

## Estimating the impact of *Bt* eggplant in Bangladesh

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# Introduction

- ▶ Meeting an increasing demand for food arising from growing population has been one of the major challenges faced by developing countries such as Bangladesh.
- ▶ This particularly is worsened by the pest-infestation in certain crops such as eggplant.
- ▶ The crop has been pesticide-intensive due to heavy infestation by several insect pest species notably fruit and shoot borer (FSB) (Islam and Norton, 2007).
- ▶ Negative impacts on environment and health arise from continued or overuse of pesticides in the traditional farming practices.
- ▶ Consequently, the desirable technology is the one that reduces or eliminates any or all of the above problems (Barrows et al., 2014).
- ▶ Genetically engineered (GE) crops in agricultural research community is regarded one of the long-term solutions to some of these problems (Barrow et al., 2014; Napasintuwong, 2010).

- ▶ Bangladesh approved commercial farming of *Bt* eggplant in October 2013 (the first crop for human consumption in Asia), 29th among the GM-approving countries.
- ▶ The technology (*Bt*) is new to the country, but the government has expanded research on other possible food crops such as golden rice, and potato.
- ▶ As a result, it is important to understand the economic impact of the first *Bt* crop - *Bt* eggplant - farming.
- ▶ This is in particular important as such understanding might inform policy on other *Bt* crops.
- ▶ We conduct an economic impact evaluation of *Bt* eggplant adoption in Bangladesh, particularly on *price, yield, costs, pesticide application intensity, and profit.*

## Price effect of *Bt* adoption

- ▶ Existing literature reports that farmers are able to achieve a significant yield and supply impact of GE crops adoption (Barrows et al, 2014).
- ▶ Consequently, adoption of GE variety leads to shifting the aggregate supply curve, which in turn reduces prices and welfare gain (Brooks and Barfoot, 2013).
- ▶ The literature on the price effects of GE crops suggest that GE crops lower the price for two reasons – rightward shift in the supply curve due to both intensive and extensive margins (Barrows et al., 2014b) and consumers' lower willingness to pay (WTP) (Lusk et al., 2005).
- ▶ However, WTP for GE product is higher than WTP for non-GE in case the GE products provide tangible benefits such as increased nutrition to consumers (Colson and Huffman, 2011).
- ▶ That is, the prices are higher if the higher quality effect dominates the increased supply effect.
- ▶ **What the findings are on *Bt* eggplant on?:** Price of *Bt* is higher than non-*Bt* eggplant at both retail and wholesale levels. (Ahmed et al., 2019; Shelton et al., 2020).

We find that *Bt* eggplant adoption

- ▶ increases by 25% that is similar to two other studies available (Ahmed et al., 2019; Shelton et al., 2020)
- ▶ Total costs do not vary across adoption status, but *Bt* variety adoption reduces pesticides cost significantly
- ▶ Reduced pesticide costs are due to significant reduction in intensity of pesticide application (by 28%)
- ▶ Finally, *Bt* farmers enjoy 49% increased profit compared to their non-*Bt* counterparts.

# Conclusion

- ▶ Unlike other *GE* crops, quality attribute of *Bt* eggplant dominates the supply effects leading to an increased price for the *Bt* variety.
- ▶ Adoption of *Bt* eggplant increases yield, and profit.
- ▶ While total costs remain unchanged, *Bt* technology reduces pesticides costs through substantial reduction in application intensity.
- ▶ Despite there are challenges, adoption of *Bt* eggplant has potentials to improve food security in food-insecure countries.
- ▶ It also has potential to improve farmers' health and environmental quality that are associated with the agricultural practice.

Thank you!  
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