

# Highlights

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### The impact of improved bean production technologies in northern Tanzania

Common bean (*Phaseolus vulgaris*) together with maize and rice are the major food crops of smallholder farmers in Tanzania. It is estimated that over 75% of rural households in Tanzania depend on beans for daily subsistence. The common bean is an important source of protein for low-income families in rural and urban areas providing about 38% of utilisable protein and 12-16% of daily calorific requirements. Despite its lower calorific value, the cost per calorie from beans is lower than that from maize. This makes beans a cheaper source of protein for the poor and one of the most important strategic crops in efforts to eradicate poverty and food insecurity in sub-Saharan Africa.

The government of Tanzania (GOT) initiated a national bean research programme (NBRP) in the early 1980s with the objective of identifying high-yielding varieties that are also resistant to diseases and insect pests. Over the last two decades, the NBRP in collaboration with Sokoine University of Agriculture and other organisations have released five improved bean varieties, with support from the GOT, CIAT and the Eastern and Central African Bean Research Network (ECABREN). The improved bean varieties developed are: Lyamungu 85, Lyamungu 90, Selian 94, Selian 97 and Jesca. In addition to the varieties, several improved production practices were disseminated.

The objective of this study was to document the impact of the improved bean technologies on the livelihoods of rural farm households. The NBRP conducted the study in collaboration with CIAT and ECABREN between July and December 2004 in north eastern and north western Tanzania. A sample of 306 farm households was selected from six districts representing three bean cropping systems (maize-bean, banana-coffee-bean and bean pure stand), and in two agro-ecological zones (low altitude and high altitude). Data was collected by interviewing farmers using a structured questionnaire. Household-level impacts of improved bean varieties were analysed in terms of adoption rates, yields gains, changes in household incomes and consumption; and farmer perceptions on variety preferences, gender and impacts on food security.

#### Results

##### Profile of farm households

Wealth ranking done by key informants classified 29% of households in the sample as poor, 50% as medium wealth, and 21% as rich. Cropping systems with the highest concentration of commercial bean farming (Monduli and Karagwe) had the highest percentage of rich households (40%) and the lowest percentage of poor households (17%); while the mainly subsistence banana-coffee-bean cropping system (Moshi, Rombo, Karagwe) had the highest percentage of poor households (37%) and the lowest percentage of rich households (19%).

Most of the households (85-94%) in all zones were male-headed with one wife. Most farmers had attained primary education (75-91%). The average farm size cultivated by the low wealth category is 3 acres while the rich wealth category cultivates 11 acres. Men own the land in 83 percent of the households, while women own land in 12% of households. The average bean plot size for the rich is 2 to 4 times that of low wealth households. Men's bean plots are more than twice the area of women's plots.

##### Impact on livelihoods

The results of this study confirm that adoption of improved bean varieties and bean production technologies have made significant positive impacts on the livelihoods of rural farm households in northern Tanzania. Results include improvements in household food security and incomes; poverty reduction,

increase in amount of food available during periods of shortage, and savings in fuelwood consumption.

### **Varieties adopted and adoption rates**

Overall survey results show that 76% of farm households grow improved varieties. In 2004 the quantity of improved variety seed planted was equivalent to 54 % of all farmers' seed. Adoption of improved varieties was highest (89%) in semi-commercial bean cropping systems (maize-bean and bean monoculture), and lowest (67%) in subsistence cropping systems (banana-coffee-bean). The most widely adopted improved varieties were Lyamungu 85 and Lyamungu 90, grown by over 70% of farmers. Adoption rates for Selian 94, Jesca, and Selian 97 were very low (1-10%). The low adoption rates are attributed to limited farmer awareness of the varieties and limited access to start-up seed; hence the need to promote them more vigorously and extensively.

Most farmers sold beans, with 64% selling more than 50% of their output, indicating that beans are evolving from a staple to a dependable cash crop. Its growing prominence puts more pressure on researchers to emphasize market traits in breeding programmes. In cropping systems where beans are mainly intercropped with bananas, coffee, legumes and roots, there was concern about poor adaptation of certain new varieties to intercropping. In these areas where land is scarce, there is need for varieties capable of yielding well under stress due to low soil fertility and high crop density.

### **Increased household income**

Estimated annual contribution of beans to household income was 45%, of which improved varieties accounted for 64%. In monetary terms, this value translated into TShs 460,478 (419 USD) from improved varieties, compared to TShs 143,143 (130 USD) earned from unimproved varieties. Most of the income gains went to adopters: they earned three times more income from beans than non-adopters.

While income from unimproved varieties increased by 59% over the last five years, average income from improved varieties grew by 197%. In comparison, the increase in bean consumption by farm households was much less than income. Average annual consumption of unimproved varieties five years ago was 86 kg, almost the same as improved varieties at 96 kg; both had increased slightly to 92 kg and 114 kg respectively by 2004. The greatest beneficiaries were the rich farmers: their income from

improved varieties increased by an average of 341%, compared to an increase of 105% for the low wealth category.

### **Household food security**

Household food security was strengthened as a result of households having more output available for consumption and more disposable income from bean sales.

### **Impact on gender relations**

Increased female involvement attributed to growing improved varieties was reported in relation to: decisions on growing beans (45%), how much beans to sell (39%), who sells beans (47%) and who controls income from beans (41%).

### **Recommendations**

It is evident that past research has made a significant impact through development of high yielding varieties and production technologies. However, the overall impact on productivity is limited due to less than expected yield gains realised by farmers. Average improved variety yields were 40% of the attainable yields of 1.5 to 2.0 metric tones per hectare under optimal management. This was because of:

### **Inadequate dissemination of improved varieties**

Major success realised to date has been due mainly to Lyamungu 85 and 90. Only small quantities of other improved varieties are being grown by farmers because of limited awareness and limited accesses to seed. More vigorous promotion using a multi-channel dissemination approach and involving other stakeholders (NGOs, farmer research groups) is needed.

### **The absence of climbers**

Climbing beans represent a major opportunity for achieving major gains in productivity especially for farmers in land constrained regions such as Kagera. Researchers must develop bean technologies that guarantee high productivity under monoculture and intercropping systems.

### **Biotic and abiotic stresses**

The major challenge to boosting bean production is for research to address emerging major biotic and abiotic stresses which threaten to reduce the gains made from previous advances. Susceptibility to diseases, pests, and drought were ranked highest among traits to be improved. Most of the traditional bean growing areas are increasingly experiencing erratic and insufficient rains. There is therefore a need to place more emphasis on developing drought tolerant bean varieties.



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**More Information:**  
Xavery P., Kalyebara R., Kasambala S., and Ngulu F., 2006. The Impact of Improved Bean Production Technologies in Northern and North Western Tanzania. Occasional Publication Series No. 43, Pan African Bean Research Alliance, CIAT Africa Region, Kampala, Uganda and Selian Agricultural Research Institute – Arusha, Tanzania.