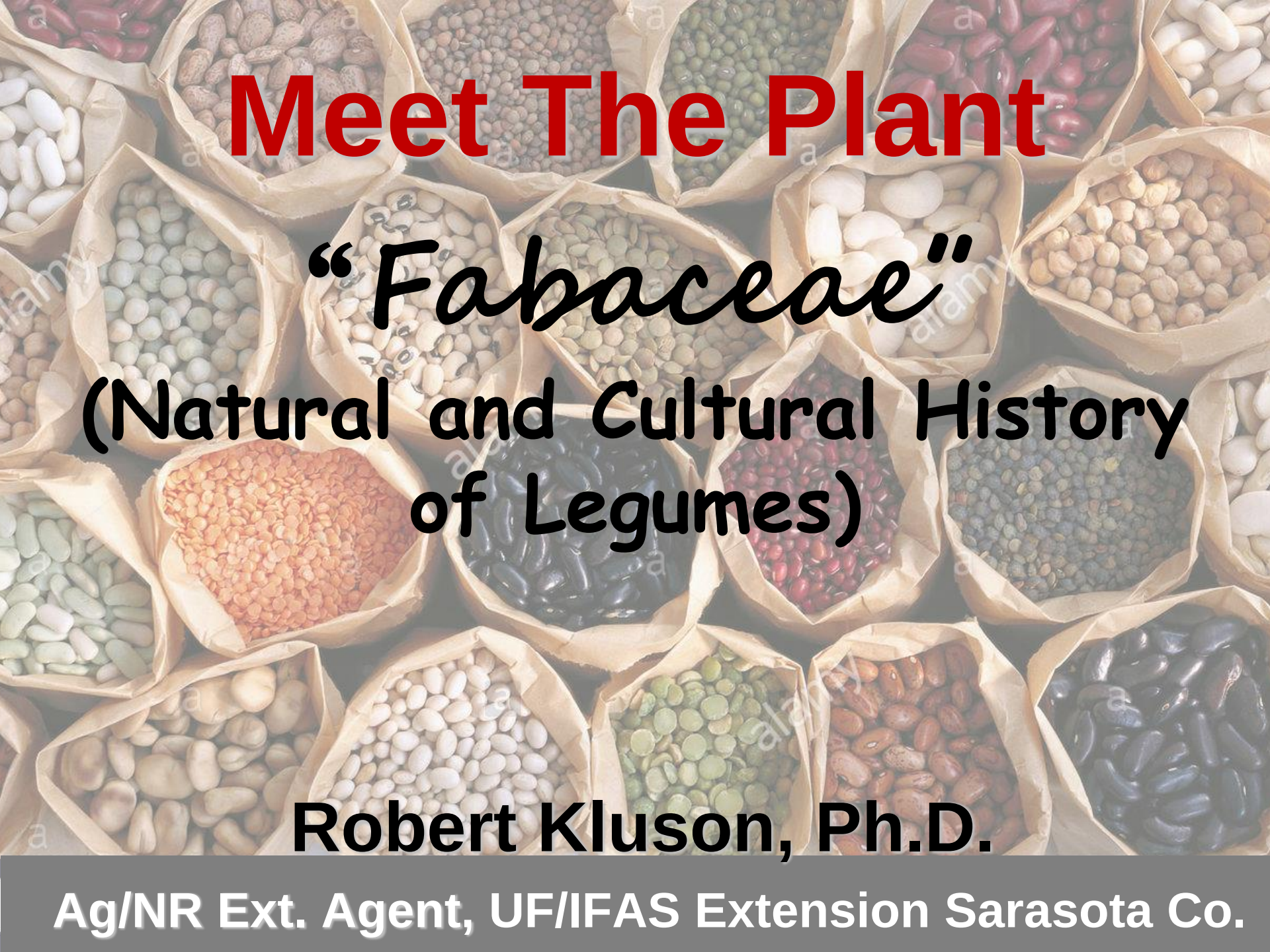
UF UNIVERSITY of FLORIDA
IFAS Extension

UF/IFAS EXTENSION SARASOTA COUNTY

- A partnership between **Sarasota County**, the **University of Florida**, and the **USDA**.
- Our Mission is to translate research into community initiatives, classes, and volunteer opportunities related to five core areas:
    - Agriculture;
    - Lawn and Garden;
    - Natural Resources and Sustainability;
    - Nutrition and Healthy Living; and
    - Youth Development -- 4-H

What is Sarasota Extension?



Meet The Plant

"Fabaceae"

(Natural and Cultural History of Legumes)

Robert Kluson, Ph.D.

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OUTLINE

- Overview of “Meet The Plant” Series
- Introduction to Legumes Family
  - What’s In A Name?
- Natural History
  - Center of origin
  - Botany
  - Phytochemistry
- Cultural History
  - Food and other uses

Approach of Talks on "Meet The Plant"

- Today my talk at this workshop is part of a series of presentations intended to expand the awareness and familiarity of the general public with different worldwide and Florida crops.
- It's not focused on crop production.
- Provide background information from the sciences of the natural and cultural history of crops from different plant families.

“Meet The Plant” Series Titles

- Brassicaceae ← Jan 16th
- Cannabaceae ← Jan 23rd
- Leguminaceae ← TODAY !
- Solanaceae ← March 26th
- Cucurbitaceae ← April TBD

What's In A Name?

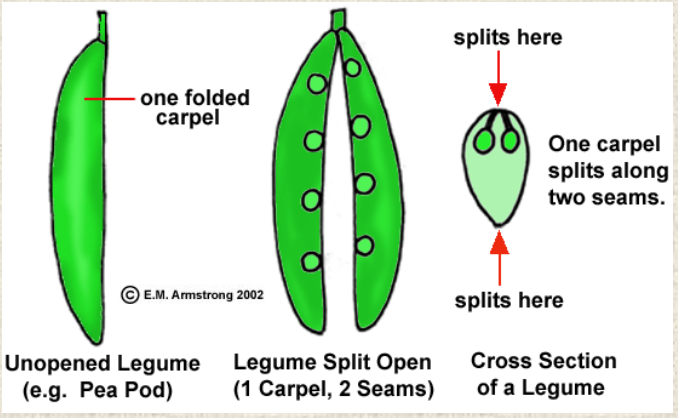
❖ Legume

➢Etymology:

•from *F. légume, L. legumen, fr. legere, to gather. So called because they may be gathered without cutting.*

➢Botany:

- A pod formed of a simple pistil, which is dehiscent by both sutures and so divides into two valves, the seeds being borne at the inner or ventral suture only.
- In the modification of the legume called a 'Loment' the pod breaks up into indehiscent joints.



Loment

What's In A Name?

❖ Pulse

➢ Etymology:

- means "peas, beans, lentils, etc." late 13c., from Old French pouls, pols and directly from Latin puls "thick gruel, porridge, mush," (a cooked bean dish which the ancient Romans were fond of eating) probably via Etruscan, from Greek poltos "porridge" made from flour, or both the Greek and Latin words are from the same source

➢ Botany:

- The esculent seeds of leguminous plants cultivated as field or garden crops, as peas, beans, lentils, etc.

What's In A Name?

❖ Bean

- Etymology
  - Old English "bean", from Proto-Germanic "bauno" (source also of Old Norse "baun", Middle Dutch "bone", Dutch "boon", Old High German "bona", German "Bohne")
  - Related to Latin faba "bean;" Greek phakos "lentil;" Albanian bathë "horse-bean;" Old Prussian babo, Russian bob "bean,"
  - Authorities suggest that the Italic, Slavic and Germanic are probably independent loanwords from a European substratum word of the form "bab"- (or similar) "bean"
- Botany:
  - A name given to the seed of certain leguminous herbs, chiefly of the genera Faba, Phaseolus, and Dolichos; also, to certain other plants and their seeds which are not leguminous at all, as the coffee-bean.

What's In A Name?

❖ Bean

➢ Idioms

- Bean counter - A bean counter is an accountant.
- Easy as beans - Something that is so easy that anyone can do it is easy as beans.
- Full of beans - If someone's full of beans, they are very energetic.
- Not know beans about - (USA) If someone doesn't know beans about something, they know nothing about it.
- Spill the beans - If you spill the beans, you reveal a secret or confess to something.
- Bean-ball - Means "a pitch thrown at the head" and is U.S. baseball slang; thus slang bean means a "head"

Legume Natural History

Natural History

- Legumes are plants of the bean or pea family, Leguminosae (former name), or Fabaceae.
- The Leguminosae is one of the largest families of flowering plants with 18,000 species classified into around 650 genera. This is just under a twelfth of all known flowering plants. It ranks third in size after the Orchidaceae and the Asteraceae-Compositae plant families.
- The principal unifying feature of the family is the fruit, a pod, technically known as a Legume. The Legume is modified in many ways to facilitate dispersal by animals, wind and water.

Natural History

- Legumes are a significant component of nearly all terrestrial biomes, on all continents (except Antarctica). Some are fresh-water aquatics, but there are no truly marine species.
- The species within the family range from dwarf herbs of arctic and alpine vegetation to massive trees of tropical forest.
- Recent molecular studies of fossil records have concluded that legumes probably evolved approx. 60 million years ago (Ma), early in the Tertiary period. This was after the K/T extinction, and a time at which many other angiosperm families also first appeared

Natural History

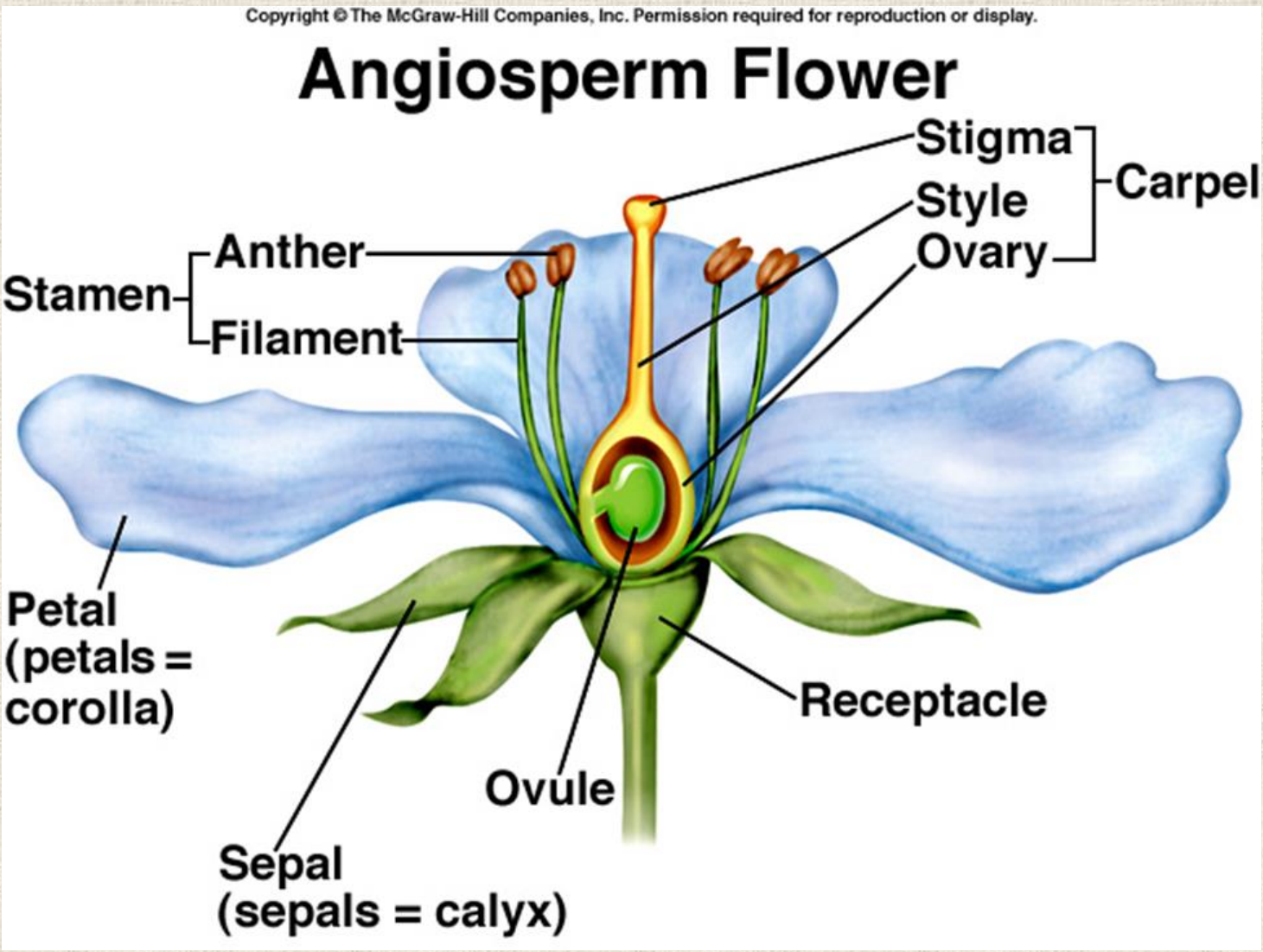
- The Leguminosae is an extremely diverse family of plants
- The family is usually divided into three sub-families:
  - Papilionoideae
  - Caesalpinioideae
  - Mimosoideae.
- The three subfamilies are generally identifiable by their flowers.

