

AGRICULTURE and PESTICIDE NOTES

AGRICULTURAL REVOLUTIONS

- A. The first green revolution took place from 1950 to 1970 and based on industrialized agriculture. By using petroleum products, pesticides, and inorganic fertilizers, developed countries were able to greatly increase their food production. Excess food was exported to developing countries.
- B. The second green revolution took place from 1970 to 2000 as faster growing, higher yielding crops were developed and exported to developing nations.
- C. The third green revolution is now taking place as bioengineers splice designer genes into food crops in an effort to make them higher yielding, tastier, easier to transport, more drought resistant, and more pest resistant.

Environmental Impacts of Agriculture

- 1) Agriculture is the world's #1 reason for habitat loss.
- 2) Causes water pollution from herbicide fertilizer, oil runoff, and sediments.
- 3) Air pollution from particulates (disturbed soil) and diesel exhaust (tractors).
- 4) Salinization of the soil from inorganic fertilizers.
- 5) Loss of species diversity → increased pestilence, pests can move quickly through a crop exhausts (monoculture) → loss of genetic resources (Mexican wild corn for example).
- 6) Depletion of surface and subsurface (aquifer) water supplies uses up more than ½ of H₂O in USA.
- 7) Soil erosion caused by wind, water, and exposed soil.
- 8) Pesticide pollution of the air, land, and water.
- 9) Uses up a tremendous amount of fossil fuels- 17% of USA total energy use.

INFORMATION CONCERNING AGRICULTURE

1. Wheat, rice, corn, and potatoes make up over half of the world's food production.
2. Worldwide there are about 30,000 plant species that are edible, but only 15 plant and 8 animal species supply 90% of the world's food .
3. We now produce more than enough food to feed everyone on earth, if there were no political restraints and people ate less meat.
4. Industrial agriculture uses 8% of the world's oil but saves virgin land.
5. If animals are included, it takes, on average, 3 Calories of fossil fuel energy to produce 1 Calorie of food energy.
6. If you include transportation along with animals, it then takes 10 Calories of energy input to produce 1 Calorie of food.
7. Livestock eat up 38% of the world's grain production (70% in USA)
8. Livestock use up more than half of the available freshwater in the United States, mostly for growing crops used for feed.
9. Livestock are responsible for 14% of the United States' topsoil loss.
10. If everyone became a vegetarian, world oil reserves would last another 260 years instead of the projected 40 to 80 years.
11. Cattle produce 12-15% of the world's methane.
12. Livestock are producing 21 times more feces than people, but fortunately, one-half is recycled back into the soil.

MAJOR TYPES OF FOOD PRODUCTION

A. INDUSTRIALIZED

INDUSTRIALIZED (HIGH INPUT) AGRICULTURE- uses large amounts of fossil fuel energy, water, commercial fertilizers, and pesticides

PLANTATION AGRICULTURE – a type of industrialized agriculture practiced in developing countries in which cash crops such as bananas and coffee are grown by large corporations.

B. TRADITIONAL

TRADITIONAL SUBSISTENCE AGRICULTURE-uses human labor or draft animals to produce only enough food for a farm family's survival.

1. Family farms
2. Shifting (slash and burn) cultivation (#1 cause of rainforest loss)
3. Nomadic herding of livestock

TRADITIONAL INTENSIVE AGRICULTURE- farmers increase their inputs of human and animal labor, fertilizer, and water to get a higher yield per area of cultivated land to produce enough food to feed their families and to **sell for income**.

The Impacts of Agriculture on the Environment

- I. Ten thousand years ago agriculture permanently changed the way in which humans interact with the natural environment.
 - A. Farming abolished the hunter/gather way of life.
 - B. Farming provided extra food which led to specialization and the development of human culture.
 - C. Natural habitat was destroyed in order to make room for growing crops and building cities
- II. In the 1950's and 1960's the Green Revolution based on industrial agriculture which used petroleum products, pesticides, inorganic fertilizers, and high-yield varieties of grain greatly increased the world output of food

1st → 1950 – 1970

2ND → 1967 – 1998 fasts growing, high yielding

1950 – 1984 world tripled food productions by 40%

3rd bioengineering – high-yield plants
disease resistant plants
salt tolerant
drought resistant
nitrate producing
energy efficient
tolerate poor soils

We now produce enough food to feed everyone on earth – if there were no political restraints plus everyone were vegetarians

Food

30,000 plants species edible

- only 15 plants plus 8 animal species supply 90% of the worlds food
- wheat, rice, corn plus potato make up over half of the worlds food production

industrial agriculture → use 8% worlds oil but saves virgin land

44% to 1.8% of U.S.A people are farmers

3 units of fossil-fuel energy if animals are included → unit of food energy

10 units → 1 unit

if you include transportation

livestock – eat up 38% of world's grain
production (70% to U.S.A)

use up more than ½ of the water in the U.S.A., mostly for growing grains as a source of food

livestock → 14% of U.S topsoil loss

- If everyone became a vegetarian, world oil reserves would last 260 years instead of 40-80 years
- Cattle produce 12-15% of worlds methane
- Livestock are producing 21 times more feces than people than humans, But ½ is recycled back into soil

Food productions

2025 → 8.2 billion people will need to double food productions from 1995 to 2050 plus people need to become vegetarians.

PROBLEMS WITH PESTICIDES

- **Genetic resistance** – Since most pests have large populations and short-life spans (many generations over a short period of time) they can quickly develop resistance to pesticides. (over 500 species of pests have developed resistance to one or more pesticides).
- **Ecosystem in-balance** – Pesticides kill off beneficial predators, as well as, undesirable pests. This means that new pests will be created because their natural predators are no longer in the ecosystem. (Less than 5% of a pesticide will reach its intended target)
- **Biological magnification** – Since they are often persistent and mobile, pesticide residues concentrate in organisms at the top of the food chain.
- **Bioaccumulation** – Individual organisms can accumulate pesticides in their bodies over time leading to diseases such as cancer and to endocrine disruption.
- **Endocrine Disrupters** - Pesticides can attach themselves to biochemicals produced by the endocrine system of animals. This can drastically effect the physiology and behavior of animals.

Rachel Carson – Wrote one of the most famous environmental books of all time entitled ***Silent Spring (1962)***. In the book she wrote about how the pesticide DDT was accumulating in song birds and killing them off. This drew national attention to the problem of pesticides in the environment and led to legislative action