Distribution of bean and tropical forage germplasm from an international genebank: a service to the global agriculture

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Introduction

The Genetic Resources Unit (GRU) of CIAT was established as such in late 1978, and inherited the bean collections from the breeders. In 1978-79, collections of tropical pastures were progressively passed to the GRU for their conservation and study. With world mandates for *Phaseolus* beans and lowland tropical forages, the GRU conserves mostly as seed collections 35,656 and 23,140 accessions of these crops, respectively (CIAT, 2007). Because germplasm activities - namely distribution - have been on since 1973 (surely on a formal basis since 1980) to date, some analysis of trends is possible.

The signing of an agreement in October 1994 between the Food and Agriculture Organization (FAO) of the United Nations and CIAT confirms further the curatorship role of GRU. Since 1995, distribution of germplasm to external users has been systematically done under the acceptance of a Material Transfer Agreement (MTA). In 1995-1996 the first designation to FAO (i.e. the sending of an electronic file about all accessions maintained in-trust by CIAT) took place, with subsequent updates every two years since. As per the last update in 2007, 65,392 accessions have been designated (for beans: 35,656; cassava: 6,596; and tropical forages: 23,140).

Methods

Pending on seed availability, CIAT GRU distributes to recipients small samples of seeds, once the following conditions are fulfilled: i) the user is identified, ii) the requested material is defined, iii) the purpose of the request is spelled out, iv) the user has agreed on the SMTA/MTA, and v) the obligations as per the phytosanitary regulations are met.

Results

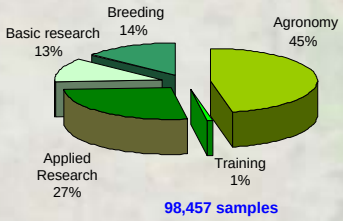
Over the period 1973-2007 (Figures 1-4), CIAT GRU has distributed 485,847 samples (402,027 of beans to institutions in 98 countries, and 83,820 of forages to 104 countries), over 8.5 times the size of the collection. The main users of CIAT genebank have been the commodity programmes of the Center (76 and 48%, respectively).

Figura 1a. Distribution of Bean Germplasm in 1973-2007 (402,027 samples)

Figure 1b. Distribution of Forage Germplasm in 1980- 2007 (83,820 samples)

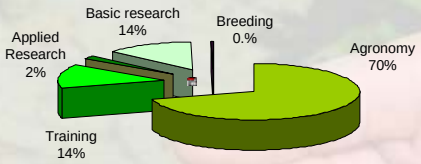
Next to CIAT programmes are the national programmes of agricultural research: they have received more than 50% of distributed accessions, followed by universities with 20-36% of distributed accessions. NGOs, networks, other genebanks, and individual farmers represent less than 4% of distributed germplasm. Commercial companies have a share of 1-2% of total distributed.

Figure 2a. Distribution of Bean Germplasm to External Users in 1973-2007 by Purpose



98,457 samples

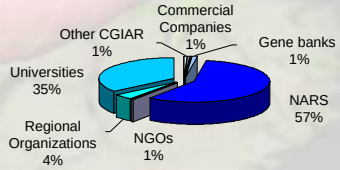
Figure 2b. Distribution of Forage Germplasm to External Users in 1980-2007 by Purpose



43,920 samples

Testing germplasm for yield and adaptation through agronomy trials has been the main purpose of external users to ask CIAT for germplasm (70 and 45% of the accessions distributed to external institutions, for forages and beans, respectively). Breeding is important for bean, but less so for forages. Basic research (e.g. phylogeny, studies of gene pools, gene mapping) and applied research (e.g. reactions to diseases and pests) are important purposes of external requests, particularly over the last decade. Training is an important purpose only for forages. On the other hand, the entry into force of MTAs since 1995 has not affected distribution rates in contrast with the reduction of network activities for germplasm evaluation (IBYAN for beans, RIEPT for pastures) due to financial constraints.

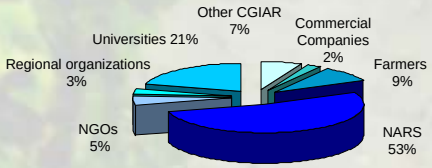
Figure 3a. Distribution of Bean Germplasm to External Users in 1973-2007 by Type of User



98,457 samples

Poster presented at the 40th Anniversary of CIAT, Palmira, Colombia, 6-9 November 2007.

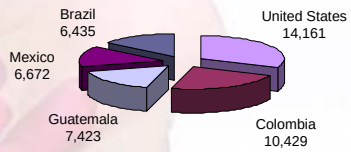
Figure 3b. Distribution of Forage Germplasm to External Users in 1980-2007 by Type of User



43,920 samples

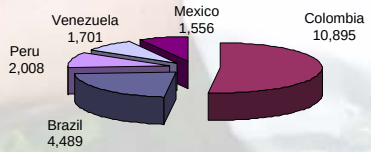
In both beans and forages, the top five country recipients received less than 50% of distributed germplasm (46 and 47%, respectively), while the numbers of countries are significant (98 and 104, respectively), indicating that CIAT GRU is an important provider of genetic resources for those commodities. As reported by FAO (1998), the collections of this genebank rank first in size and diversity. Beyond doubt, countries in Africa could make wider use of such collections. Interestingly, the five accessions with highest distribution rate (wrongly called "best sellers" because this service is free of charges for recipient institutions) for both commodities represent a very small fraction of total distributed, indicating that the distributed material has been diverse. The sort of materials distributed has also been changing over time; for instance, the forage legume *Cratylia* of no priority in the 70s was the No. 1 in distribution in 2005, and wild beans with almost no demand in early times have been increasingly studied recently.

Figure 4a. Five top users of Bean Germplasm in 1973-2007



46% of total distributed; 98,457 samples; 98 Countries

Figure 4b. Five top users of Forage Germplasm in 1980-2007



47% of total distributed; 43,920 samples; 104 Countries

Acknowledgements

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Literature cited

CIAT (2005). Annual report. International Center for Tropical Agriculture. Palmira, Colombia.

FAO (1998). The state of the world's plant genetic resources for food and agriculture. Food and Agriculture Organization of the United Nations. Rome, Italy.