Natural History

- Like many flowers, those found on legume plants are hermaphroditic, containing both the stamen and pistil. The flower typically has five petals and an ovary with one carpel, cavity, and style
- This makes the plants self-fertile, meaning that an individual plant is able to reproduce by itself which can have the effect of limiting genetic diversity.
- However, hybridization occurs frequently in nature due to this characteristic, as any plant can pollinate another due to same hermaphroditic properties.
- The distinctive nature of the flowers of the legume subfamilies is not in the parts but in the shape of the parts.

Flower Botany of Legumes

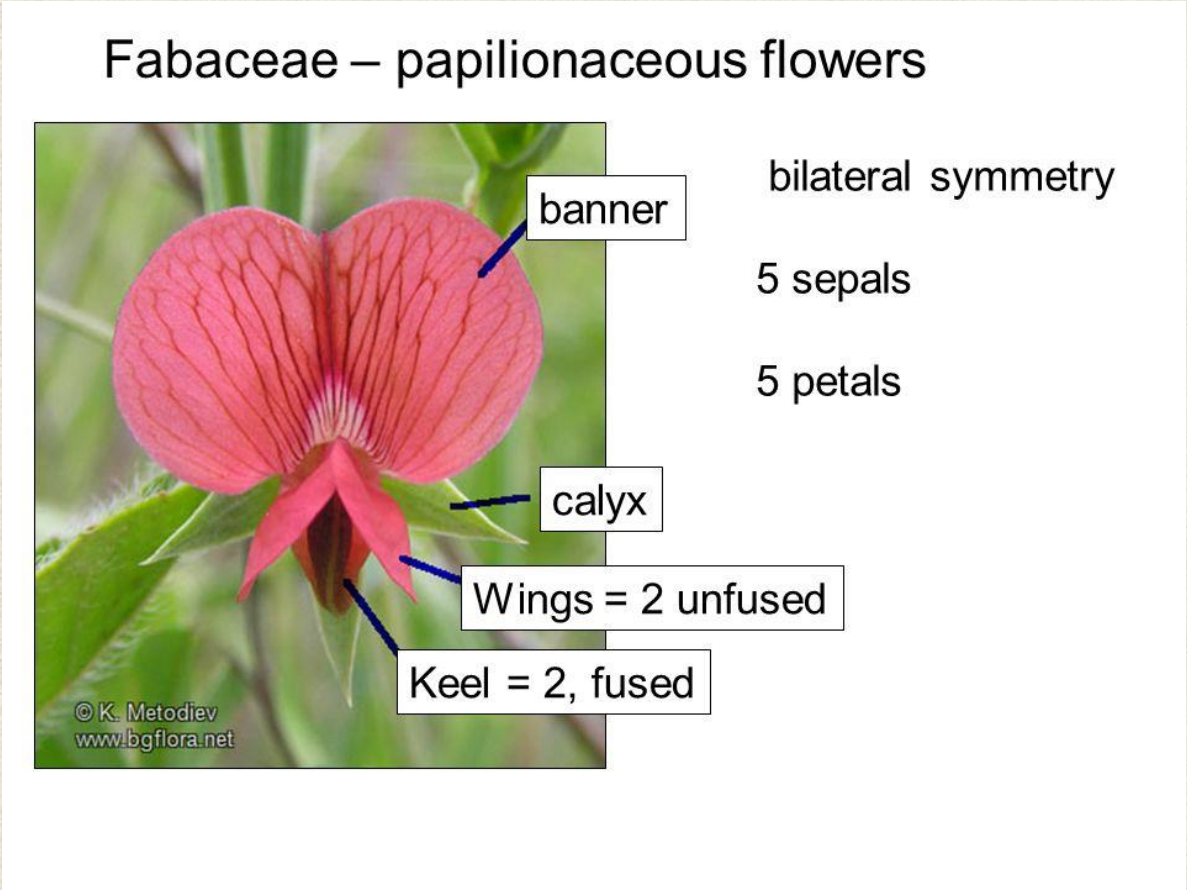
‘Perfect’ Flower Parts



Natural History: Papilionoideae

- The largest of the three subfamilies with about two-thirds of all the genera and species of the family. It is also the most widespread, extending further into temperate regions than the other two subfamilies.
- The majority of the species are herbaceous.
- For the most part the Papilionoideae are easily recognised by their characteristic papilionaceous (butterfly-like) flowers.

Flower Botany of Papilionoideae



- The flower is irregular (zygomorphic) and is made up of five petals; a ‘banner’ petal, two wing petals, and two petals partially fused together to form a boat-shaped keel. The keel encloses the stamens, which are not visible externally.

Natural History: Caesalpinioideae

- The majority of the Caesalpinioideae are tropical or subtropical trees and shrubs.

- The flowers of the Caesalpinioideae are irregular (zygomorphic) with five petals which are not differentiated into standard, wings and keel. The stamens are visible externally.

Caecalpinia

Cercis (Redbud)

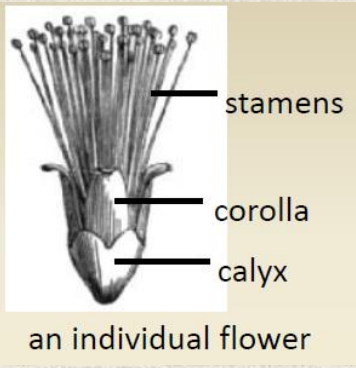
Natural History: Mimosoideae

- Like the Caesalpinioideae, the majority of the Mimosoideae are tropical or subtropical trees and shrubs.

- The Mimosoideae are characterised by their small, regular (actinomorphic) flowers crowded together, generally into spikes or heads which resemble a pom-pom. The stamens have become the most attractive part of the flower, the five petals inconspicuous.

