

AIM: What methods are used to increase food supplies to feed a growing population?

## I. GENETICALLY MODIFIED ORGANISMS (GMOs)

1. favorable traits are isolated from a donor species and inserted into a host species
2. seeds/offspring carries the favorable trait

Examples:

- a. soybeans – herbicide resistant
- b. Bt Corn - makes its own pesticide (Bacillus thuringiensis bacteria gene)
- c. AquaAdvantage Salmon – growth hormone ocean pout

### PROS

1. reduced use of chemical pesticides
2. longer crop season (drought / frost resistance)
3. cheaper consumer prices

### CONS

1. unknown long-term effects
2. cultural resistance / fears
3. possible food allergies

## II.

## IRRADIATION

expose food to ionizing energy (gamma and X-rays) to kill bacteria/insects in food



### PROS

1. reduced foodborne illness
2. reduced use of pesticides
3. extends shelf-life

### CONS

1. doesn't guarantee total food safety
2. mutations in bacteria – more resistant?
3. fear of residual radiation

### III. PESTICIDE USE

Pests - any unwanted organism that invades food sources, space, and/ or spread disease

- r-strategists

- **\*\*the natural checks and balances disrupted by monoculture has increased pest problems\*\***

TYPES	
<b>Broad Spectrum</b> toxic to many species (ex. Sevin)	<b>Narrow Spectrum</b> effective on a specific organism / group of organisms (ex. ant traps)
herbicides, insecticides, fungicides, algicides, rodenticides, nematocides (worm pests)	
<b>Contact</b> kills pests directly	<b>Systemic</b> - absorbed by a plant hen applied to seeds, soil, or leaves - insects die by eating plant with toxin

CLASSES		
<b>Inorganic</b> - toxic, persistent, broad spectrum "older": metal salts: mercury & lead (banned) arsenic (trying to ban) chromium copper (also a fungicide) "newer": borates (Borax), silicates	<b>Organic / Botanical</b> plant extracts that break down into less harmful compounds relatively safe for human handling pyrethrum, nicotine	<b>Synthetic</b> toxic, not naturally-derived, fat-soluble, persistent, mobile chlorinated hydrocarbons DDT (mosquitoes) Chlordane (insects, termites) Lindane (still used in prescription lice shampoo)

PESTICIDE PROS	PESTICIDE CONS
1. control/eliminate diseases mosquitoes - malaria / zika ticks - lyme/RMSF (Rocky Mt. scarlet fever)	1. kills non-target species – including predators of pests 2. affects non-target areas (soil, air, water) 3. bioaccumulation / biomagnification 4. strong connections to human health problems (cancer, etc.)
2. increase food supplies	5. genetic resistance and the <b>"pesticide treadmill"</b> <div style="text-align: center; margin-top: 10px;"> <pre> graph TD     A[apply pesticide] --&gt; B[most die, some survive ("selected")]     B --&gt; C["'selected' resistant pests resurge"]     C --&gt; D[apply more pesticide]     D --&gt; E["'selected' more resistant pests survive"]     E --&gt; F[apply new pesticide (or increase concentration)]     F --&gt; A                     </pre> </div>
3. lower consumer costs	
4. increase farmer profits	
5. easy to use / quick results	