TRAINING FOR SAFE OFF-SEASON VEGETABLE PRODUCTION

Growing vegetables in the off-season can increase supplies in lean times for customers. Is the risk worth the effort for farmers?

Rain shelters and specially bred varieties allow farmers in southwestern Bangladesh to produce vegetables such as tomatoes in the hot, wet summer—the off-season, when supplies are low and prices are high. Since 2012, AVRDC – The World Vegetable Center has trained hundreds of farmers to apply these technologies through a United States Agency for International Development (USAID) project.

A recent evaluation quantified the effect of the training on technology adoption, income, and also on farmers' use of pesticides, as pests and diseases are a particular problem during off-season production. Farmers who had participated in the training had a net household income in the off-season that was 48% higher that of non-trained farmers, but the trained farmers also used considerably more pesticides than the non-trained farmers. This finding highlights that for safe off-season crop production, training must emphazise sustainable pest management methods.

Introduction

Increasing off-season vegetable production is part of the effort to diversify rice-reliant agriculture in Bangladesh. Farmers who produce tomato, eggplant and other high-value vegetable crops during the hot and humid *kharif* season—traditionally the period to grow rice—can see dramatic improvements in their crop output, land productivity, profitability, and net income. But there is risk in pursuing these benefits. Off-season production requires investment in protective structures such as rain shelters. Farmers must also contend with the season's more intense incidence of pests and diseases. This study examined how training in off-season tomato production affected the income and pesticide use of smallholder vegetable farmers in the districts of Jessore and Barisal.

Research Findings

In 2012, farmers received two days of hands-on training on off-season tomato production, which included constructing rain shelters, raising healthy seedlings, improved cultivation methods, and integrated pest management. Trained farmers were given 3 grams of heat-tolerant tomato seed and some monetary support for buying inputs to plant 81 m^2 of tomato for one season. Farmers also received regular visits and technical assistance from AVRDC staff, but only for one season.

The study collected data two years after the training had been conducted to reduce the effect of inputs and cash provided in the first year (as all inputs needed to be purchased new every season, except for some of the bamboo poles used for the rain shelters). Researchers took a sample of 94 farmers who had participated the training and compared them to 151 farmers from other villages who had not received the training. None of the sampled farmers had previously tried off-season tomato production.

The data showed that the average trained farmer was younger, more literate, better educated and more often a member of a farmers' organization than the average non-trained farmer. These characteristics are likely to have a positive association to farm performance. A direct comparison of trained with non-trained farmers would therefore give biased results.

To solve this, the study used a large set of observable household characteristics to match each trained farmer

with the most similar non-trained farmer and vice versa. Alternative matching methods were used to lend robustness to the findings.

The study found that of the 94 farmers who initially adopted off-season tomato production after the training in 2012, 29 farmers continued the activity two years later—an indication that off-season tomato production was not easy for farmers. Farmers identified insect pests and diseases as the most important constraint.

The study revealed that farmers motivated to take the risk to produce vegetables in the off-season must be equipped with the knowledge and tools to manage pests and diseases safely.

Outcomes and Impacts

Farmers trained in off-season tomato production saw major improvements in crop output, land productivity, and farm profitablility during the *kharif* season two years after the intervention.

Trained farmers had a net household income during the *kharif* seaon that was on average 48% higher than that of non-trained farmers. Even farmers who had not continued off-season tomato production in the second year still had significantly higher incomes, as they applied some of the knowledge they gained from the training to other crops.

However, the trained farmers used more pesticides (+56%) than the non-trained farmers, which points to the challenge of controlling insect pests and diseases during the off-season. Trained farmers did protect themselves better during pesticide spraying than non-trained farmers, but a higher percentage of the trained farmers mixed different pesticides together for a single spray–a practice that can increase pesticide risk.

While off-season vegetable production can generate big improvements in income, farmers must not sacrifice their health, and the health of their family members, the environment, and consumers by misusing pesticides in pursuit of profit.

Table 1. Effects of training in off-season tomato production for the *kharif* season in southwestern Bangladesh

Outcome	Potential outcome (PO) mean	Average treatment effect (ATE)	% Increase (ATE as % of PO mean)
Total income (USD/capita)			
– PSM	170.0	85.9	50.5
– IPW	166.7	75.3	45.2
Pesticide use (kg/ha)			
– PSM	3.4	2.0	58.4
– IPW	3.3	1.7	53.0

Wider environment

Although rice for food security remains a mainstay, agricultural production in Bangladesh is becoming more diversified with higher-value crops. Average farm sizes have declined over time, and higher returns per hectare, obtained by growing high-value crops such as vegetables and fruit, are needed to improve living standards. Most tomato varieties are not well adapted to hot and humid tropical conditions. Since 1996, AVRDC and the Bangladesh Agricultural Research Insititute have been breeding heat-tolerant open pollinated and hybrid tomato varieties for use in the tropics in Asia and Africa.

Next steps

AVRDC is adjusting its off-season vegetable production training to place greater emphasis on effective, low-risk, safe and sustainable pest management methods. The unexpected consequence found during this study highlights the need for careful monitoring of the uptake of new technologies in different locations and the importance of learning from farmers' experiences.

References

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