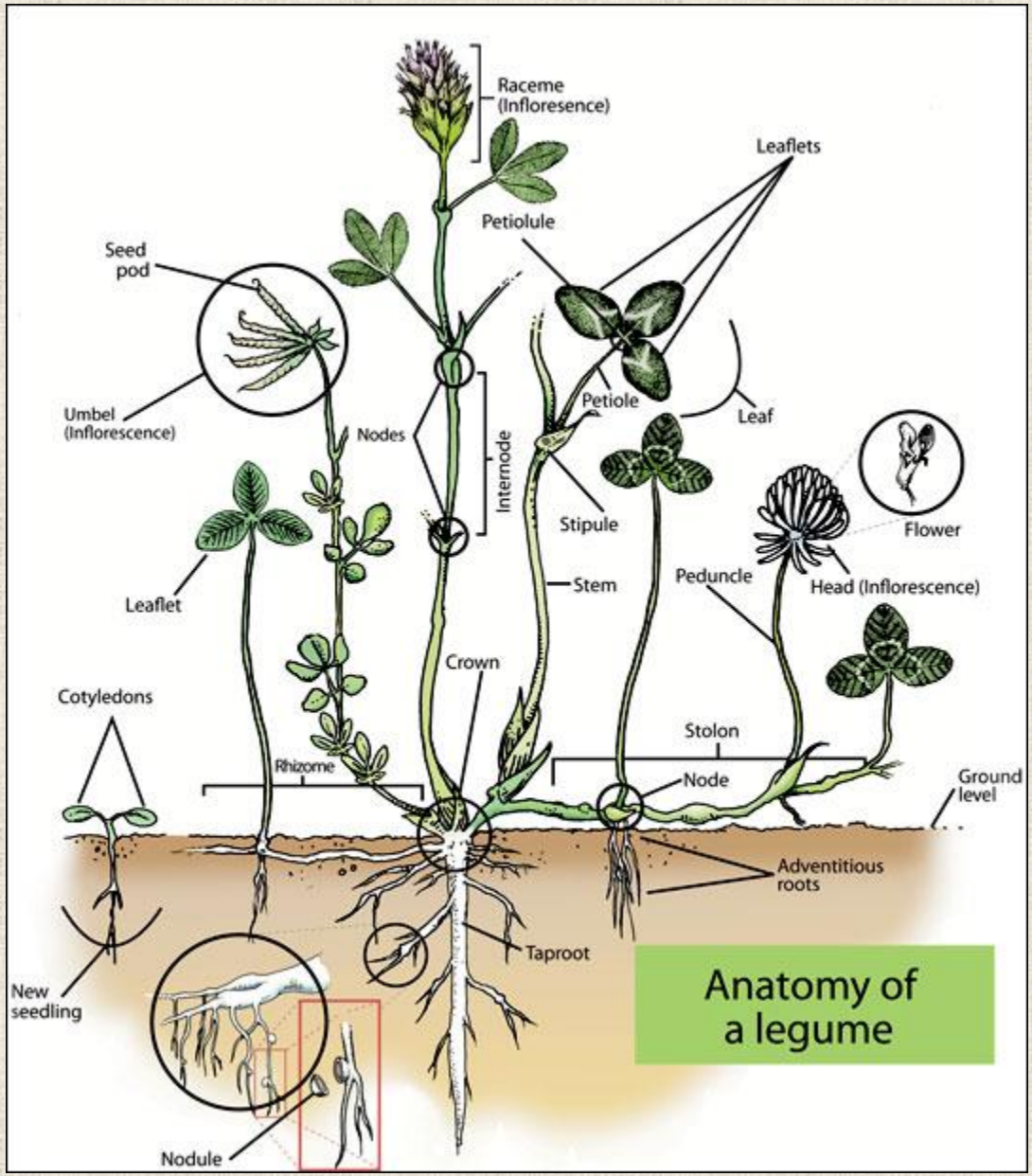
Mimosa

Acacia



an individual flower

Botany of Legumes

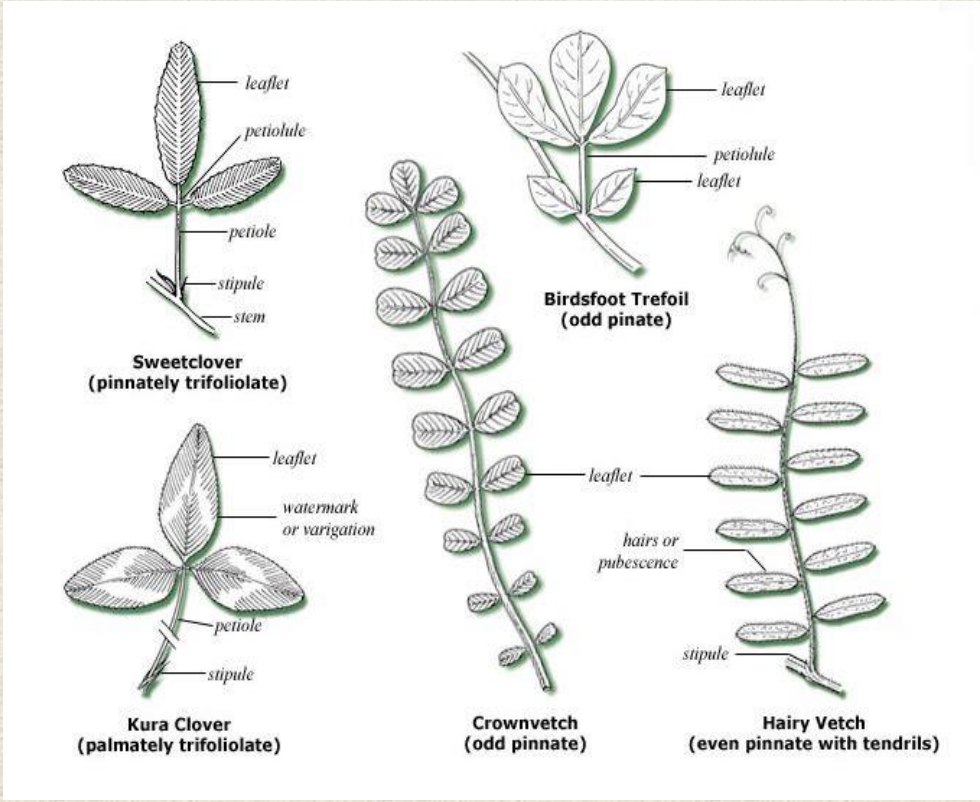


- Picture shows the great diversity of growth forms of herbaceous legumes

Botany of Legumes

- Leaf Diversity Examples

Pulses



Forages

Botany of Legumes

- Seed Pod Diversity

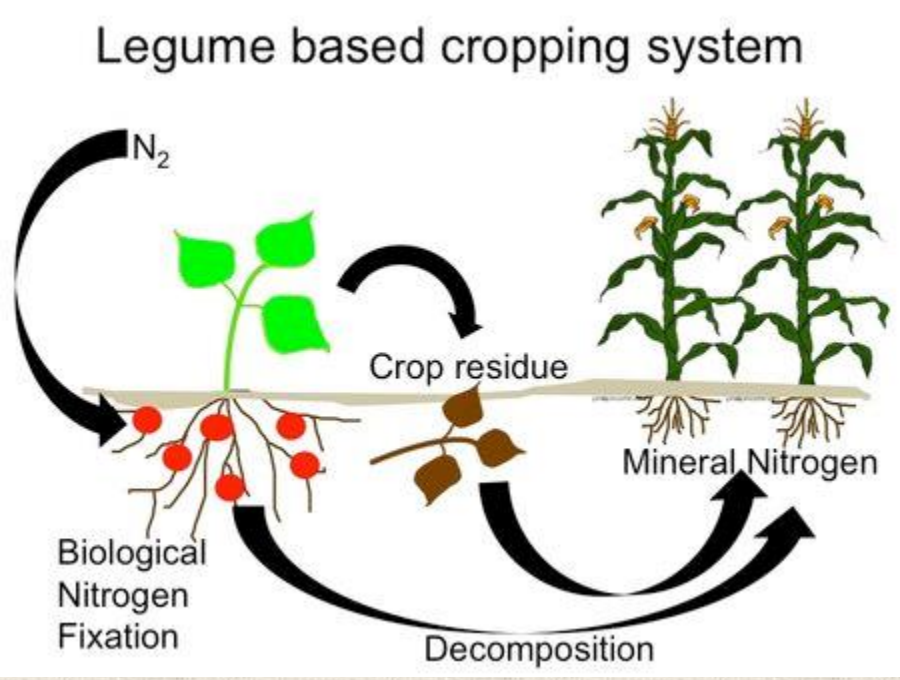
Natural History

- Considering the large array of legume species it is not surprising that the growth strategy of beans vary.
- All wild bean species have runners, as well as some domesticated bean species.
- The vines climb available trees, poles, or walls, and are known to grow up to twelve feet or more. These are known as pole or garden beans.
- Some beans grow on short plants and are known as bush or field beans.
- In all types, the distinctive pods typically grow to five or six inches long.

Natural History

❖ Symbiotic Nitrogen Fixation

- Legumes are characterized by their capacity for to fix atmospheric nitrogen via the formation of a symbiosis with Rhizobium bacteria, a natural soil microbe
- Nitrogen is then available for legume host growth, as well as to companion and subsequent plants



Natural History:
Symbiotic N Fixation

$$N_2 + 12\ ATP \xrightarrow{\text{nitrogenase}} 2\ NH_3 + 12\ ADP + 12\ P_i$$

nitrogen (atmospheric) — ammonia — phosphate (inorganic)

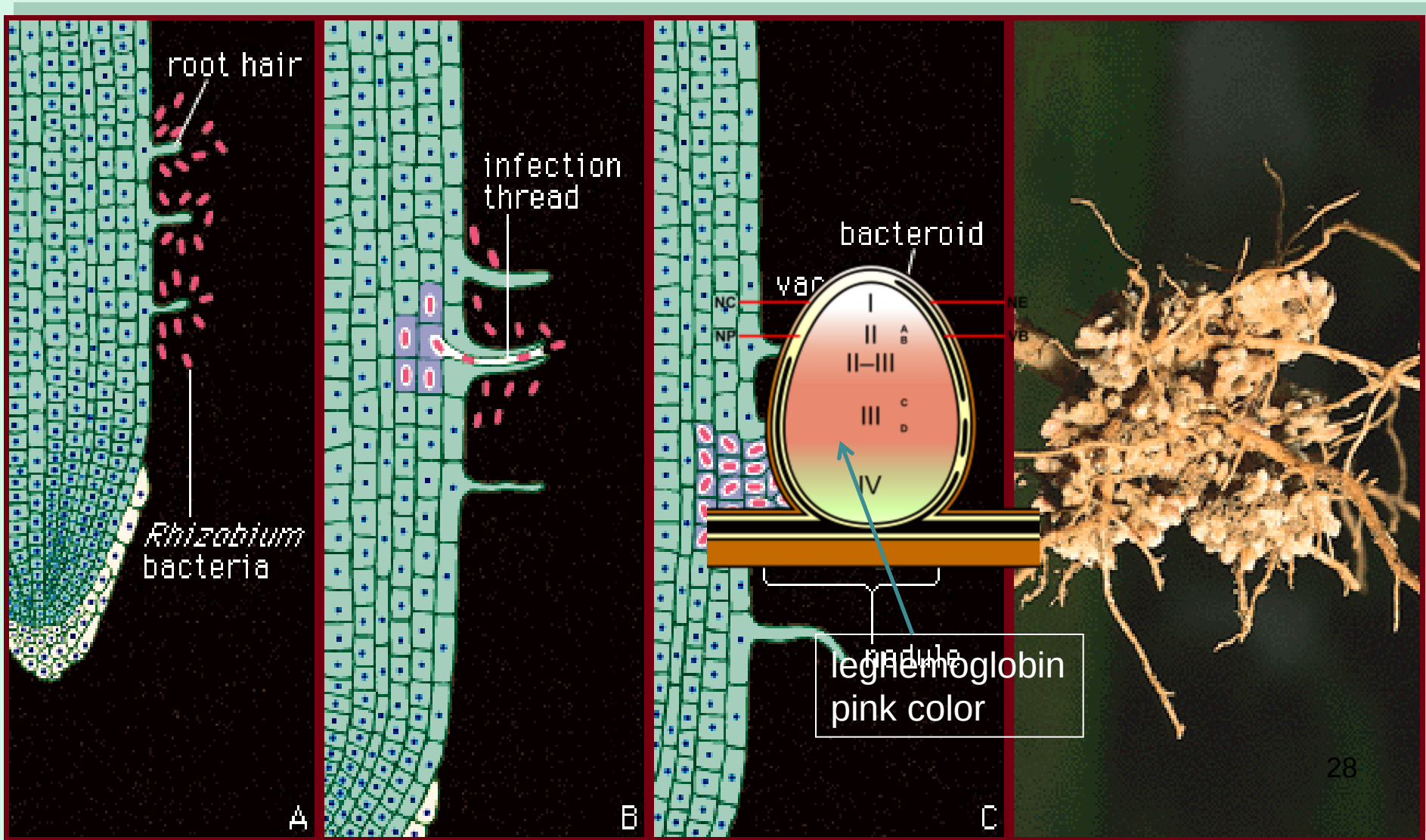
It takes 12 ATPs to provide sufficient energy to break the strong triple bond betwen the two nitrogen atoms of N_2 gas: $N \equiv N$

Simplified Equation For Nitrogen Fixation

- Nodules formed where *Rhizobium* bacteria infected roots of legume crops
- Converts atmospheric nitrogen in soil pores for plant uptake & use in protein synthesis

Natural History: N Fixation

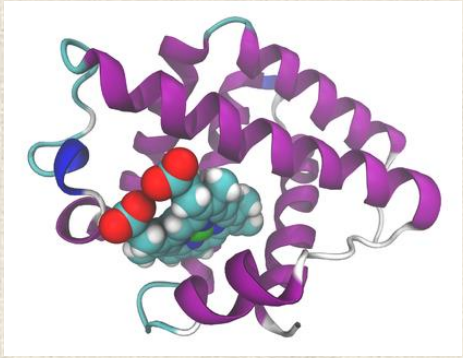
Legume Root Nodules Development



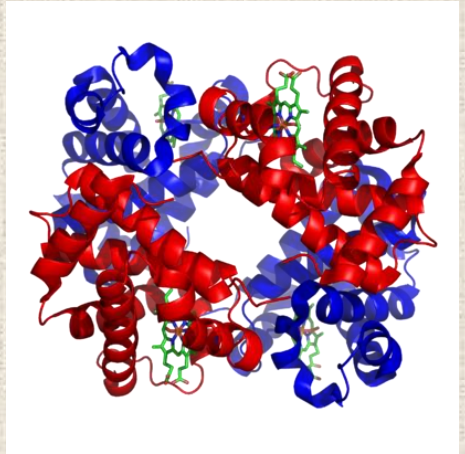
Natural History: N Fixation

Leghemoglobin

- The red pigment of the nodules.
- A product of the Rhizobium-legume symbiosis & not present in either organism grown alone
- The main functions are (1) to facilitate oxygen supply to the nitrogen fixing bacteria and (2) to protect the enzyme, nitrogenase from being inactivated by oxygen.



