Distribution of Benefits and Adoption of Bt Cotton in Pakistan: Ex-ante Analysis

Hina Nazli, Rakhal Sarker, Karl Meilke
Department of Food, Agricultural and Resource Economics, University of Guelph, Guelph, Canada
David Orden
International Food Policy Research Institute, Washington D.C, USA


Copyrights 2010 by H. Nazli, R. Sarker, K. Meilke, D. Orden. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided this copyright notice appears on all such copies.

Contact : Hina Nazli  Email: hnazli@uoguelph.ca  Phone: 519-824 4120 x 53427
Introduction

• Among the four largest cotton producing countries, Pakistan is the only one that has not commercially adopted GM cotton.
• The Government of Pakistan (GOP) has been negotiating with Monsanto for the latest GM cotton seed since May 2008.
• These negotiations have remained inconclusive due to a disagreement over the technology fee.
• The GOP argues that a high technology fee will transfer all of the benefits of GM cotton to Monsanto leaving none for cotton growers.
• Empirical evidence from other developing countries indicates that farmers receive a larger share of the benefits from GM cotton than the technology innovators.

Objectives

• Research gap:
  − There is little empirical analysis to provide estimates of the size and distribution of potential benefits and expected costs of adopting GM cotton in Pakistan
• Objective
  − To examine the potential economic impacts of introducing GM cotton in Pakistan by conducting an ex-ante evaluation of the size and distribution of economic benefits among producers, consumers, and technology innovators

Methods

• Adjusted Economic Surplus Model (Alston et al., 1995; Moschini and Lapan, 1997; Falck-Zepeda et al., 2000)
• Four hypothetical scenarios are developed and simulated:
  − commercial adoption of varieties developed by the private sector in Pakistan;
  − commercial adoption of hybrid seed imported from India;
  − commercial adoption of the latest GM technology; and
  − irregular adoption of latest GM technology
• Values of parameters are based on interviews with experts
• Risk and uncertainty is incorporated by replacing single-point values with probability distributions for selected parameters

Variable Assumptions

<table>
<thead>
<tr>
<th>Variables</th>
<th>Scenario 1</th>
<th>Scenario 2</th>
<th>Scenario 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield change (%)</td>
<td>0.15, 0.25</td>
<td>0.22, 0.35</td>
<td>0.30, 0.40</td>
</tr>
<tr>
<td>Change in Pest expenditure (%)</td>
<td>0.10, 0.15</td>
<td>0.13, 0.30</td>
<td>0.20, 0.35</td>
</tr>
<tr>
<td>Seed premium (US$/hectare)</td>
<td>6.8, 10</td>
<td>34.40, 49</td>
<td>27.32, 42</td>
</tr>
<tr>
<td>Adoption rate (%)</td>
<td>50.65, 80</td>
<td>50.70, 90</td>
<td>50.70, 90</td>
</tr>
<tr>
<td>Diffusion path (yrs)</td>
<td>21</td>
<td>21</td>
<td>22</td>
</tr>
<tr>
<td>R&amp;D cost (US$)</td>
<td>200,000</td>
<td>90,000</td>
<td>1,200,000</td>
</tr>
<tr>
<td>Cost of TF (US$)</td>
<td>-</td>
<td>-</td>
<td>655,389,100</td>
</tr>
</tbody>
</table>

Results: Benefits-Cost of Adoption

Results: Impact of Technology Fee

Results: Irregular Adoption and Economic Benefits

Conclusions

• The commercial adoption of Bt cotton can result in substantial benefits to producers and consumers
• Despite a decline in price, the share of the benefits going to farmers is significant
• Contrary to popular belief, the share of benefits to innovators is small

Policy Implications

Despite the high technology fee, the total gross benefits are higher than the cost to the GOP.

− Pakistan should adopt the latest Bt cotton technology

Fluctuating adoption rates can reduce the economic benefits. Therefore:

− address several technical and institutional issues (easy access to agricultural inputs and credit, proper training to use GM technology, extension, etc.)

References


Acknowledgements

− Institute for Society, Culture and Environment, University of Virginia Tech, Alexandria, Virginia, USA
− Innovative Development Strategies, Islamabad, Pakistan
− Pakistan Agricultural Research Council, Islamabad, Pakistan
− Pakistan Institute of Development Economics, Islamabad, Pakistan