

## **Tomato Grafting for Improved Rainy Season Nutrition and Income**

**SIIL Project:** Women in Agriculture Network (WAgN)-Cambodia: Gender- and Ecologically-Sensitive Agriculture

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### **The issue:**

Tomatoes are difficult to grow during Cambodia's monsoonal rainy season. Flooding, waterlogged soils, diseases, and high temperatures can kill young tomato transplants or significantly reduce yields.

The vast majority of tomatoes found in the marketplace and used by restaurants and hotels during the May-October rainy season are imported from neighboring countries, commanding a premium price.

### **What was accomplished:**

Grafting tomato scions onto selected rootstocks of eggplant (Figure 1) can minimize problems caused by flooding and soil-borne diseases. Sometimes the use of grafted tomato plants can be the difference between harvesting a good crop and harvesting no crop at all.

The research team first evaluated and determined the best rootstock selections that offered the highest degree of resistance to flooding, fusarium wilt, bacterial wilt, and root knot nematodes – the most serious tomato pests present during the rainy season (Figure 2).

Prior to this project, tomato grafting was untested and relatively unknown to farmers and agricultural development workers in Cambodia. The team implemented a series of 'hands-on' training workshops spanning over two years, and strategically targeted women farmers, entrepreneurs, and NGO staff (Figure 3).

Outreach activities, demonstrations, and promotion to key stakeholders was critical for creating a strong and broad foundation for scaling up this important sustainable intensification technology (Figure 4).

### **Why is it important:**

Small farm diversification is critical to creating resilient food systems, particularly in countries like Cambodia, that are highly susceptible to the ills associated with climate change. Vegetable grafting technology is a powerful tool to improve food production at one of the most challenging times of the year.

Additionally, home vegetable production and marketing remains a feminine enterprise in Cambodia. Development of a 'rainy season vegetable production toolkit', including tomato grafting, promotes women empowerment via increased market access and participation (Figure 5).

**Who will benefit:**

Grafted tomato production provides an entry point into local lucrative produce markets for smallholder women during the rainy season, and has the potential to improve both nutritional and economic outcomes.

Added household income from increased market participation also holds the potential to directly benefit children by improving access to education, health care, and nutritious food.

**The impact:**

This project represents longstanding collaboration between researchers at Penn State University, the University of Tennessee, and key Cambodian collaborators.

Three disease-resistant eggplant rootstocks were tested and identified from the World Vegetable Center's germplasm resources, along with a local eggplant landrace. The University of Battambang engaged graduate students in both grafting research and assisting with crucial outreach and training activities. CE SAIN (Center of Excellence on Sustainable Agricultural Intensification and Nutrition) has established tomato grafting demonstration plots at several of its technology parks.

Tomato grafting is now a proven SI technology to aid Cambodia's effort to improve food security. Rural women farmers have adopted the technology and locally-grown tomatoes are now present in the marketplace – even during the rainy season.



Figure 1. Market-demanded tomato scion grafted onto disease-resistant eggplant rootstock.



Figure 2. Grafted tomato survives waterlogged soils and periodic flooding while still maintaining high yields.



Figure 3. Teaching tomato grafting techniques at 'Train-the-Trainer' workshops.



Figure 4. Promoting tomato grafting to improve farmer income and household nutrition – the Minister of Agriculture, Forestry and Fisheries observes grafting demonstration.



Figure 5. Smallholder farmer reaps the rewards from grafted, market-demanded tomatoes.