Leghemoglobin



Hemoglobin

- Has close chemical & structural similarities to hemoglobin found in all mammals, as well as the red color. Therefore, we really are "human beans"

Natural History

- Legume sub-families differ in capacity for symbiotic nitrogen fixation

Table 2-1. Nodulation in the subfamilies of the *Leguminosae*.

Subfamily	Estimated number of species	Number of species reported: Nodulated	Not nodulated	Total
Mimosoideae	2,900	351	37	388
Caesalpinoideae	2,800	72	180	252
Papilionoideae	14,000	2,416	46	2,462
Total	19,700	2,839	263	3,102

From O.N. Allen and E.K. Allen, 1981. In Leguminosae: A Source Book of Characteristics, Uses, and Nodulation.

Natural History

- Legume species within sub-families differ in capacity for symbiotic nitrogen fixation

Legumes

Average N Fixation per Season

Snap bean	40 lb/A
Peanut	40
Pea	70
Vetch	80
Lentil	100
Alfalfa	190

Erdman, USDA/ARS, 1967

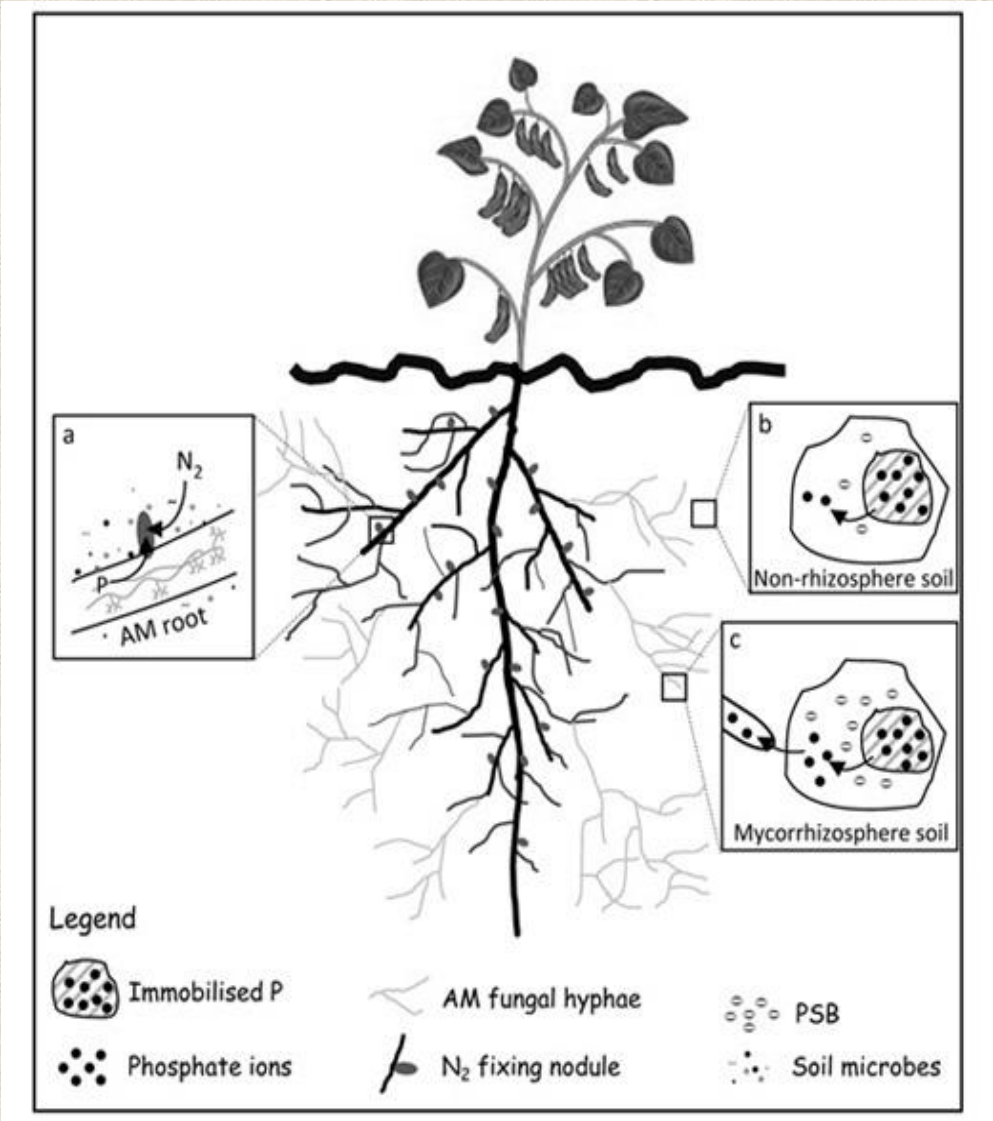
Example species of Papilionoideae

Natural History: N Fixation

❖ Evolutionary History

- Assuming an origin of the Leguminosae at 60 Ma, the next few million years were a time of great climatic change, particularly with respect to carbon dioxide and temperature. At approx. 55 Ma, several linked changes occurred. There was an abrupt rise in temperature of 5–10°C over a wide range of latitudes accompanied by a ‘catastrophic’ release of both methane and carbon dioxide from sea-floor sediments.
- This period marked the origin of two major groups of nodulating legumes, the genistoids and dalbergioids, as well as groups of caesalpinioids that include nodulating genera.
- It’s hypothesized then that the high atmospheric CO_2 levels promoted plant growth via enhanced photosynthesis but meant that N would become limiting, thus producing the selective pressure for the evolution of N fixation.

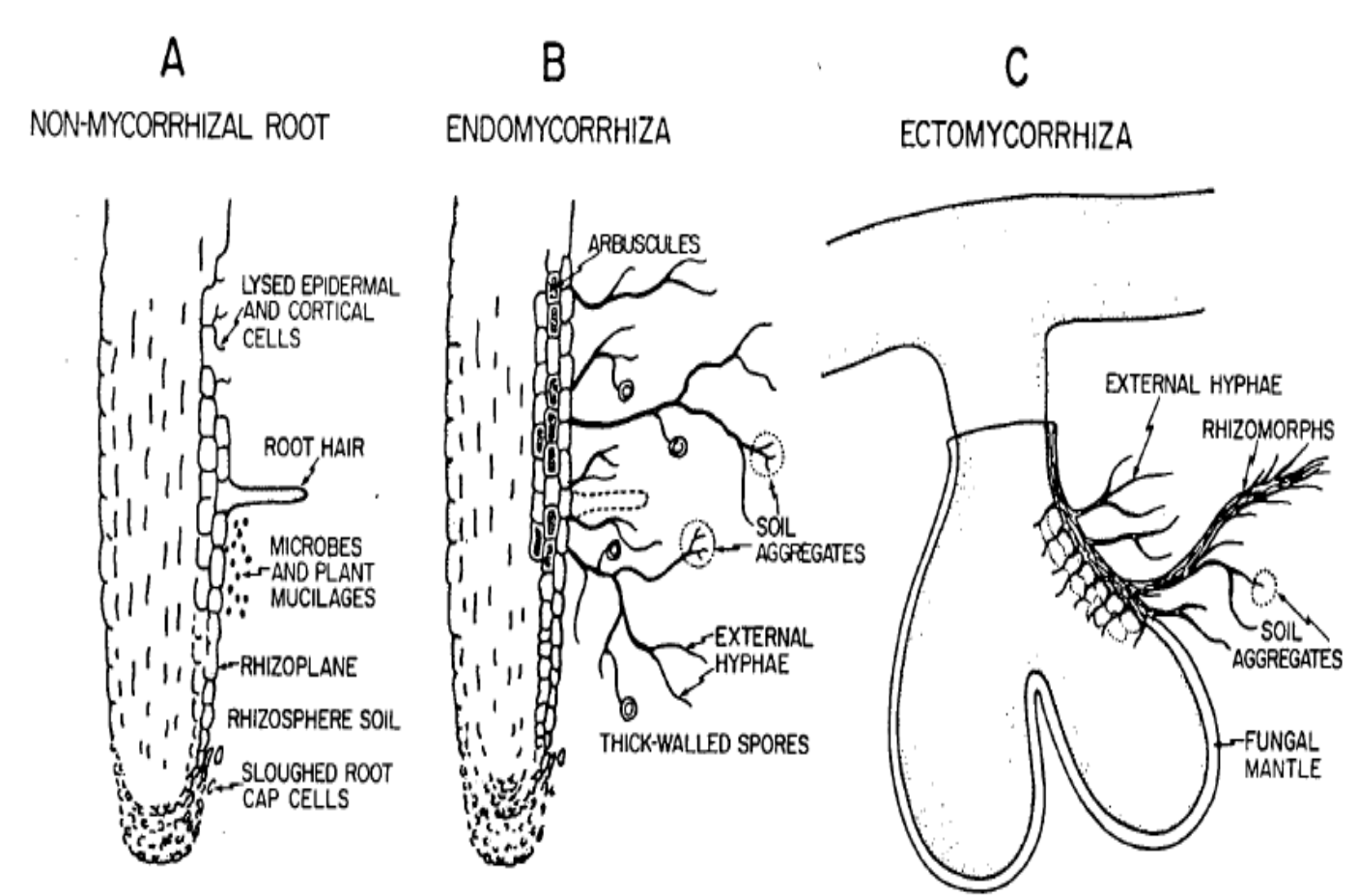
Natural History



- Symbiotic Nitrogen Fixation is Actually a Tripartite Symbiosis of a Legume host, Rhizobium bacteria and Mycorrhizae fungi.

