The Green Revolution in India

Importance of an Individualized Approach

With many thanks to Anna Jungbluth, Bhupendra Khetani, Bashar Zeitoon, Jorge Phillips
Indian Agriculture Pre-Green Revolution

- **Rule of the British Raj** (Acharya)
  - Indian cereal grain supply dependent on Britain/trade (Arnold-Baker)
  - Most cannot afford high trade prices (Acharya)
  - Bengal Famine—1943 (Arnold-Baker)
    - Trade difficulties cause rice shortage (Arnold-Baker)
    - News of difficulties lead to hoarding ("Global Governance")
    - Raised prices ("Global Governance")
    - 1 million people die (Arnold-Baker)

- **Independence—1947**
  - Food Shortages (Acharya)
  - Government tries to make grain supply self-dependent (Acharya)
Crops

- From low-yield, diverse system, to high yield, high concern

- Rice, wheat, jowar, bajra, barley, maize,

- **Wheat no. 8156** (Rajaram)
  - Better growing season and yield (Rajaram)
  - Requires fertilizer (N) (Rajaram)
  - Reduction biodiversity

- **Rice T(N)-1** (“Agriculture”)
  - Strains the soil (Sangha)
  - Water requirement (“Agriculture,” Sangha)
Worked example of a tailored approach based on research of inputs, outputs, and country-specific resources.

Environmental concerns—excessive use of water, fertilizer and pesticide, and burning of crop stumps

- Major input costs—fertilizers, pesticides and labour
- Environmental concern—burning wheat stumps, fertilizers and pesticides residues
- Outputs: rice yield, straw for ropes, or rarely for cattle feed
- Conventional way (at least 70% of the land area in Punjab)

Winter crop: Wheat
- Outputs: grain yield, wheat straw for cattle feed

Summer crop: Rice
- Major input costs—fertilizers, pesticides and labour, tillage, and water use

Environmental and social benefits—stubble for soil improvement, less water usage, work opportunities for people
- ST system (applying scientific and traditional knowledge)
- Outputs: yield, offsite effects: markets at village level, work opportunities

Winter crop: Wheat
- Major input costs—fertilizers, pesticides and labour
- Outputs: grain yield, wheat straw for cattle feed

Summer crop: Maize Mung beans
- Major input costs—labour, and herbicides (if needed)
- Environmental benefits—retaining wheat stumps, minimum tillage

Sanghal, 338, fig. 5.
Technical Focus: Irrigation

❖ Colonial times “Maddison”
  ➢ Canals and irrigation channels mainly used for poppy fields
  ➢ Emphasis on cash crops decreases production, leads to famine

❖ The need for innovation in irrigation (“The Green Revolution”)
  ➢ One rainy season: monsoon
  ➢ Only one growing season

❖ Irrigation projects of the Green Revolution
  ➢ Various undertakings: water channels, dams
  ➢ Permitted double-cropping (“the Green Revolution”)

❖ From 1947 to now (Dehadrai)
  ➢ Potential irrigated land has tripled as of 2001
  ➢ Actual net irrigated land is much less

Maddison, A. (1970), The historical origins of Indian poverty, PSL Quarterly Review, 23(92), pp. 31-81 cite “maddison”
Technology Systems

❖ Rural electrification (Mondal)
  ➢ 86% Indians villages electrified by 2004

❖ Infrastructure (Mondal)
  ➢ Road network in the rural connected villages with markets

❖ Farm mechanisation (Mondal)
  ➢ Reduced human labor
  ➢ Expedited operation
  ➢ Increase productivity and efficiency

Graph Source: (CURRENT STATUS)
Public Policy

❖ Command Area Development (CAD)-1975 (Mondal)
  ➢ Enhanced the use of irrigation potential & water management
  ➢ Road improvement
  ➢ Afforestation & erosion control
  ➢ Project organization buildings & minor flood protection
  ➢ Agricultural research
  ➢ Training of staff in on-farm development

❖ Agricultural Credit (Mondal)
  ➢ Pro: Federal loan for farmers
  ➢ Con: Failed to meet the needs of small and marginal farmers

❖ Agricultural Prices Commission (Sharma)
  ➢ Pro: Established minimum procurement prices
  ➢ Con: Reduced competition and restricted the market
Socioeconomic Effects

❖ Dramatic increase food production:
   ➢ India is second largest rice exporter ("Hunger in India")

❖ Rapid industrialization of economy widens the income gap between landless laborers and landowners. (Frankel 98) (Sen 103)
   ➢ Laborers suffer: replaced by machines
   ➢ Government policies support large landowners’ production of food
     ■ do not support laborers or small landowners
   ➢ Landowners benefit

❖ Mass poverty causes malnourishment ("Executive Summary")
   ➢ 15.2% of the modern Indian population undernourished ("Hunger in India")
   ➢ Due to poverty related living conditions and diet, 3000 Indian children die every day ("Hunger in India") ("Executive Summary")
Environmental Effects

- High yield crops depleted soil nutrients (Rahunvanshi, Zwerdling)
- Irrigation systems
  - More dependable growing seasons (Mondal)
  - Irrigation systems required more water for farming (Zwerdling,)
- Improper handling of chemicals, fertilizers, pesticides
  - polluted the water and possibly led to increase in health problems (Pepper)
- Greater demand for land for farming
- Decrease biodiversity in crops (Rajaram)
In Conclusion: production target reached, at what cost?

❖ Changes need to be tailored to each country
   ▶ Crop rotation
   ▶ irrigation systems & sprinkler systems
   ▶ transportation of yield
   ▶ more self-sufficient farmers through policy
   ▶ Soil health, biodiversity, and pollution

❖ Consensus
   ▶ The green revolution in India worked in regards to the desire to produce more food, but failed in the distribution of the food and maintaining the health of the soil.
“Indian Agriculture”


“Crops”


“Irrigation”

- http://www.fao.org/docrep/007/y5082e/y5082e08.htm
Works Cited (continued)

“Technology Systems,” “Public Policy,” “Socio-Economic Effects”

“Environmental Effects” (All accessed 9/17)