Transfer of Technology
Section 1

Issues in Technology Transfer

1. Characteristics of the technology
   - Efficiency
   - Effect on different inputs

2. Process of transferring and forces leading to adoption

3. Impacts
   - Production
   - Distribution

4. Macro vs micro views
   - Macro - aggregate, national aspects
   - Micro - farmer or village level

Factor Bias of New Technology

Labor intensive (Labor using)   Labor saving (Land using)
Land saving (Land intensive)

World Expenditures on Ag Research vs. Value of Ag Production, by Income Group, 1974

<table>
<thead>
<tr>
<th>Group</th>
<th>Per cap. y (U.S. $)</th>
<th>Ratio Res. Expend. to Value of Ag. Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>&gt; 1750</td>
<td>2.55%</td>
</tr>
<tr>
<td>II</td>
<td>1001-1750</td>
<td>2.34%</td>
</tr>
<tr>
<td>III</td>
<td>401-1000</td>
<td>1.16%</td>
</tr>
<tr>
<td>IV</td>
<td>151-400</td>
<td>1.01%</td>
</tr>
<tr>
<td>V</td>
<td>≤ 150</td>
<td>.67%</td>
</tr>
</tbody>
</table>
Two Most Serious Constraints to 3rd World Agriculture (Hayami & Ruttan)

1. Limited Industrial Capacity to Produce Mechanical Technology
2. Limited Local Research Capacity to Develop Biological Technology

Three Phases in International Technology Transfer (and role of local research system)

1. Material transfer
2. Transfer design of the new technology
3. Transfer knowledge and capacity to produce locally adaptable technology

Keys to Generating Locally Adapted and Economically Viable Technology

1. Transfer of Knowledge
2. Local Capacity to Use and Adapt Knowledge

Adoption Rates for Packages of New Practices with New Seed

<table>
<thead>
<tr>
<th>Crop</th>
<th>Entire package (4 practices)</th>
<th>Seed &amp; Chemical Fertilizer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheat</td>
<td>9%</td>
<td>77%</td>
</tr>
<tr>
<td>Rice</td>
<td>17%</td>
<td>90%</td>
</tr>
<tr>
<td>Jowar</td>
<td>56%</td>
<td>71%</td>
</tr>
</tbody>
</table>

Profit = [m]r - [m]c - risk - uncertainty - learning costs - search costs
Adoption of New Wheat Variety

<table>
<thead>
<tr>
<th>Results</th>
<th>Change PI/ha.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Practice A: shifts from LYV to HYV</td>
<td>Slight</td>
</tr>
<tr>
<td>Practice B: apply optimum fertilizer to LYV</td>
<td>Higher</td>
</tr>
<tr>
<td>Practice C: apply optimum fertilizer to HYV</td>
<td>3 times &gt; ‘B’</td>
</tr>
</tbody>
</table>
Comparison of Yield Increase, Marginal Rate of Return on Capital and Risk of the Three Biochemical Technological Components

V = Use of Improved Varieties (Apizaco, Cerro Prieto, Centinela, Puebla)
H = Use of Herbicide (1 lt/ha Esteron 47)
F = Use of Fertilizer (80 kg/ha and 45 kg/ha of Nitrogen in Wet and Dry Zone, Respectfully

Source: Based on results from on-farm experiments, 1976-80

1 Calculated from 1980 prices.
2 Net return calculated in 20% of experiments with lowest returns. Monetary returns converted to kg/ha of grain at 1980 prices.
Adoption pattern depends on:

- profitability
- riskiness
- divisibility, or initial capital required (appropriate technology)
- complexity
- availability
- credibility of the information (reduces risk and uncertainty)