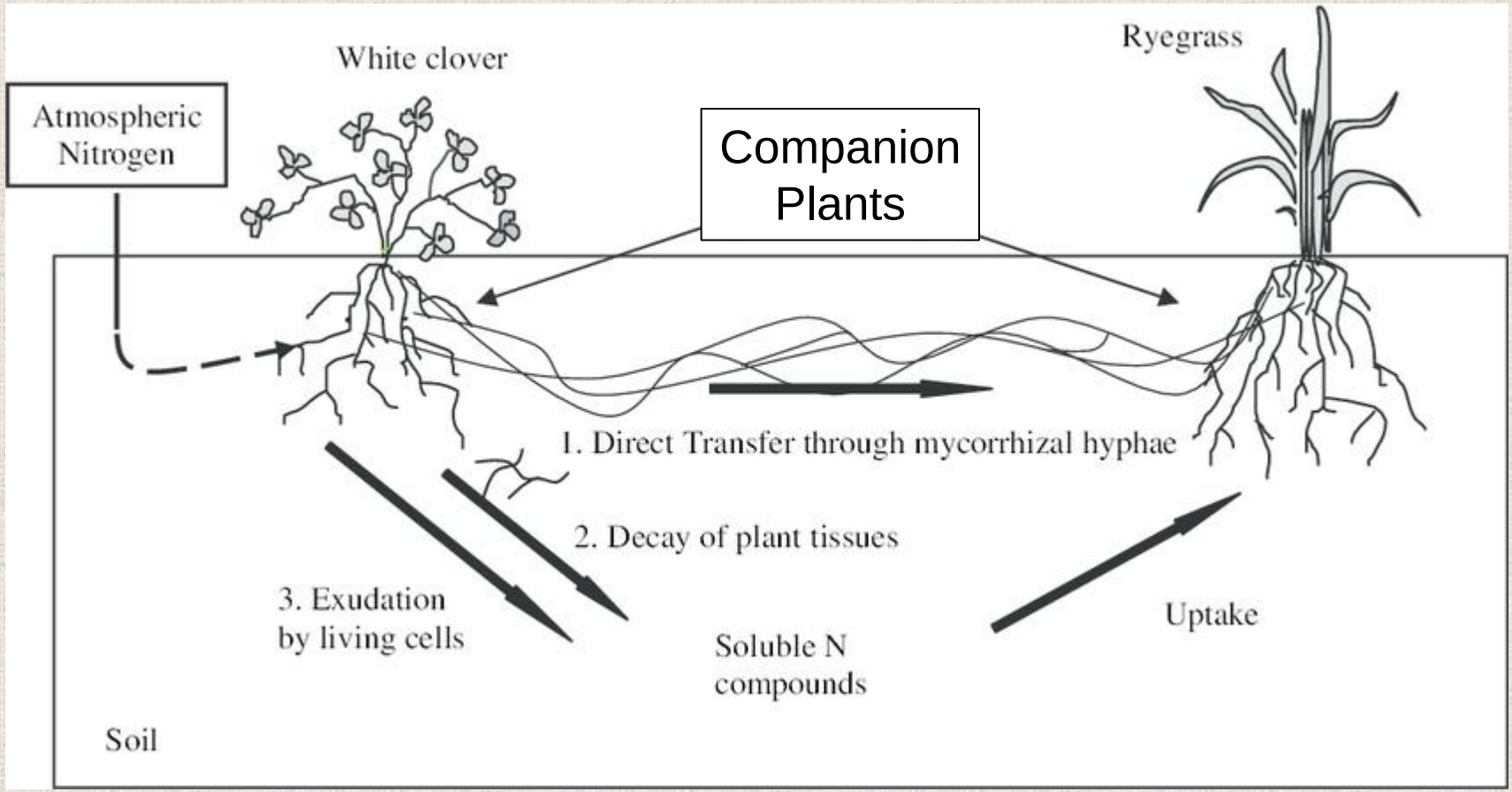
Natural History: Mycorrhizae

- ✓ Myco (fungi) + rhizae (root)
- ✓ Serves as an expanded root system that provides water and nutrient benefits to plant host



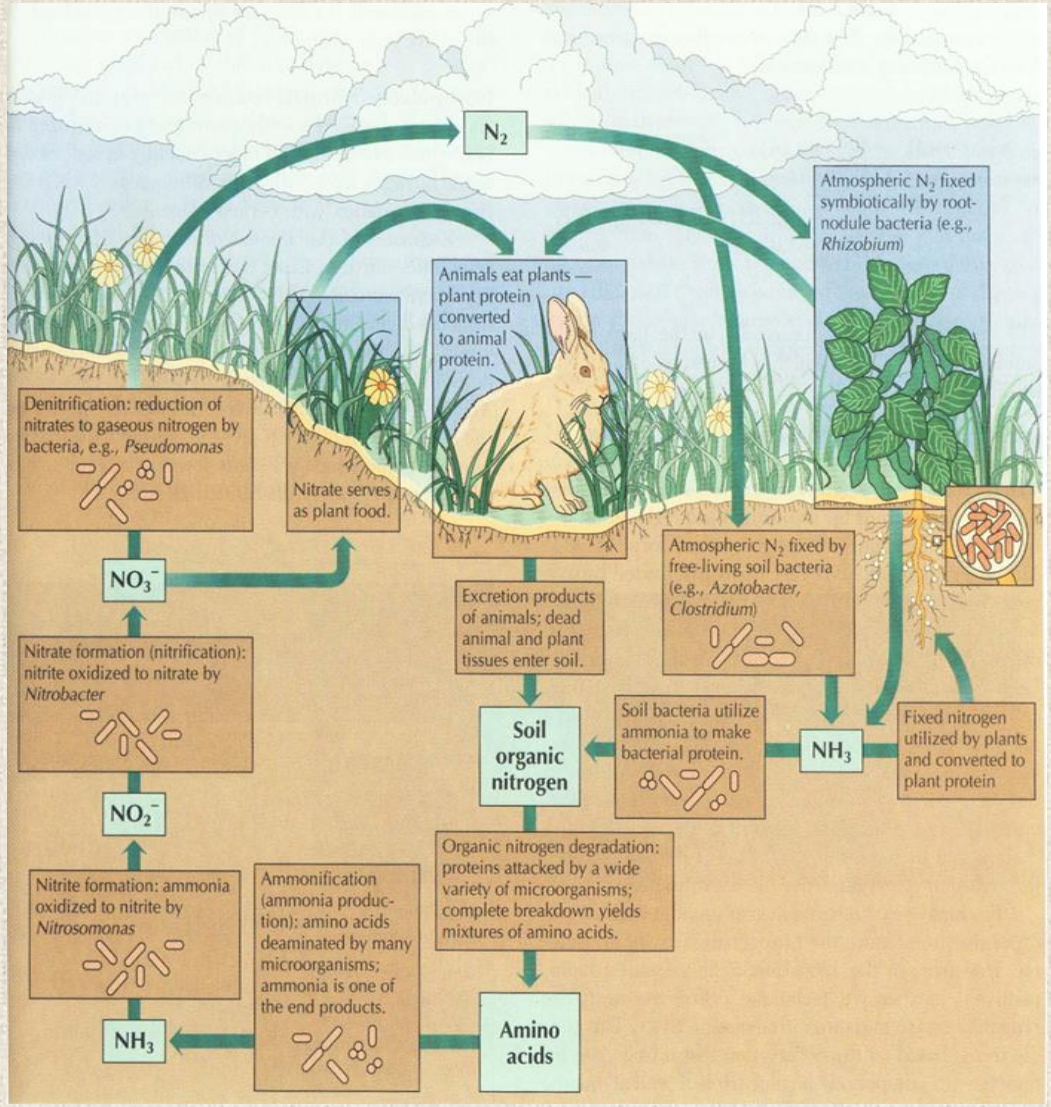
Natural History

- Legume Nitrogen Fixation also benefits companion non-legume plants via direct and indirect pathways.



Natural History

Legume N Fixation & N Cycle

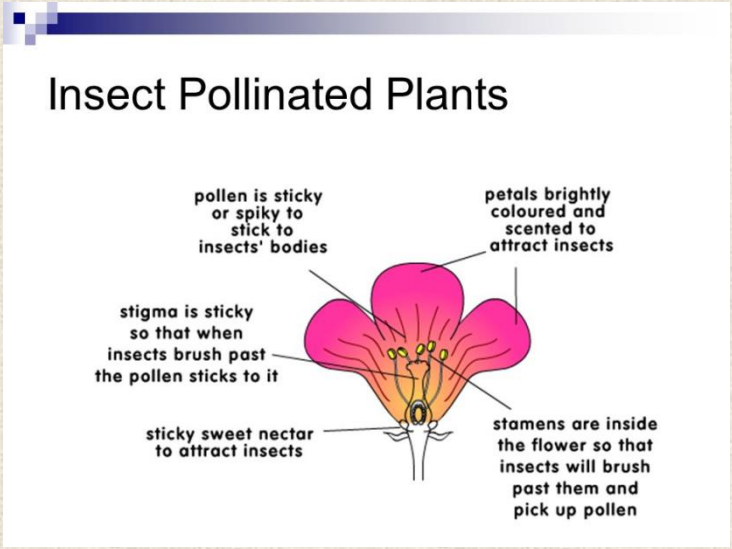


- Legumes and symbiotic N fixation are a critical part of the N cycle of functional soil ecosystems

Natural History: Pollination

- The pollination requirements for legumes vary according to whether they are self-fertile or self-sterile

- Legume crops can be very attractive to pollinators, especially Hymenoptera, for both their pollen and nectar.



- There are special problems with some important legume varieties. In alfalfa, for example, the blossoms must be tripped in order for pollination to occur. To result in the required cross-pollination bees must carry out the tripping.

Natural History: Pollination

Some bees are better pollinators of flowers like alfalfa, blueberry, and tomato than honey bees

- **because of flower structure--in alfalfa, honey bees avoid being whacked on the head**

alfalfa

untripped vs. tripped

alkali bee
Nomia melanderi

alfalfa leaf cutter bee (European)
Megachile rotundata

- Native bees trip over 80% of alfalfa flowers visited while honey bees trip 20%.

Natural History

Defensive mutualisms

- Example, *Acacia* and acacia ants
- Leaves have extrafloral nectary at base (makes nectar but not produced on a flower)
- Young leaflets have Beltian Bodies (protein rich) at tips

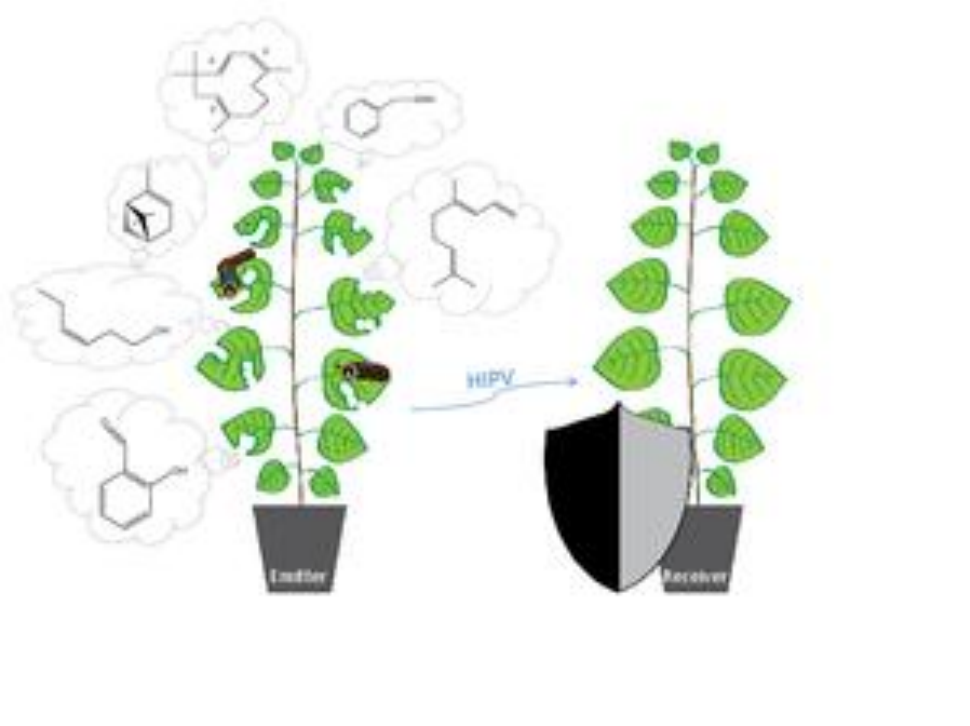
Natural History

- Biologically active phytochemicals are found in legumes.
- They are produced by plant “secondary” metabolism that produces compounds such as alkaloids, flavonoids, anthocyanidins, terpenes and phenolics.
- Secondary phytochemicals are organic compounds that are not directly involved in the normal growth, development, or reproduction of an organism. Secondary metabolites often play an important role in plant chemical-based ecological interactions with their biotic and non-biotic environment.

