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Seed multiplication and preliminary evaluations of Phaseolus coccineus germplasm collection at C.I.A.T. (Centro Internacional de Agricultura Tropical, Cali, Colombia)

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Within the genus Phaseolus, P. coccineus L. contains numerous interesting features for which insufficient variability exists in the P. vulgaris L. gene pool. Cross-pollination mechanism, strong root system, long peduncles, cold tolerance, resistance to bean fly (Ophiomyia sp.), Ascochyta sp. and golden mosaic are all characteristics found in P. coccineus and which could significantly increase the agronomic performance of the common bean through interspecific hybridization.

However, two conditions are required in order to exploit fully the P. coccineus gene pool: the seed multiplication and the complete evaluation of a sufficiently large collection, well representative of the species. C.I.A.T. has been mandated to carry out research works in those two fields. The C.I.A.T. collection involves actually around 1300 accessions from both the cultivated subspecies (coccineus and polyanthus) and the wild forms. As P. coccineus is an allogamous species, a special methodology of seed increase has been devised in order to maintain the genetic integrity of each population. Seed increase is being carried out at two locations of Colombia. At Popayan (1700 m altitude, 15°C mean temperature and 2000 mm annual rainfall), 12 plants of each accession are grown in mesh cages. Flowers are hand-pollinated with pollen from the same plants or plants from the same population, according to a system developed by VANDERBORGHT (1983). In total, 70 accessions can be multiplied twice a year at this location. At Rio Negro (2200 m altitude, 17°C mean temperature and 1650 mm annual rainfall), 18 plants from each accession are grown in open field. Plants are hand-pollinated in the same way as in Popayan but paper bags are used to protect the hand-pollinated racemes from insects' activities. This method allows the seed increase of 350 accessions a year. Seeds from controlled pollination obtained at both locations constitute the base stock of the gene bank's curator; seeds from open pollination (e.g. from Rio Negro, non covered racemes) constitute materials of distribution.

During the seed multiplication, evaluations are conducted mainly for some morphological traits such as growth habit, flower and stem color, bracteole shape and size. In 1985, a preliminary screening of 26 accessions of the subsp. polyanthus has also been carried out to identify sources of resistance to Ascochyta, a fungus disease prevailing in highland areas of the Andean zones and of East Africa. All the accessions tested had a good level of resistance but 4 of them were particularly performing: 2 from Guatemala (G 35336 and G 35182), 1 from Mexico (G 35337) and 1 from Colombia (G 35372).

Future evaluations of the P. coccineus collection are planned for Ascochyta both in Colombia and in East Africa and for bean fly in Taiwan and in East Africa.

Reference

VANDERBORGHT T. (1983). Increasing seed of Phaseolus coccineus L. Plant Genetic Resources - Newsletter (I.b.P.G.R.). 53:17-18