Historical Perspectives

Farming in the olden times

-**Agricultural practices** (from Roman books)

- Crop rotation
- Manure application
- Green manure
- Tillage
- Use of lime
- Growth of legumes for soil improvement

-**traditional(natural) farming**

no synthetic check for chemicals, practiced for thousands of years

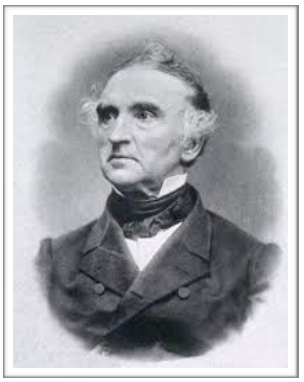
-**industrial revolution**

- Introduced inorganic methods
- Conventional farming —>used synthetic chemical fertilisers and pesticides

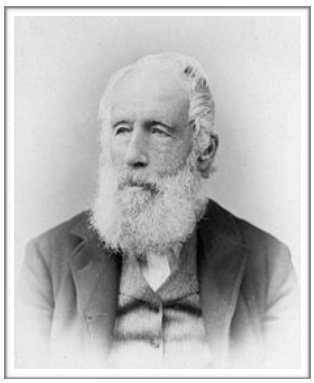
PRE-WORLD WAR II

- first 40 years of 20th century—rapidly changed farming
  - **gasoline-powered engines**
  - **reduced need for farm labor**
    - improved plant varieties
    - labor-saving machinery
    - chemical fertilisers and pesticides

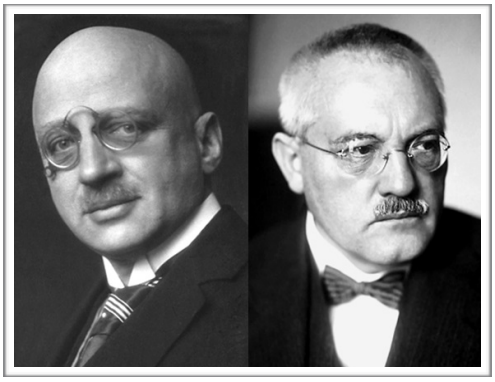
-farmer population —decreasing
  - bigger fields, more specialised cropping



Justus von Liebig:
•German chemist
•Father of chemical fertiliser - promoted importance of adding inorganic minerals as plant nutrition
•Law of the minimum - growth controlled not by total amount of resources available but by the scarcest resource (limiting factor)



Sir John Lawes:
•Produced super phosphate
•&Sir Joseph Gilbert -Rothamsted Research Station: investigates impacts of inorganic and organic fertilisers in crop yields



Haber and Bosch
•Developed process that converts nitrogen gas into ammonia
-NH_4NO_3 - nitrate fertiliser
-Organophosphatesphate nerve gas - insecticides
-DDT - pesticide

AFTER WORLD WAR II

- widespread use of DDT
    - Insect became resistant
    - Chemicals did not decomposed rapidly, persisted in environment
    - Banned in many countries
    - “Silent Spring” Rachel Carson

-**biomagnification** - when chemical become concentrated in tissues as they move up the food chain

- Fat soluble chemicals
- Long life span
- Biologically active

- pesticide overuse.

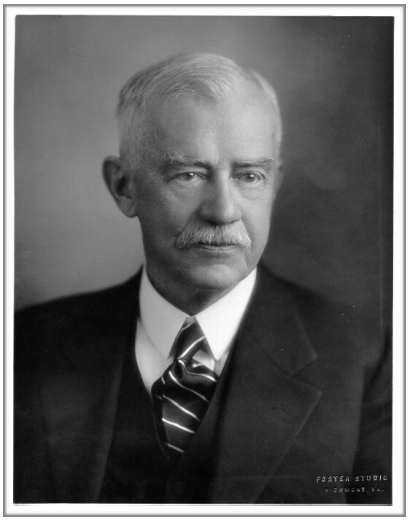
The green revolution 1960’s

- increase in crop production
    - New high-yielding varieties
    - Controlled irrigation
    - Chemical fertiliser
    - Chemical pesticides
    - Machinery
- consequences of orienting toward economic profit
    - Increased yield
    - Negative impact on farmers and environment
    - Lead to **monoculture cropping system**
    - Lead to **loss of genetic diversity**

PROBLEMS WITH CHEMICAL FARMING

- Decrease in soil fertility
- Need to use more chemical fertilisers every year (pesticide resistance)
- Increase in disease and pest problems
- Contaminated water
- Contaminate produce

MODERN ORGANIC FARMING



- **Sir Albert Howard**: "Father of modern organic agriculture"
•An Agricultural Testament: problems of plant diseases, soil erosion under chemical agriculture

- **Natural farming**:
  - No-till system for small-scale grain production
  - Principles:
    - no plowing
    - no chemical Fertilisers
    - no pesticides
    - ducks, carps helps eat pests and slugs
    - ground covers using straw from previous crop as mulch
- **Kyusei(saving) nature farming**
  - Effective microorganisms (EM) to improve soil's production power

Lower cost to farmer
Inputs made from natural materials
Higher yield
High quality food
Sustainable, easily practiced

ORGANIC AGRICULTURE

- Crop rotation
  - Avoid buildup of pathogens and pests when continuously cropped
  - Balance fertility demands
  - Impove soil structure and fertility alternate deep-rooted & shallow-rooted plants
  - Replenish nitrogen - grow legumes or use green manure

Organic gardening principles

- no chemicals
- Use biologycal pest control
- Weeds controlled mechanically and through covers crops and mulch
- Rely on crop rotation, crop residues, manures, compost to maintain soil productivity
- Grow variety of crops rather than 1