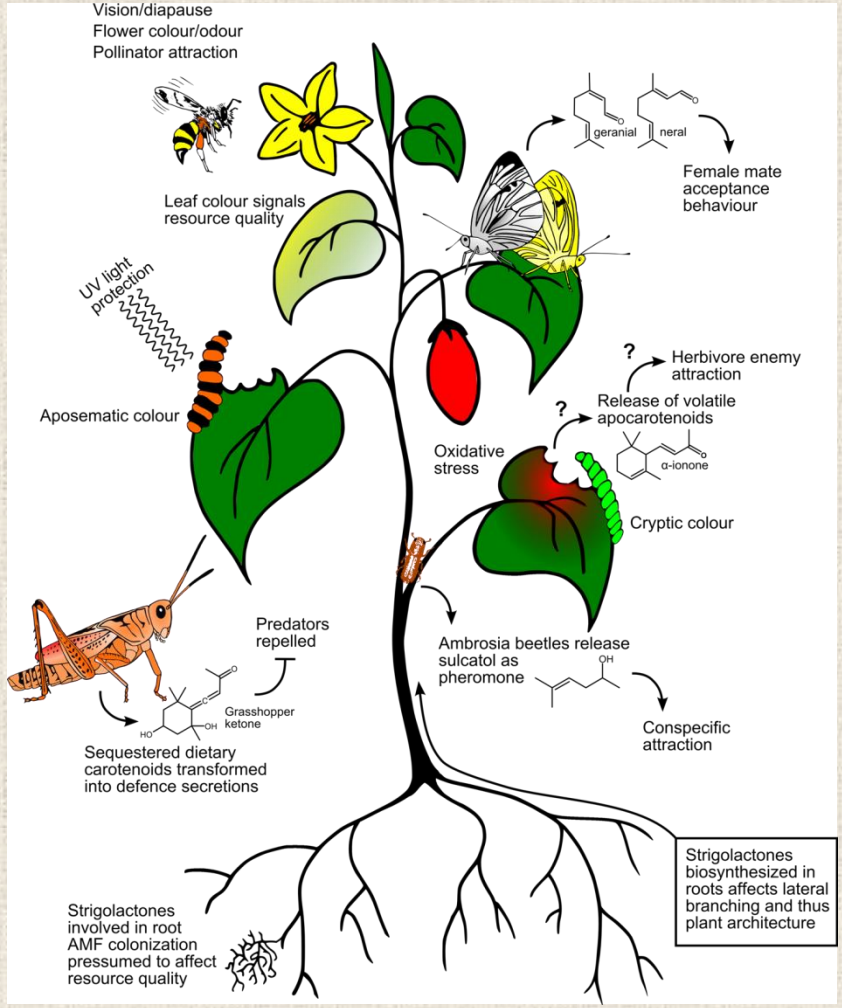
Natural History

- Chemical protection via secondary phytochemicals plays a decisive role in the resistance of plants against pathogens and herbivores.
- As is the situation with all defense systems of plants and animals, a few specialized pathogens have evolved in plants and have overcome the chemical defense barrier.
- Furthermore, they are often attracted by a given plant toxin.
- During domestication of our crop and food plants secondary metabolites have sometimes been eliminated.
- Taking lupines as an example, research has shown that quinolizidine alkaloids are important as chemical defense compounds and that the alkaloid-free varieties ("sweet lupins"), which have been selected by plant breeders, are highly susceptible to a wide range of herbivores to which the alkaloid-rich wild types were resistant.

Natural History



Plant chemical defense example



Legume plant chemical ecology includes multiple processes

Legume Cultural History

Cultural History

- Legumes are plants with a long history of cultivation and used for food (human & livestock), fiber, oil, fuel, medicine, ornamentals, and shelter.

- Examples from the 3 legume sub-families include:
  - Papilionoideae - contains most of the important leguminous pulse crop species such as the soy bean (*Glycine max*), common pea (*Pisum sativum*), chickpea (*Cicer arietinum*), French bean (*Phaseolus vulgaris*), lentil (*Lens culinaris*) and peanut (*Arachis hypogaea*).
  - Caesalpinioideae – contains well-known tropical ornamentals such as Flamboyant (Delonix regia) and Barbados Pride (*Caesalpinia pulcherrima*). Alexandrian Senna (*Senna alexandrina*) is a commercially grown medicinal plant, known for its purgative qualities.

Cultural History

- Legumes are plants with a long history of cultivation and used for food, fiber, oil, fuel, medicine, cover crops, ornamentals, and shelter.

- Examples from the 3 legume sub-families include: (cont.)

  - Mimosoideae - examples of genera within this subfamily are Acacia and Mimosa. Certain Acacia species are extremely important economically. An extract from the bark of the Golden Wattle (*Acacia pycnantha*) is used in tanning, several species, such as Australian Blackwood (e.g. *Acacia melanoxylon*) provide useful timbers and some (e.g. *Acacia senegal*) yield commercial gum arabic, which is used in a wide range of industrial processes.

Cultural History

- Legumes or beans are second only to the Grasses (cereals) in providing food crops for world agriculture. In comparison to cereal grains the seeds of Legumes are rich in high quality protein, providing man with a highly nutritional food resource.

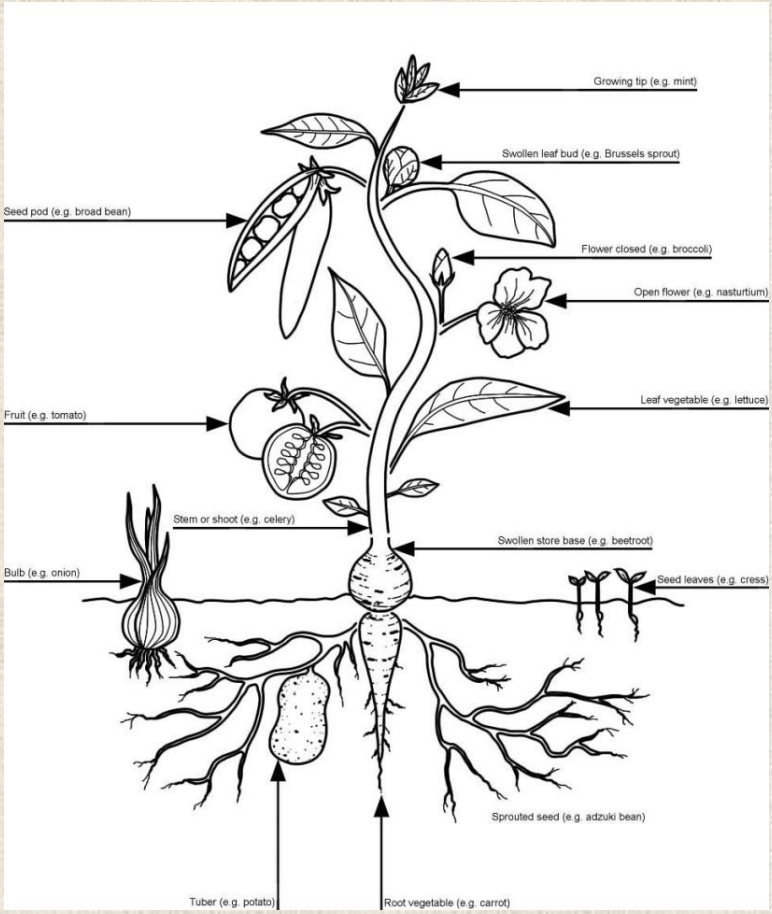
- Legumes or beans were among the first cultivated plants in the Mediterranean, as well as one of the first domesticated plants in the New World, appearing before 6000 B.C.

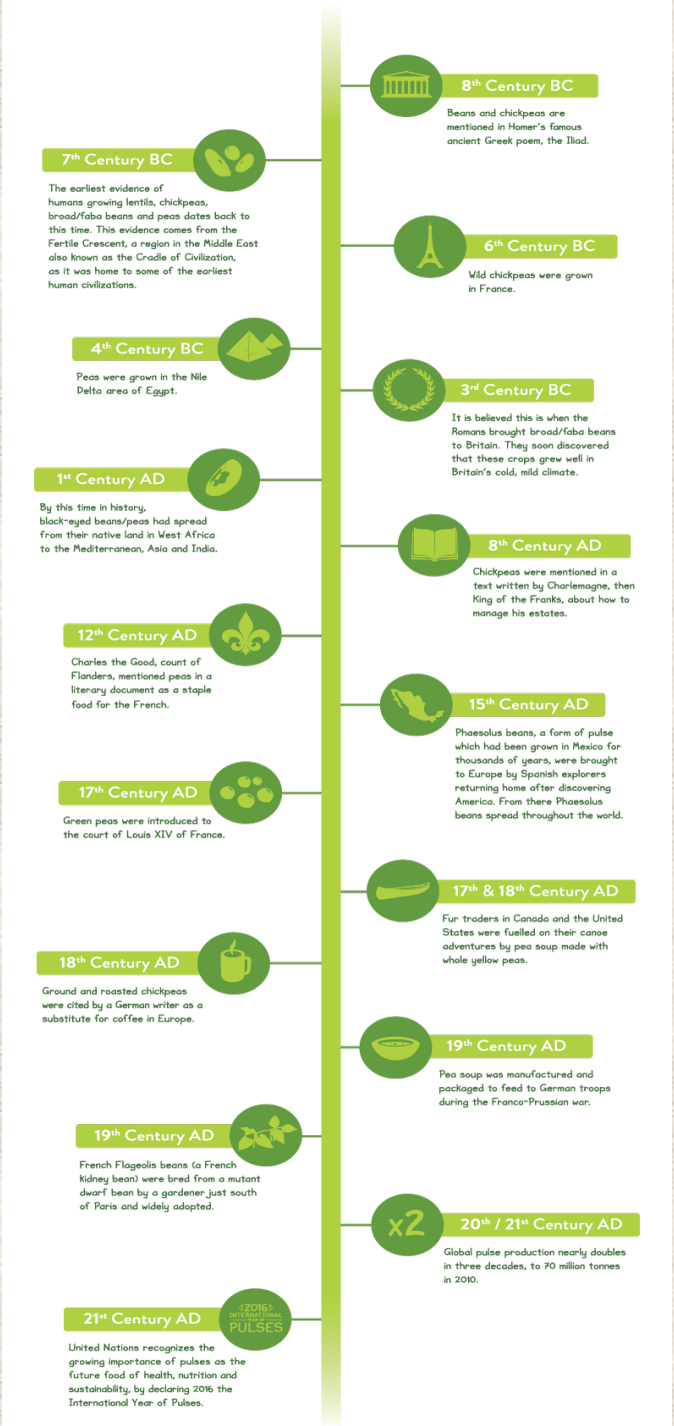
Cultural History

- The Mediterranean's most famous beans are the fava bean, lentil, and chickpea.
- The New World bean. *Phaseolus* is the genus that has provided the most edible species of beans. Four different species were domesticated in the Americas, e.g., the scarlet runner bean (*Phaseolus coccineus*), originally from Mexico, the tepary bean (*Phaseolus acutifolius*), the lima bean (*Phaseolus lunatus*), originally from Peru, and the common bean (*Phaseolus vulgaris*), the most widespread bean.
- Old World beans that were once classified as *Phaseolus* are now assigned to the genus *Vigna*.

