Highlights
CIAT in Africa

Bean varieties for humid tropical regions: reality or fiction?

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Common bean, *Phaseolus vulgaris* L., which originates from the highlands of South and Central America is widely regarded as a crop adapted to cooler, less humid highland regions (>1000 metres above sea level (masl)). In eastern, central and southern Africa, 90 percent of production comes from highland agro-ecological zones. In central and west Africa, cowpeas and groundnuts are widely cultivated as they are considered to be more tolerant to heat and high humidity than beans. Bean production has traditionally been considered unviable in the humid tropical lowland areas, which make up most of the land area. However bean has remained a minor crop in this region for this reason – yet consumer demand for beans is growing rapidly as towns and cities expand.

Interest in lowland bean production is growing in Congo-Brazzaville, Cameroon, Central African Republic, Cabinda (Angola) and other countries in the tropical humid lowlands of west and central Africa.

Bean production in the lowlands

Lowland bean production is limited because past research efforts have concentrated on developing cultivars for the highland zones. As a result, most of the varieties developed in the last 20 years are adapted to cooler altitudes. Beans are grown over three seasons in the lowlands. Major disease constraints to production in the lowlands include common bacterial blight, web blight, bean common mosaic virus, root rot, and rust. Major pests include bruchids, aphids and foliage/stem beetle (with symptoms similar to bean stem maggot).

Beans consumed in the lowlands are produced in the highlands and exported to markets in the lowland zone. For example, bean consumed in the western lowland zone in DR Congo are imported from the highland production zones in eastern parts of the country (such as in North Kivu province). As a result, prices in Kinshasa 1,000 km to the west and other markets are relatively high because of transportation costs, and are not affordable to the urban poor, contrary to the popular belief that bean is a 'poor man's meat'. For example, beans were retailing at more than US$ 1.25 per kg in Kinshasa markets in July 2004 compared to about $0.50 per kg in Kivu. INERA (Institut National pour l'Etude et la Recherché Agronomiques), the national agricultural research institute of the Democratic Republic of Congo, has identified bean as a priority crop for production in lowland zones because of increase in demand and potential for income generation for smallholder farmers. Interest in lowland bean production is growing in Congo-Brazzaville, Cameroon, Central African Republic, Cabinda (Angola) and other countries in the tropical humid lowlands of west and central Africa. Considerable potential exists to improve bean production in lowlands. A collaborative programme under the auspices of PABRA, led by INERA and supported by CIAT and the University of Nairobi was initiated to identify bean genotypes adapted to the lowland humid tropical zones

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Destination	Type of Material	Number of Accessions
Liberia	Advance lines & released varieties	15
Central Africa Republic	MCR lines	15
	White bean	8
	Sugars	11
Congo-Brazzaville	Released varieties	12

Table 1: Bean germplasm adapted to humid tropical lowlands distributed from INERA-M'vuazi, DR Congo.

to serve not only western Congo but also western Africa more generally. This brief highlights progress in this programme.

Germplasm introduction and evaluation

Bean germplasm was introduced to INERA-M'vuazi, west of Kinshasa, from highland and mid-elevation research stations of INERA at Mulungu and Gandanjika, Madagascar (FOFIFA-Centre National de la Recherche Appliquée au Développement) and Kenya (University of Nairobi). M'vuazi, the main coordinating centre for bean research in western DR Congo, is located at latitude 5°27'S, longitude 14° 54'E and 470 masl. It has mean annual temperature of 23.6°C and receives 1425 mm rainfall per year. All trial sites were below 1000 masl. Evaluations were conducted in collaboration with farmer groups, NGOs and community based organisations (CBOs).

The collection comprised of 80 sugar bean lines, and 40 low fertility tolerant bean genotypes from the Bean Improvement for Low fertility Soils in Africa (BILFA) programme of PABRA coordinated by INERA-Mulungu. Eight entries were from the Madagascar bean programme, more than 86 F_2 and F_3 segregating populations from the regional multiple constraint nurseries at University of Nairobi and local collections from Gandanjika [a mid-elevation research station of INERA in central DRC]. The collection was evaluated at M'vuazi, Kisantu and several on-farm sites in Bas Congo, Kinshasa and Bandu Provinces in western DR Congo.

New varieties released

Twelve bean varieties adapted to lowland conditions have been released in the last three years by INERA- M'vuazi. Two lines KS 65-2 (sugar) and KS 47-1 (medium yellow) selected from regional nurseries have been identified for release. KS 47-1 was in Kinshasa markets in July 2004. Ten more varieties (three being Congolese landraces and seven from CIAT) are at a pre-release stage. Soil fertility is low in much of lowland West Africa and several BILFA lines are performing well.

Disseminating lowland varieties

As this bean seed market is too new and dispersed to attract seed companies, dissemination of the varieties in western DR Congo is being conducted in collaboration with 14 NGOs and farmers' associations. It is led by INERA's Research and Development (extension) section, farmer associations and field schools in Kisantu, and CADIM in Plateau de Bateke. Several released varieties are now being traded in Kinshasa markets, with strong consumer preferences in evidence. Yellows, whites and sugars dominate the markets in Kinshasa. Yellows are the most expensive (CFr 560 or US$1.31 per kg). Dark browns were the cheapest (CFr 200 or US$0.47 per kg).

Reaching out to other lowland regions

INERA M'vuazi has been instrumental in disseminating bean germplasm to other countries in west and central Africa. Some of the genotypes distributed to Liberia, Central African Republic and Congo-Brazzaville for local evaluation are shown in Table 1.

These results suggest that bean may be more broadly adapted than expected. Some of the varieties performing well in lowlands such as Lyamungu 90 were selected for highland zones and appear to have broad adaptation. Although climbing beans are traditionally grown at high altitudes, several climbing bean varieties were performing well at M'vuazi (470 masl). We observed climbing lines growing vigorously in eastern region of Cameroon at 700 masl during a visit in November 2005. It appears that there is considerable potential for expanding bush and climbing bean production to lowland agro-ecological zones. New germplasm was distributed from Kenya, DR Congo and Uganda for evaluation in Cameroon in January 2006.

Developing heat tolerant climbing beans is now a priority at CIAT, Colombia. New bred germplasm will feed into the efforts described above, and should offer new opportunities to lowland farmers, and dietary protein at lower prices for urban consumers. Introduction of bean lines to these regions will increase farmers' crop options for domestic consumption, and products for the markets.

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