

# The Science of Seedless

## High School Science

### Objective:

Understand how seedless vegetables and fruits are grown

### Supplies:

Watermelon (or large image of watermelon slice)  
Seedless watermelon (or large image of seedless watermelon slice)  
Computer access

### Lesson:

1. Assign four groups a different seedless fruit or vegetable to research:
  - Seedless watermelon
  - Seedless cucumber
  - Seedless grape
  - Seedless orange
2. Ask each group to answer this question: If your assigned fruit or vegetable is seedless, how do farmers grow it?
3. After the research period, let each group share and record findings in front of class. Compare and contrast the production of seedless watermelons, cucumbers, grapes, and oranges.
4. Focus on seedless watermelon. Examine the regular watermelon and seedless watermelon (or images of) with class.
5. Share the following background information that may not have been covered by the seedless watermelon research group.

### Background:

Review with class or ask each group to look up definitions:

**Chromosome** – A threadlike structure of nucleic acids and protein found in the nucleus of most living cells, carrying genetic information in the form of genes.

Each chromosome consists of a DNA double helix bearing a linear sequence of genes, coiled and recoiled around aggregated proteins (histones). Their number varies from species to species: humans have 22 pairs plus the two sex chromosomes. During cell division, each DNA strand is duplicated, and the chromosomes condense to become visible as distinct pairs of chromatids joined at the centromere.

**DNA** – Deoxyribonucleic acid, a self-replicating material present in nearly all living organisms as the main constituent of chromosomes. It is the carrier of genetic information.

Seedless watermelons were invented over 50 years ago, and they have few or no black seeds. White seed coats, where a seed did not mature, are visible within these watermelons and are perfectly safe to swallow.

Watermelon breeders discovered that crossing a **diploid plant** (bearing the standard two sets of chromosomes) with a **tetraploid plant** (having four sets of chromosomes) results in a fruit that produces a triploid seed (having three sets of chromosomes). This triploid seed is the seed that produces seedless watermelons.

A seedless watermelon is a sterile hybrid which is created by crossing male pollen for a watermelon, containing 22 chromosomes per cell, with a female watermelon flower with 44 chromosomes per cell. When this seeded fruit matures, the small, white seed coats inside contain 33 chromosomes, rendering it sterile and incapable of producing seeds. This is similar to the mule, produced by crossing a horse with a donkey. This process does not involve genetic modification.

The seedless watermelons need seeded watermelons in order to be pollinated and set fruit. In a watermelon field where they're growing seedless, roughly 25% of the plants are seeded varieties and 75% are seedless varieties. Hives of bees are brought into the fields to cross-pollinate from the seeded plants to the seedless plants. Without this cross-pollination, the seedless watermelon plants would not produce fruit.

