Agriculture, biotechnology, and the future of food

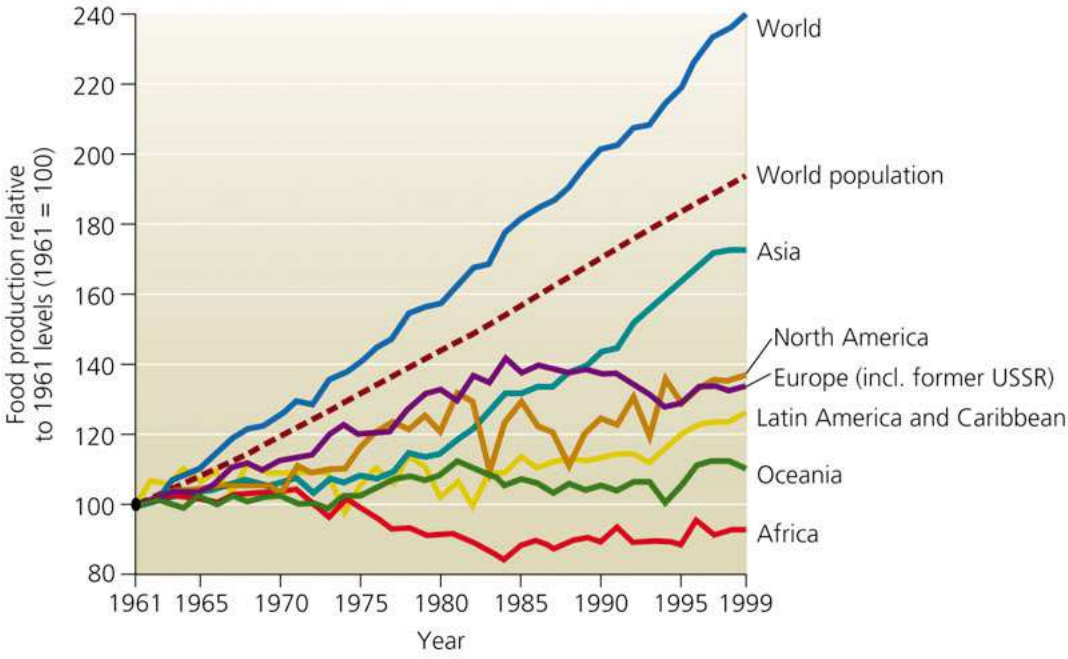
Chapter 9

The Race to Feed the World

- For every two people living today, there will be three in 2050.
- The kind of world we live in then will depend on the choices we make now, and some of our most important choices involve our means of producing food.
- Perhaps the answer lies in genetically modified crops, or perhaps in organic farming and sustainable agriculture.

Agriculture production and population increase

- Our ability to produce food has grown even faster than has global population.
- Due to political obstacles and inefficiencies in distribution, almost 800 million people in developing countries do not have enough to eat.



Food Security

- Agricultural scientists and policymakers pursue a goal of food security – an adequate, reliable, and available food supply to all people at all times.
- Whether a food supply is sustainable depends largely on maintaining healthy soil, water and biodiversity.

Food Security

- We have increased our ability to produce food.
- This is being done by devoting more energy to agriculture; by planting and harvesting more frequently; by increasing the use of irrigation, fertilizer, and pesticides; by increasing the amount of cultivated land; and by developing more productive crop and livestock varieties.

Dietary Problems

- Some people do not have enough food to stay healthy, others are affluent enough to consume far more than healthy.
- Undernourished people receive less than 90% of their daily caloric needs and live mostly in developing countries.
- People who suffer from overnutrition, receive too many calories each day, live largely in the developed world.
- Malnutrition, the lack of nutritional elements the body needs, including a complete complement of vitamins and minerals, can occur in both undernourished and overnourished individuals.

Diseases Associated with Nutrition

- 1) Marasmus
- 2) Kwashiorkor
- 3) Xerophthalmia
- 4) Rickets
- 5) Anemia
- 6) Defective blood clotting
- 7) Beriberi
- 8) Scurvy
- 9) Cretinism
- 10) Goiter
- 11) Pellagra
- 12) Obesity
- 13) Diabetes (type 2)

The Green Revolution

- A program of the mid and late 20th century to find a way to produce higher quantity and quality food
- Purpose was to increase crop output per unit area – more efficient land and techniques
- Began with a new breed of wheat in the 1940s that produced 5x as much product, while resisting wind and disease.
- Other LDCs followed path by planting breeds of rice and wheat that were much more successful

The Good and the Bad

- Advantages
  - Saved millions from starvation
  - Can reuse cultivated land, instead of cutting down trees to make more farmland, slowing the rate of deforestation and helping keep higher numbers of biodiversity
- Disadvantages
  - Extensive use of water, fertilizers, pesticides and fossil fuels caused pollution, salinization, and desertification
  - Monoculture has decreased biodiveristy and narrowed the human diet

The future of the Green Revolution

- Overall food production has outpaced human population growth, but grain crops have declined under the world's need.
- Land is less productive, therefore grains do not grow as well
- Though food security is based on distribution, it may eventually become driven by production
- Solutions: genetic engineering, organic agriculture