

Highlights

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Snap beans for income generation by small farmers in east Africa

Snap bean (or 'French bean'), is a strain of common bean, *Phaseolus vulgaris* L. which is grown as a cash crop by large scale and smallholder farmers. More than 90 percent of the crop produced in eastern Africa is exported to regional and international markets. Snap bean is an important export vegetable crop in Kenya, Tanzania, Uganda, Zambia, Zimbabwe and North Africa. It is gaining importance in other countries such as Cameroon, Ethiopia, Rwanda and Sudan. In east, central and north Africa, production is dominated by bush types. Climbing types are generally more productive and have a longer harvest period compared with the bush types, and could be expected to be of particular interest to small-scale producers wishing to intensify returns to the use of family labour. However, suitable varieties for eastern Africa are yet to be developed.

Market preferences for snap bean pods differ with regions. Most of the snap bean produced in eastern Africa are round and thin mainly to suit European markets. In contrast, flat podded types are popular in some North American markets. Snap bean

improvement in

eastern Africa focuses on the development and production of bush and climbing snap bean varieties with a high proportion of the harvestable yield of each plant being extra fine and fine beans that command premium prices.



There is growing interest in increasing snap bean production for domestic and export markets in Burundi, Ethiopia, Madagascar, Rwanda and other countries in eastern and central Africa.

Snap bean in African rural economies

Snap bean is an important source of income for smallholder farmers especially in Kenya, Uganda, Sudan and Tanzania. Snap bean is also grown by large commercial companies for export to overseas supermarkets and for canning industries. Due to the high pod quality, packaging, and post harvest care required for export produce, smallholder farmers are organised into groups (such as FPEAK, Fresh produce exporters association of Kenya), or contracted by companies and quasi-government organisations (such as the Horticultural Crops Development Authority (HCDA) in Kenya).

Today, snap bean is the leading contributor to the rapidly growing and highly successful vegetable export sector in Kenya. For the last five years, Kenya exported 25,000 Metric tonnes (t) of snap bean per year with a value of more than \$60 million. Estimates indicate that more than 1 million people benefit from the snap bean sub-sector in Kenya¹. But recently the small farmer sector, which was the backbone of this industry, is becoming marginalised by the preference of European supermarket chains, faced with EU requirements for monitoring quality at farm level, for contracting directly with a small number of large producers.

Threats to productivity

Yield of snap bean in smallholder farmers' fields varies from 2-8 t ha⁻¹, compared to over 14 t ha⁻¹ among large scale producers. Smallholder production is constrained by pests (such as bean stem maggots) and diseases (such as rust). The intensive nature of cultivation of this crop leads to high disease and insect pressure, and consequently excessive use of pesticides. Smallholder production is further constrained by high costs of seed. The few varieties developed by public institutions are often susceptible to diseases and pests. Very little has been done to develop improved snap bean varieties and make them freely accessible to smallholder farmers and informal seed producers (who supply over 90 percent of dry bean seed grown) in the region. Due to the high quality demands, smallholder farmers rely on fungicides and insecticides to reduce production and post harvest losses associated with diseases and pests. This is no longer a viable option because of recently instituted maximum residue levels. Preference by large European supermarkets to simplify their sourcing and buy from large scale producers threaten to push smallholder farmers out of business. Large associations of small farmers such as FPEAK help importers satisfy the need to be able to track the supply chain back to individual farms for quality assurance.

Regional initiatives for snap improvement

A regional snap bean programme, initiated in 2001 to support the development of improved snap bean varieties with high yield potential, resistance to biotic stresses, and pod quality for smallholder production receives support from CIAT and the East and Central Africa Bean Research Network (ECABREN) and, since 2005 by ASARECA. It is based at four institutions: Kawanda Agricultural Research Institute in Uganda; Moi University in Eldoret; National Horticultural Research Centre, KARI-Thika, Kenya and at the Department of Plant Science and Crop Protection, University of Nairobi. Work at Kawanda focuses on screening snap bean varieties with farmers and developing production packages. Three lines have been selected after four years of evaluation with farmers. These are HAB 433, J12 and L3.

The programme at Moi University, Kenya aims to develop locally adapted snap bean cultivars with improved pod yield, resistance to anthracnose and rust, and marketable pod quality. After six generations of selection, 12 lines were identified and evaluated in national

performance trial at six locations, in partnership with Kenya Plant Health Inspectorate (KEPHIS). The mean yields per location ranged from 3.1 t per ha⁻¹ at Thika to 19.7 t ha⁻¹ at Marigat. These lines showed broad adaptation and high yield potential in a range of environments. Four lines were rated resistant to rust, based on disease scores at Marigat, Lanet and Njoro, which had the highest disease pressure. These lines also had good pod quality, comparable to that of commercial cultivars. The four lines had average yields of 10 to 13 t ha⁻¹ across the six locations.

Activities at KARI-Thika focuses on developing a working collection of snap and runner bean varieties, and on developing segregating populations. Fifteen snap bean and five runner bean accessions have been collected at KARI-Thika. Twenty F₄ selections from a cross between a commercial variety and a locally improved rust resistant variety ('Kutules') were made. Two promising F₄ lines showed a type 1 growth habit, good ground-pod clearance, high pod load (30-40 pods/plant), acceptable pod characteristics and good snapping ability. These have been advanced to F₆ generation.

At the University of Nairobi, crosses were made to transfer rust resistance to three susceptible snap bean varieties. Segregating populations have been developed from crosses among three commercial, rust susceptible snap bean cultivars and two rust resistant lines. Seeds of lines identified in the four institutions are being increased for regional evaluation with farmers and exporters. For example, a farmers' field day was organised in partnership with an exporting company in Naivasha, Kenya. Exporters provide a critical link with supermarkets and other outlets in export destinations.

Future directions

The future of snap bean production looks promising partly due to increasing consumption in domestic urban markets, including the hotel trade. Availability of public commercial varieties will increase access to seed by smallholder farmers. New varieties are likely to lower production costs due to improved access to seed and reduced reliance on fungicides and pesticides. Most importantly, reduced reliance on pesticides will assist farmers to meet the stringent export requirements for residue levels, essential if this crop is to continue providing incomes and employment in rural areas.



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