Legume Crop Diversity

- Plant parts as vegetables
  - Leaf
  - Stem
  - Root
  - Seed
- Herbs (culinary)
- Fruits
- Medicinal
- Flowers (nursery & edible)





Legume Crop Diversity

❖ Pulse Food Crops

- It is estimated that humans have been growing and eating pulses for more than 11,000 years.
- Although the exact number might be unknown, one can estimate that there are hundreds of varieties of pulses, including many local varieties that are not exported or grown worldwide.

Legume Crop Diversity Examples

- Watch short video “Pulses Around The World” – see https://pulses.org/what-are-pulses/pulses-around-the-world

Legume Crop Diversity Examples

❖ Leafy Legume Food Crops

- Those known to have leaves eaten by humans in a preliminary count published in 1990 total 88 genera with 290 species, including
  - Papilionoideae - 63 genera and 205 species
  - Caesalpinioideae - 15 genera and 52 species
  - Mimosoideae - 10 genera and 33 species
- This total does not include leaves used for tea or medicinal purposes, but only those eaten as vegetables: raw, steamed boiled, fried or cooked mixed in with other foods.

Legume Crop Diversity

- How Did Legume Crops & Cultivars Originate?
  - Crop domestication = human-induced plant adaptation
  - *Centers of Origin* have wild relatives of the crop.
  - Hybridization and polyploid formation are important driving forces in crop evolution
  - In each *Center of Origin* numerous crops were domesticated
  - Genetic diversity can be measured at the molecular level

Legumes – Changes Under Domestication

1. Annual habit, selfing breeding system
2. Less seed scattering
3. Greater seed size
4. Synchronous fruiting
5. Loss of dormancy

   - question: which came first, domestication or loss of dormancy?

Recent studies – no common set of "domesticated genes"

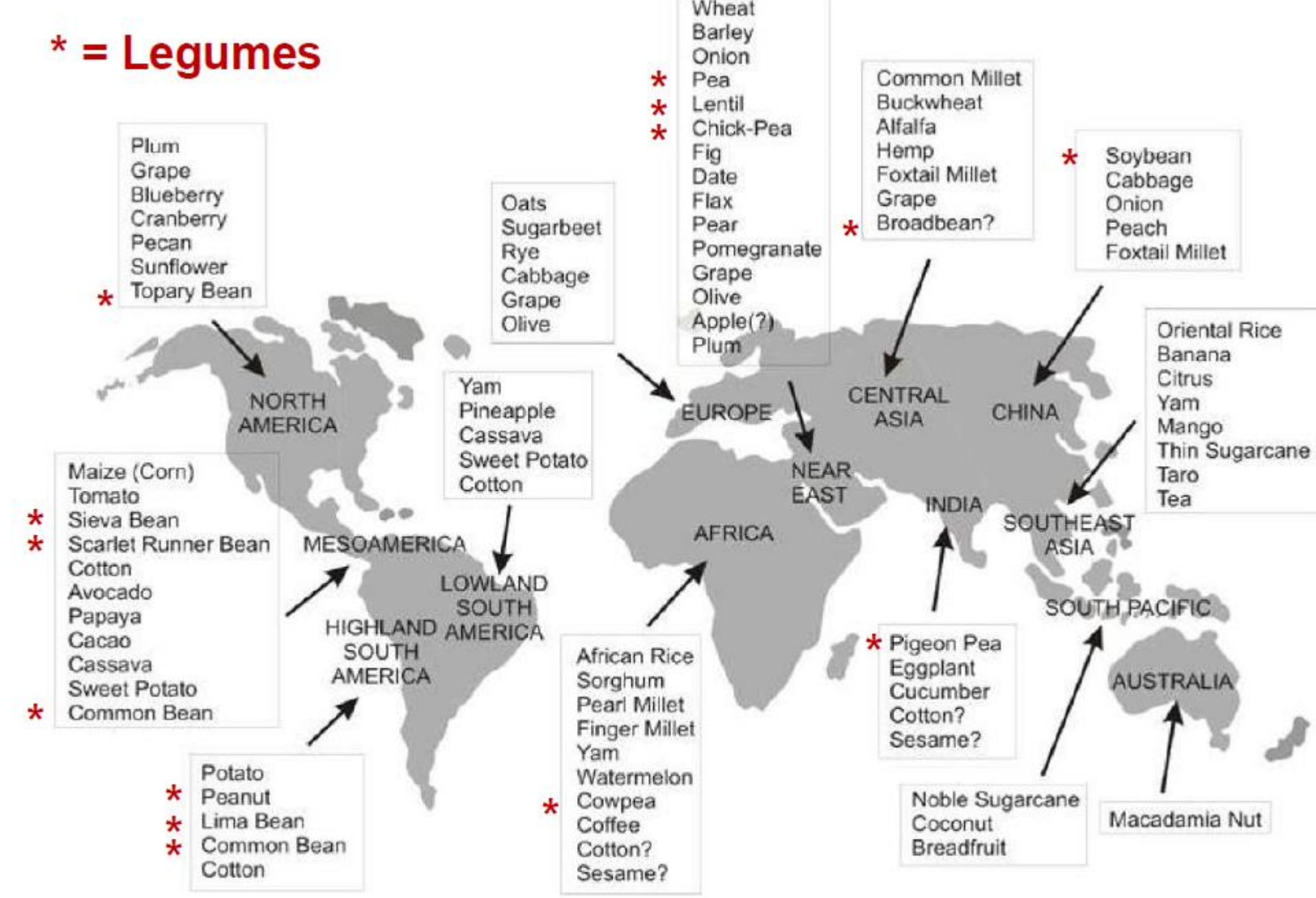


Figure 1.2. Centers of Origin, regions of the world where major food crops were domesticated (Harlan

Legume Crop Diversity

Domestication of legumes

centers of origin

- Near East and Europe: peas, broad beans, lentils, and garbanzos.
- New World: common beans, lima beans, and peanuts
- South East Asia and China: soy beans, mung beans (*Vigna aureus*) and adjuki bean (*Vigna mungo*).
- Africa: black-eyed pea, pigeon pea.

Facts About Historical Crop Origins

- Unlike other staple foods which vary from place to place around the world, nearly every culture has depended on the ubiquitous bean for sustenance.
- Archaeological research has led scientists to believe that beans first began to be cultivated somewhere between 7,000 and 3,000 B.C. which places them among the world's first domesticated plants.

Facts About Historical Crop Origins

- Crops have been moved globally from their centers of origin in the course of agriculture development. This has made the exact origins of native species difficult for scientists to sort.
- Crops have also been selected by farmers & gardeners as “land races” for adaptation to local conditions.
- Through their culinary history beans have been developed into a wide range of uses. “Some are dried and boiled, others are eaten fresh and immature; some are ground into flour; some are processed into food only vaguely reminiscent of beans such as soy milk, tofu or vegetable oil”

Bean Crop Diversity

- Example names of different legume beans

- Asparagus bean
- Asparagus pea
- Baby lima bean
- Black bean
- Black-eyed pea
- Black turtle bean
- Boston bean
- Boston navy bean
- Broad bean
- Cannellini bean
- Chickpeas
- Chili bean
- Cranberry bean
- Dwarf bean
- Egyptian bean
- Egyptian white broad bean
- English bean
- Fava bean
- Fava coceira
- Field pea
- French green bean
- Frijol bola roja
- Frijole negro
- Great northern bean
- Green bean
- Green/yellow peas
- Kidney bean
- Lentils
- Lima bean
- Madagascar bean
- Mexican black bean

Bean Crop Diversity

❖ Example names of different legume beans (cont.)

- Mexican red bean
- Molasses face bean
- Mung bean
- Mung pea
- Mungo bean
- Navy bean
- Pea bean
- Peanut
- Peruvian bean
- Pinto bean
- Red bean
- Red eye bean
- Red kidney bean
- Rice bean
- Runner bean
- Scarlet runner bean
- Small red bean
- Snow pea
- Southern pea
- Sugar snap pea
- Soybean
- Wax bean
- White kidney bean
- White pea bean
- Winged bean

Nutritional value of legumes

- Legumes rich in protein (nitrogen).
- Many are in the 20-30% range.
- Legumes also contain some fats but usually less starches than cereal grains.

Split Peas

Nutrition Facts

Serving Size 1/3 cup (65g)
Servings Per Container

Amount Per Serving

Calories 80	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0%
Saturated Fat 0g	0%
Trans Fat 0g	
Cholesterol 0mg	0%
Sodium 0mg	0%
Total Carbohydrate 14g	5%
Dietary Fiber 5g	20%
Sugars 2g	
Protein 5g	

Vitamin A 0% • Vitamin C 0%

Calcium 0% • Iron 4%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:

Nutritional value of legumes

- Amino acid composition different from that of cereal grains.
- Legume seeds have more of some amino acids than cereal grains. Need to combine with grains to get complete protein
- Seeds of almost all legumes are toxic if eaten uncooked because of proteins or peptides that inhibit digestive enzymes.

Essential amino acids

- Not manufactured by body
- Must be consumed in diet

Red: low in grain, high in beans

Green: high in grain, low in beans

- isoleucine
- leucine
- tryptophan
- lysine
- methionine
- phenyalanine
- threonine
- valine
- histidine

Maize and Beans - Complementary

- Traditional staples in Central and South America
- *Nutritionally complementary*
  - Beans rich in amino acids deficient in corn and vitamin niacin
  - Corn rich in amino acids deficient in beans
- *Ecologically complementary*
  - Poly-cropping
  - Crop rotations
  - Well adapted to low inputs

Companion Planting – the 3 Sisters – corn, beans, squash

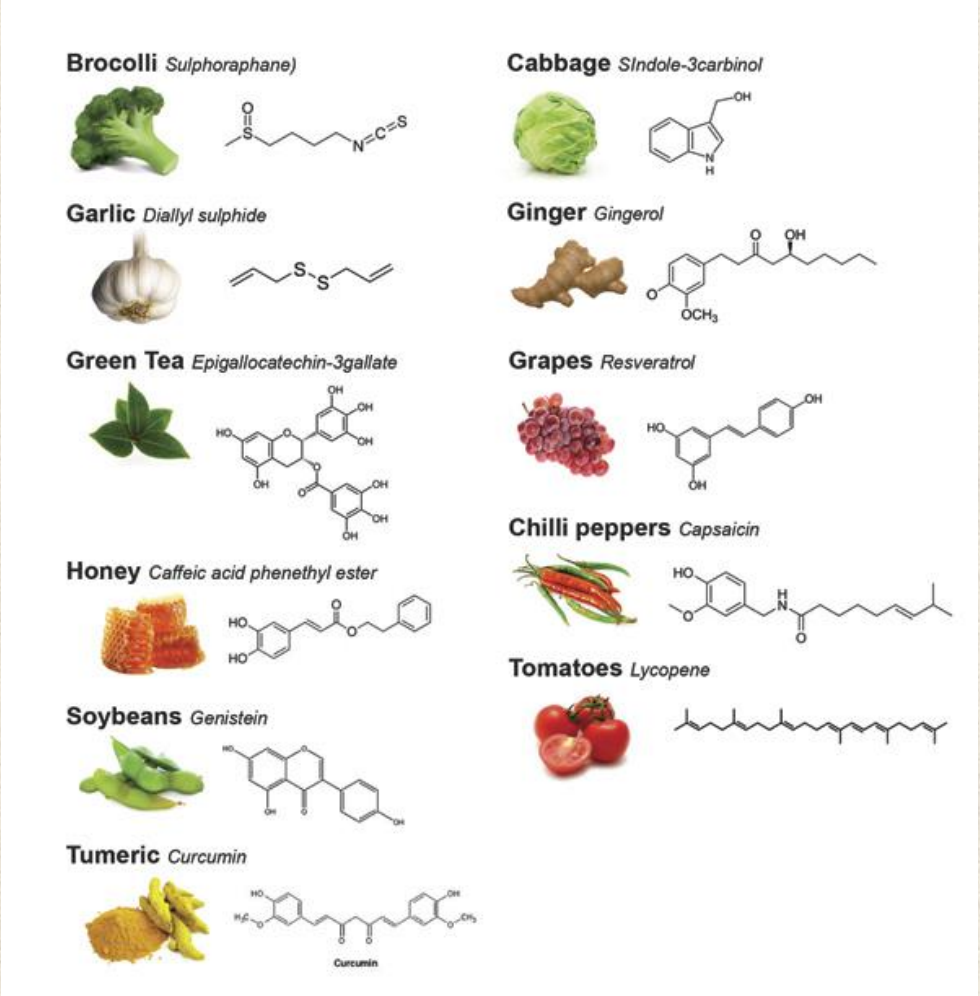
Tripartite legume-symbiotic N fixation = one factor of this cropping system

