Technology Change in Agriculture - Section 1
Definition of Green Revolution

HYV’s of Staple Food Grains

Characteristics
• early maturing
• dwarf and semi-dwarf
• responsive to fertilizer and water
• for optimum yield require:
  chemical inputs
  special cultivation practices
• neutral to scale
• land-saving

Estimated area of high-yielding varieties of wheat and rice as a proportion of total area in developing nations in 1982-83.

<table>
<thead>
<tr>
<th>Region</th>
<th>Wheat</th>
<th>Rice</th>
<th>Wheat and Rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asiaa</td>
<td>79.2</td>
<td>44.9</td>
<td>54.6</td>
</tr>
<tr>
<td>Near East</td>
<td>30.6</td>
<td>8.4</td>
<td>29.6</td>
</tr>
<tr>
<td>Africa</td>
<td>50.6</td>
<td>4.7</td>
<td>13.3</td>
</tr>
<tr>
<td>Latin America</td>
<td>77.6</td>
<td>32.9</td>
<td>59.0</td>
</tr>
<tr>
<td>Subtotal</td>
<td>60.9</td>
<td>41.6</td>
<td>49.8</td>
</tr>
<tr>
<td>Communist Asiab</td>
<td>30.6c</td>
<td>81.0</td>
<td>58.0</td>
</tr>
<tr>
<td>Total</td>
<td>51.9</td>
<td>53.6</td>
<td>52.9</td>
</tr>
</tbody>
</table>

a Excludes Taiwan.
b Excludes North Korea.
c Incomplete estimate of proportion of varieties of less than 100 cm in China.

Yield Changes in the Punjab

<table>
<thead>
<tr>
<th>Year</th>
<th>Wheat</th>
<th>Rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965-66</td>
<td>1.24 tons/ha.</td>
<td>1.0 tons/ha.</td>
</tr>
<tr>
<td>1980-81</td>
<td>2.73 tons/ha.</td>
<td>2.74 tons/ha.</td>
</tr>
</tbody>
</table>
Factors Influencing Adoption

Initial and over time
- Farm size and tenure status
Effects on
- Labor, both hired and landless
- Land and landowners
- Capital and capital owners
Regional Impacts
- Distributional effects
  Are disparities narrowed or widened?

Who were the Early Adopters?

TWO CHARACTERISTICS
1. Larger farmers
2. In areas with most favorable conditions

Green Revolution Problems

- Marketing system - inputs and outputs
- Seed characteristics
- Small farmer risk aversion
- Fixed costs of adoption
  Monetary and time costs
  “Costs” of acquiring credit
  Transactions costs
- Distribution of the benefits
  Equity, welfare

Seven Generalizations on
Green Revolution Results

1. Adopted where most suited
2. Size and tenure not a constraint
3. Size and tenure don’t influence productivity
4. Labor demand increases
5. Landowners gain more than laborers
6. Regional disparities widen
7. Consumers benefitted
Distribution of Green Revolution Gains: Example from India

Rice Production  ↑  22%
Real Income of Owners  ↑  14%
Real Income of Tenants  ↑  17%
Real Income of Landless Laborers  ↑  14%

Expanding the Green Revolution
1. Adapting varieties to less-favored areas
2. Breeding for other characteristics
3. Focus on a wider variety of crops
4. Technology to help the poor