Evaluations for Ascochyta resistance in Phaseolus coccineus germplasm collection at C.I.A.T. (Centro Internacional de Agricultura Tropical, CALI, Colombia).

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Seed multiplication, agronomic evaluation and identification of parental genotypes for interspecific hybridization with Phaseolus vulgaris L. constitute the main research activities carried out in the P. coccineus L. collection held by C.I.A.T. (SCHMIT and BAUDOIN, 1986). This collection involves actually around 1600 accessions, most of them belonging to the two cultivated forms: subspecies coccineus and subspecies polyanthus M.M. and S.; the latter being recognized also at a specific level by some authors such as SMARTT (1973). Agronomic evaluation is realized with accessions that have passed through the seed increase process. A high priority is given to the reaction of the collection to Ascochyta, a major fungus disease prevailing in Andean regions and highland areas of East Africa. As a matter of fact, Ascochyta is a common name which may designate various races or varieties of a pathogen causing leaf spot (dark-grey to black zonate lesions) but sometimes also peduncle, petiole, stem and pod lesions. One of the pathogens prevailing in the Andean zone of Colombia is Ascochyta phaseolorum Sacc.. In 1985, three Ascochyta screening trials with replicates were realized at Popayan (1700 m alt., 18°C mean temperature and 2000 mm annual rainfall) and Rio Negro (2200 m alt., 17°C mean temperature and 1850 mm annual rainfall), two stations in Colombia. Experimentations involved 43 introductions of the subsp. polyanthus and 16 introductions of the subsp. coccineus. Two susceptible varieties of P. vulgaris were used as a control: ICA - Llanogrande (Ecuador 1056) considered as non-tolerant and G 6040, considered as more tolerant. Guate 1076, a polyanthus accession previously identified as resistant to Ascochyta was also used as a control. At Popayan, natural infection was very high and artificial inoculation was not required. At Rio Negro, in order to reach a uniform disease pressure, plants were sprayed before the flowering time with a suspension of conidies (concentration of 1.2 10^6 conidies per ml of water). Severity of symptoms was visually scored at three different stages: end of flowering period or beginning of pod setting, ripening period and harvest time. All the accessions of the polyanthus subspecies showed a very good performance, with no or mild symptoms on the leaves: the best performing are G 35336 and G 35182 from Guatemala, G 3537 from Mexico and G 35372 from Colombia. The accessions of the subspecies coccineus displayed a wider range of reaction, from mild to severe symptoms on leaves or other organs of the plants: the best accessions are G 35357, G 35358 and G 35361, three populations from Colombia and G 35421, G 35429 and G 35430, three populations from Mexico.

Those accessions have been integrated in 1986 as parental genotypes in a crossing programme with Andean and East African varieties of P. vulgaris, using either coccineus or vulgaris cytoplasm. Hybridizations are being carried out at the Faculty of Gembloux and hybrids and their progenies are tested in different stations of high altitudes in Colombia.
Ontogenetic Changes and Assimilate Partitioning in Aborting and Nonaborting Seeds of Phaseolus vulgaris L.

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This research focuses on structural changes in aborting and nonaborting Phaseolus seeds from anthesis, when the embryo is 2-3 celled, to 5 days post-anthesis, when embryonic cotyledons are initiated.

Results indicate that integumentary and nucellar tissues are associated with the nutrition of the developing embryo at early stages of ontogeny. In nonaborting embryos there is characteristically a gradual starch depletion and an increase in vacuolation of cells of the integuments and nucellus; similar changes occur at a greatly accelerated rate in aborting embryos. The integuments and nucellus may be involved in direct transport of assimilates to the embryo: wall ingrowths, reflecting increased plasma membrane surface area, occur on cell walls of the embryo sac and cellular endosperm and suspensor cells and these may confer transfer cell functions involving active solute transport. Rapid starch depletion and vacuolation of maternal and nutritional tissues of aborting seeds indicates that the nutritional balance of such seeds is disrupted early in the abortion process. Such changes are followed by secondary alterations, including arrest of embryo and embryo sac development and of vascular differentiation.

The development of the transfer cell wall characteristic in the enlarged suspensor cells is particularly important to the viability of the embryo. Suspensor cells are uptake sites for exogenously applied $^{14}$C-sucrose. In nonaborting Phaseolus embryos, photosynthate appears to move from mature sieve elements through vascular parenchyma to the loosely arranged inner branch parenchyma cells which surround the enlarged suspensor cells. Although many factors affect the flux of assimilates to a developing organ, the combination of suspensor transfer cells and the anatomically mature conducting system in the nonaborting embryos may represent a transitional phase for increased assimilate conductance to the embryo from nonseed sources.

Data from this study thus far indicate that changes in partitioning between vegetative and reproductive organs at the critical stages of ontogeny when abortion occurs might increase total Harvest Index.