Cultural History

- Legume breeding history included selection for reducing or removing certain natural occurring phytochemicals found in wild types in centers of origin.
- For example, Lima beans' distinctive taste comes from cyanogenetic glucoside, a cyanide-containing compound that appears in very small amounts.
- The grasspea or India pea (*Lathyrus sativus*) is a legume eaten in the Mediterranean as well as Asia, and when eaten in quantity without other foods can cause a disease known as lathyrism, which leads to a paralysis of the lower limbs that can be permanent. In the seventeenth-century Moroccan medical compendium,Tuhfat alahbāb, this legume is described as an aphrodisiac.

Cultural History

- The medicinal use of phytochemicals from different plant families has a long history with human populations, a.k.a. “food as medicine”
- Legume breeding history also included selection for natural ocurring phytochemicals that are health promoting and found in wild types in centers of origin.



- Picture shows examples of crops bred from wild plants with medicinal phytochemicals.

Cultural History

- The majority of legumes contain phytochemicals including: enzyme inhibitors, phytohemagglutinins (lectins), phytoestrogens, oligosaccharides, saponins, and phenolic compounds, which play metabolic roles in humans who frequently consume these foods.
- Dietary intake of phytochemicals may provide health benefits, protecting against numerous diseases or disorders, such as coronary heart disease, diabetes, high blood pressure and inflammation.
- In recent decades, the Mediterranean Diet, using frequent legume foods, has emerged as a healthy dietary pattern that protects against cardiovascular disease and other chronic diseases.

Cultural History

- However, if you are a follower of Paleolithic diet, you may have a different opinion about the phytochemicals of legume foods.
- This modern diet requires the sole or predominant consumption of foods presumed to have been the only foods available or consumed by humans during the Paleolithic era.
- It typically includes vegetables, fruits, nuts, roots, and meat and typically excludes certain foods, including legumes.

Cultural History

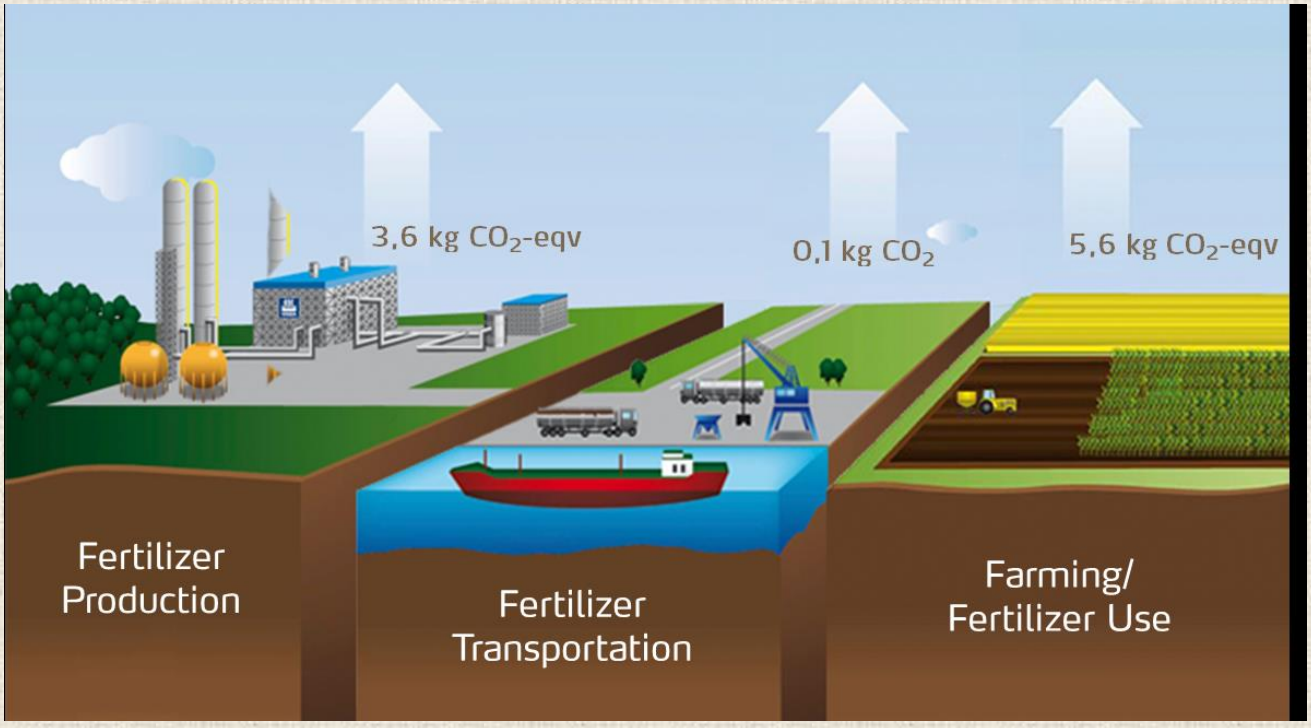
- Legumes contain unabsorbed short-chain carbohydrates called galacto-oligosaccharide (GOS) and fructans. These poorly absorbed sugars are rapidly fermented by gut bacteria in the large bowel, resulting in gas.
- Although legumes contain these poorly absorbed sugars, they can actually promote good gut health

Cultural History

- To reduce the chance of flatulence here are some tips:
  a) properly prepare your dry legumes by soaking and rinsing before cooking
  b) make sure to rinse legume in a can under water in a colander until the bubbles disappear
  c) introduce legumes slowly into your diet.

Pulse Crops and Climate Change

- It is estimated that globally, some 190M ha of pulses contribute to 5M to 7M tonnes of N in soils. As pulses can fix their own nitrogen in the soil, they reduce use of fossil fuel-dependent synthetic N fertilizers, and in this way, they play a part in reducing greenhouse gas emissions."



- Examples of C emission sources from synthetic fertilizers

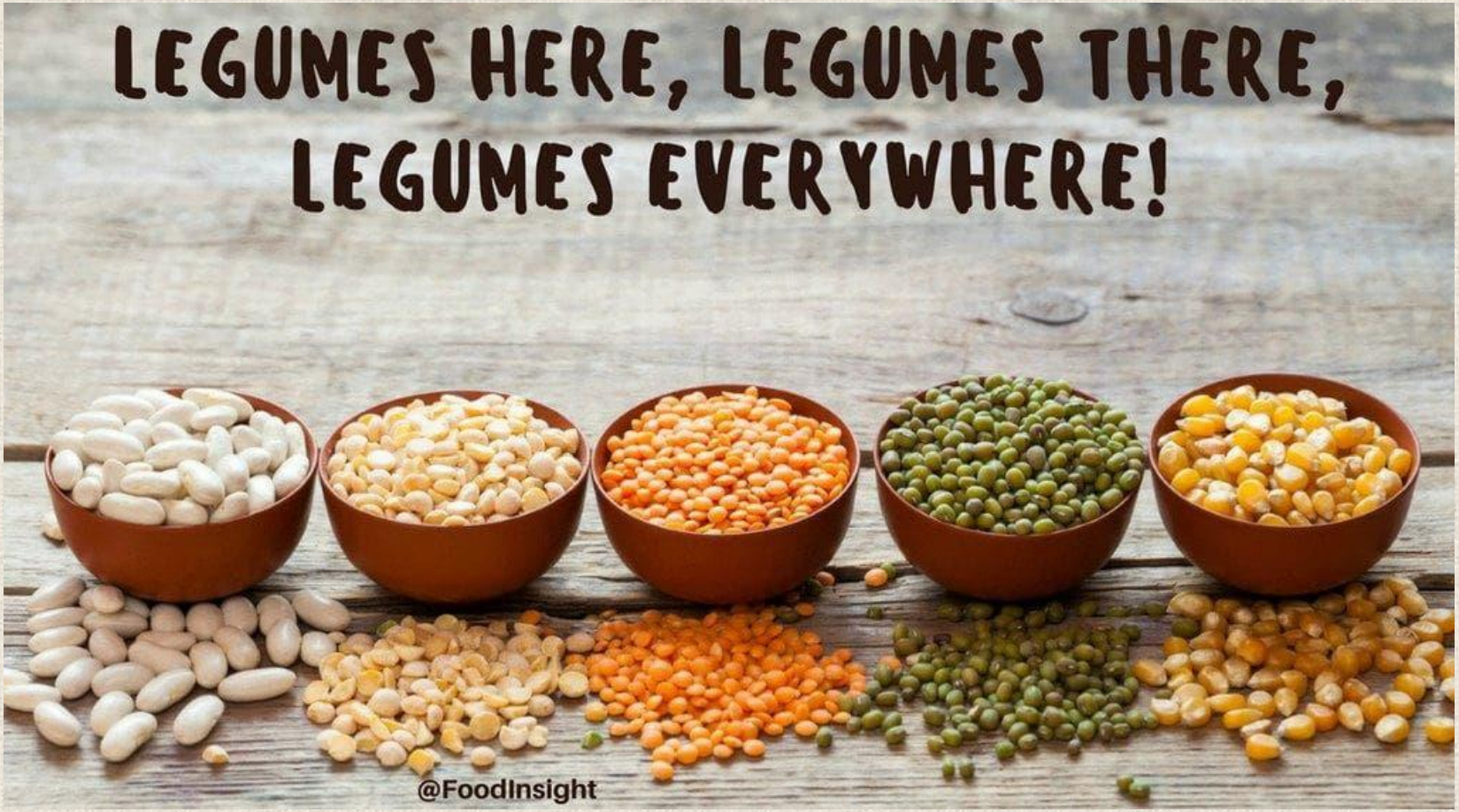
A Little Taste of Legume Poetry …

“Sweet Peas”

Developing by every art
To floriculture known,
From tares exempt, and kept apart,
Careful, as if in some fond heart
Its legume germs were sown.

- by Hattie Howard (1860-1920)
  (https://allpoetry.com/Hattie-Howard)

Thank You !


LEGUMES HERE, LEGUMES THERE,
LEGUMES EVERYWHERE!
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