

## Advancing Agricultural Innovation and Trade through New Plant Engineering Techniques

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### HIGHLIGHTS

- New Plant Engineering Techniques (NPETs), including genome editing, offer significant opportunities for improving agricultural products.
- Consumer acceptance varies across regions, influencing the potential market success of NPET-improved products.
- Regulatory heterogeneity between countries may hinder R&D investment in NPETs and limit international trade of NPET-improved goods.
- A case study on hypothetical genetically edited apples demonstrates the impact of regulatory decisions and consumer preferences on trade and welfare.
- Import bans and high sunk costs can reduce R&D investment in NPETs, leading to suboptimal levels of innovation.

**New Plant Engineering Techniques (NPETs) have the potential to revolutionize agriculture and enhance global food security.**

**Their success depends on consumer acceptance, regulatory coherence, and supportive trade policies. Policymakers and stakeholders should work together to create an environment conducive to innovation while addressing public concerns about NPETs. By promoting education, harmonizing regulations, and carefully evaluating trade policies, countries can foster the development and acceptance of NPET-improved agricultural products, leading to a more sustainable and productive global food system.**

### INTRODUCTION

New plant engineering techniques (NPETs) refer to recent developments in tools used in biotechnology. NPETs can result in improvements such as increased resistance to biotic and abiotic stresses or improved food and feed quality.

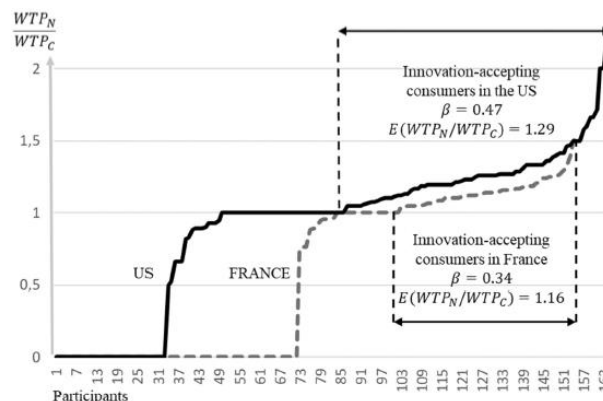
The agricultural sector is increasingly looking towards NPETs, such as genome editing, to enhance food production and quality.

This policy brief synthesizes findings from a study that explores the economic and trade implications of NPETs, using a model that integrates consumer preferences, R&D investment uncertainty, and international trade policies.

The study employs a three-stage game theoretical model to simulate R&D investment decisions in the context of international trade. The model considers consumer willingness to pay (WTP), the uncertainty of R&D success, regulatory costs, and trade policy heterogeneity.

A case study of genetically edited apples, which are hypothesized to not brown when sliced, provides a practical application of the model. Experiments conducted in the U.S. and France inform the consumer WTP data, which is then integrated into the model to assess the market and welfare impacts of NPET-improved apples entering the market.

Willingness to pay (WTP) expressed for improved apples relative to WTP expressed for conventional apples



## MAIN RESULTS

- Consumers in different regions exhibit varying **degrees of acceptance** and WTP for NPET-improved products.
- **Regulatory divergence** across countries can disincentivize R&D, affecting the introduction of NPET-improved foods.
- The potential for NPET-improved products to succeed in the marketplace heavily relies on **consumer education and regulatory harmonization**.
- **Import bans** negatively affect R&D investment decisions, reducing the likelihood of NPET innovation.
- The **case study on apples** suggests that while some consumers value NPET improvements, others may discount such products, underscoring the need for targeted information campaigns.

## POLICY RECOMMENDATIONS

1. **Foster Consumer Education:** Implement educational initiatives to increase consumer understanding and acceptance of NPET-improved products.
2. **Harmonize Regulations:** Encourage international harmonization of NPET regulations to facilitate trade and maximize the benefits of agricultural innovation.
3. **Support R&D Investment:** Provide incentives for R&D in NPETs, including public funding and streamlined regulatory processes.
4. **Monitor Consumer Preferences:** Continuously assess consumer preferences to guide the development and marketing of NPET-improved products.
5. **Promote Transparent Labeling:** Develop labeling standards that clearly communicate the use of NPETs in food production to informed consumers.
6. **Evaluate Trade Policies:** Assess the impact of trade restrictions on NPET-improved goods and consider adopting reciprocal trade policies that support innovation.