

## Fighting poverty: Impact of improved faba bean technologies in Africa

Faba bean is a key crop and a major source of dietary protein throughout North and North-east Africa. Demand is growing, fuelled by rapid population growth, and the gap between supply and demand continues to increase. Production is insufficient because crop yields are low, in turn because farmers grow varieties that are susceptible to plant diseases, insect pests, drought and high summer temperatures.

In 2003, ICARDA launched an IFAD-funded project, Technology Generation and Dissemination for the Sustainable Production of Cereals and Cool-season Food Legumes. Scientists worked with farming communities, government research and extension agencies, universities and NGOs in four countries – Egypt, Ethiopia, Sudan and Yemen – to identify, test and promote a range of new technologies for various crops, including faba bean. The project concluded in 2005.

Has the project made a difference? To find out, ICARDA and national research centers in each country jointly conducted a series of studies aiming to:

- Assess the adoption of improved technologies
- Identify technical, socioeconomic, and policy constraints that hinder the adoption of new agricultural technologies in order to draw lessons for the future
- Assess the impacts (crop yields, food security, income, poverty) on rural households

Here we summarize the impact assessment for faba bean technologies in Egypt, Ethiopia and Sudan. The analysis is based on data collected from 587 households surveyed using stratified sampling and a formal questionnaire. Results for other crops are described in other titles in the Impact Brief series.

### Adoption: Package vs components

The project developed a technology 'package' for faba bean, combining an improved variety with several agronomic or crop management practices to maximize yield and improve input-use efficiency of use from the new variety. The complete package normally gives the best results – but farmers tend to adopt the package in stages, first experimenting with one or two components, and gradually adding others. Which components were the most popular? Relative preferences varied between countries (Fig. 1), but improved variety, weed control and pest control were generally the most widely adopted components.

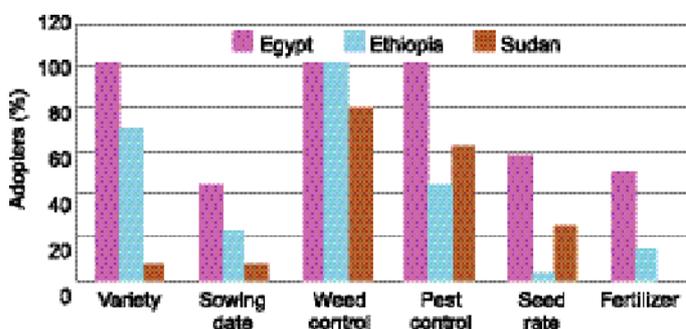
### Adoption: drivers and constraints

What factors facilitate adoption or are associated with it? What, according to farmers, are the main constraints preventing them from adopting new technologies? In Egypt, farm size, education, availability of off-farm income, and exposure to the technology were positively associated with adoption. In Ethiopia, there were several positive factors or associations: availability of seed from a research organization, awareness of the role of faba bean in crop rotations and in household nutrition, access to market, farming experience, and participation in the project. Non-availability of seed of the improved variety, susceptibility to disease, high seed price, and poor yield were the major constraints to adoption. In Sudan the main positive factor was participation in project activities and field days; while non-availability of seed was the main constraint.



*Improved faba bean technologies have helped improve food security and incomes for smallholder farm households.*

Figure 1. Adoption of faba bean technology components



## Higher productivity

Farmers who adopted the new faba bean technologies, whether the full package or individual components, obtained significantly higher yields. Simply replacing traditional varieties with improved ones led to gains of 18% in Egypt, 8% in Sudan and 42% in Ethiopia (Fig. 2).

Faba bean production systems in the three countries are quite different – intensive irrigated systems in Egypt, semi-intensive irrigated systems in Sudan, rainfed production with minimal use of fertilizer and pesticides in Ethiopia. The impacts of the new technologies were correspondingly different, with the highest absolute gains in the intensive systems, and the highest percentage gains in the low-input systems, which were starting from a low base.

## Food security and income

The new technologies substantially improved household food security and income. Average per capita faba bean production among non-adopters was 428 kg in Egypt, 44 kg in Ethiopia and 138 kg in Sudan. Among adopters, this increased by 13%, 39% and 8% in the three countries – a clear indication of improved food security. Adopters earned net returns per hectare of \$1456 in Egypt, \$180 in Ethiopia and \$164 in Sudan: 11%, 55% and 52% higher than non-adopters (Fig. 3).

## Income inequality

How did the new technologies affect income distribution? The study measured Gini coefficients (a standard indicator of equity) among adopters and non-adopters. In each country, the coefficient was lower among adopters, indicating greater homogeneity and lower inequality. In other words, these technologies appear to have reduced inequality between households while increasing average household income.

## Faba beans fight poverty

Did the new faba bean technologies contribute to poverty alleviation? We first classified households into three groups: below the poverty line, within a 'poverty band', and the relatively less poor. These groups were based on per capita income: 99 US cents per day, \$ 1 to 1.20, and above \$1.20, respectively. We then looked at whether the new technologies brought a degree of 'upward mobility' to households who adopted them.

- In Ethiopia, 3% of adopter households moved up at least one 'wealth class', while all non-adopters remained in the lowest class.
- In Sudan, 12% of adopters rose from the poorest to the middle category.
- In Egypt, 30% of adopters moved up one class. The proportion of households in the poorest class was 34% among adopters, but 46% among non-adopters.

Clearly, adoption of faba bean technologies developed jointly by ICARDA and its national partners, has improved crop yields, food security, income and nutrition. It has also had a direct and visible impact on poverty in three of Africa's most populous countries. Additional work, led by national research and extension agencies in these countries, will help extend these benefits to millions of small-scale farmers beyond the project's pilot areas.

Figure 2. Yield gains from adoption of new faba bean variety

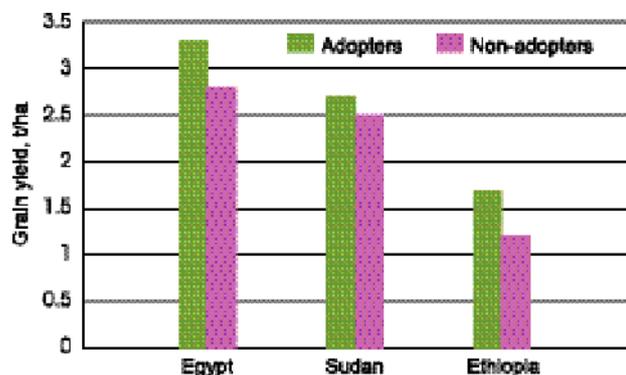


Figure 3. Impact of faba bean technologies on income

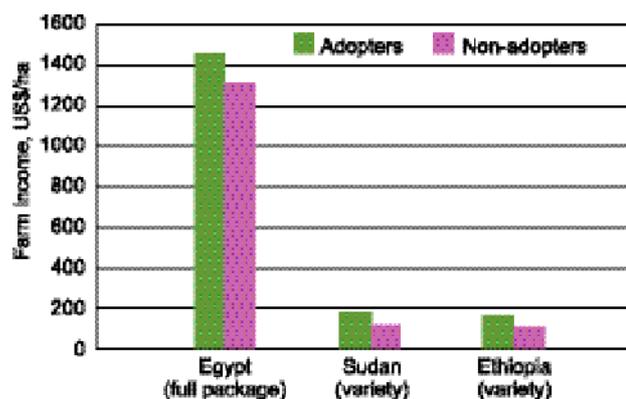


Figure 4. Impact of faba bean technologies on income distribution

