

Artificial selection

Learning Objective

- Explore ways to improve crop plants and animals using the methods of breeding.

Success criteria

1. Analyse ways of improving agricultural plants and animals with the help of selection methods.
2. Find a method that could be used to improve their plants and animals and identify why certain features have been selected.

Terminology

- Hybridization
- Inbreeding
- Offspring
- Selective breeding
- Common ancestors
- methods of breeding
- Inbreeding depression
- Domestication

Artificial selection

- Artificial Selection is a form of **selection in which humans actively choose which traits should be passed onto offspring.**
- selection **caused by humans.**
- a **deliberate and planned process.**
- leads to **deliberate genetic change.**
- **genetic constitution** of the population **changes rapidly.**
- on-going process to obtain **higher yields, superior nutrient content and resistance to disease.**

Steps of Artificial Selection

1. Humans decide trait or characteristic of interest.
2. Breed the choices together
3. Choose offspring with ideal characteristics to mate
4. Repeat for many generations
5. The allelic frequency for the characteristic increases.
6. Decide what type of selection is occurring in the population
 - Selective, Directional, Disruptive

Two different types of selective breeding processes

Hybridization and inbreeding



Brahman cattle:



English shorthorn



Santa Gertrudis cattle
(cross of 2 breeds)

Hybridization vs Inbreeding

1. Inbreeding – parents have same traits
2. Hybridization – parents have different traits

Hybridization

is the process of **crossing genetically different individuals to produce offspring**

- increases the heterozygous alleles
- two different species are involved
- Alleles of offspring are much different than their parents
- Less probability of genetic mutations

Inbreeding

is the crossing of **two closely related parents, or close relatives, who share very similar alleles.**

- increases the amount of homozygous alleles.
- One species involved
- Alleles of offspring are very similar to parents
- High probability of genetic mutations

Inbreeding

It refers to the mating of closely related individuals within the same breed for 4-6 generations.

Outbreeding

It refers to breeding of unrelated animals either of the same breed with no common ancestor or between different breeds or different species.

Interbreeding depression

- It refers to decrease in fitness and vigour due to inbreeding or it may be defined as the reduction or loss in vigour and fertility as a result of inbreeding.



Auroch
(Wild cow:
ancestor of all
domesticated
cattle)

VS



**Domesticated
Dairy Cow**

Selective Breeding

'Wild' cow



'Beef' cow



What differences can you see?

Wild banana

The first bananas may have been cultivated at least **7,000 years ago** in what is now Papua New Guinea, and were **stocky and hard**, with large, tough **seeds** throughout the fruit's interior.



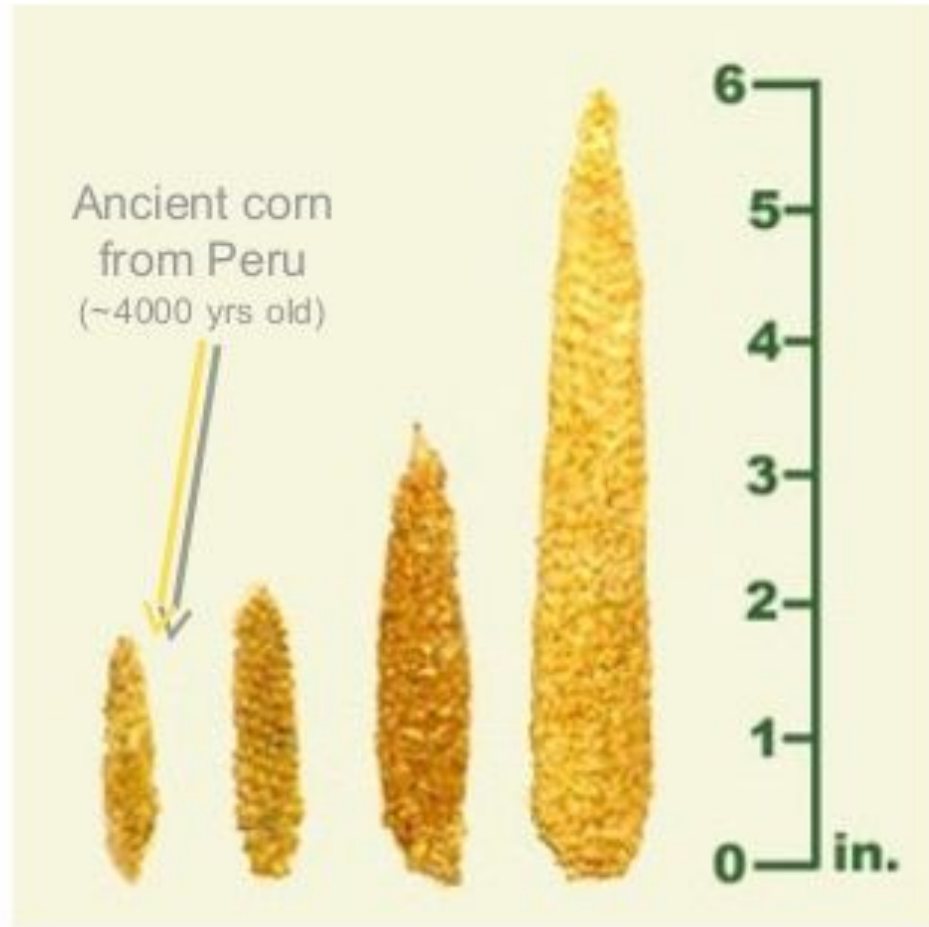
Modern banana

Today's tastier bananas are **hybrids** of two wild banana varieties, **Musa acuminata** and **Musa balbisiana**.



banana

Modern corn



Choosing only the best corn plants for seeds results in better crops over a long time.



Broccoli - suppression of flower development



Cabbage - suppression of internode length



Kale - enlargement of leaves



Cauliflower - sterility of flowers



Wild mustard



Kohlrabi - enhancement of lateral meristems

double doodle



Labrador



poodle



golden retriever

