

Chapter 12

Effects of Agriculture on the Environment

Problems from Agriculture

- Soil Erosion
- Sediment Transport and Deposition
- Onsite pollution from fert. And pest.
- Offsite pollution
- Deforestation
- Desertification
- Aquifer damage
- Salinization
- Heavy metals
- Loss of biodiversity

Sediment Damage

- Eroded soil (resulting from plowing) goes into water ways
 - Fill in fisheries, destroy coral reefs, nutrients cause eutrophication, monetary cost of dredging

Soil Sustainability

- Contour plowing
 - Plow perpendicular to slope
- No till agriculture
 - No plow, leave stems in field,

Pest Control

- Undesirable competitors, parasites, or predators
- Insects are #1
- Also nematodes, bacteria/virus, weeds, vertebrates

Pesticides

- 1st wave - broad, such as arsenic
- 2nd wave - oil based and specific, such as nicotine
- 3rd wave, chlorinated hydrocarbons, such as DDT

DDT

- At first appeared to be not dangerous except to target insects
- 1 - has long term effects
- 2 - biomagnification
- 3 - DDT is stored in fat

DDT (continued)

- Banned in US in 1971
- BUT - still produced in US for sale in other places - mainly for control of malaria and yellow fever

Next chemical wave

- “organophosphates” - phosphorous containing chemicals that effect the nervous system
- Avoid DDT problems - BUT...
- Toxic to people

Secondary Pest Outbreaks

- 1 - reduction in target causes increase in competitor
- 2 - resistance due to natural selection

IPM - Integrated Pest Management

- Use natural enemies
- Plant diverse crops
- Low or no-till agriculture
- Specific chemicals

Principles of IPM

- Goal is control, not extinction
- Maximize natural control agents
- Manage the ecosystem
- Be aware of unexpected effects

Biological control

- Introduce predators, diseases, etc
- Ladybugs
- *Bacillus thuringiensis* - kills insect larvae
- Wasps - lay eggs in larvae - oriental moth example
- Pheromones

Grazing Lands

- Overgrazing
 - Reduces plant diversity, leads to dominance of undesirable plants, increases erosion, allows feet to stamp land

Modern v. traditional cattle

- Initially raised on rangeland, then moved to feedlots
 - Feedlots are major pollution sources
- Traditional leads to overgrazing

Biogeography of Animals

- Animals (not really a word) have been transplanted all over
- Currently the tropical areas are at especially high risk

Desertification

- Causes: bad farming practices, overgrazing, conversion of range to croplands, poor forestry practices, soil poisoning, irrigation

Desertification

- Symptoms: lower water table, increased salt, less surface water, increased erosion, loss of native veg,

Desertification

- Prevention: monitor symptoms, soil conservation, forest management, proper irrigation

Global effects

- Change in albedo and chemical cycling
- CO₂ increase
- Fire as source of particulates
- Nitrogen fertilizer

Weeds

- Major problem in terms of potential crop loss
- Problem results from goals of agriculture
- \$3.6 bil/yr to control = 60% of all pesticide sales[include lawns?]