

Studies in an allopolyploid population of an interspecific combination between *Phaseolus vulgaris* and *Phaseolus filiformis*.

M.E. WEILENMANN de TAU, J.P. BAUDOIN and R. MARECHAL

Faculté des Sciences agronomiques de l'Etat, 5800 GEMBLoux (Belgium).

Chromosome doubling through colchicine application on young seedlings has allowed to restaure the fertility of several interspecific hybrids between *Phaseolus vulgaris* L. and a distantly related wild species, *P. filiformis* Benth. (WEILENMANN de TAU, BAUDOIN and MARECHAL, 1986). The latter, native of California Golf, is particularly interesting for its tolerance to both hot and cold environments and for its level of resistance to various diseases (HUBBELING, 1957). The possible utilization of these allotetraploid hybrids for the improvement of the common bean has been discussed by WEILENMANN et al. (1986). During the period may-november 1986, an in-depth study was initiated in a bubble house at the Faculty of Gembloux with a C1 population in order to assess the genetic variability, the meiotic behaviour and the possibilities of reversing to the diploid stage. The population consisted of 30 individuals of the allopolyploid hybrid between NI 34 (seed parent) and NI 860. NI 34 is a common bean variety from ZAIRE while NI 860 is a wild ecotype of *P. filiformis* received from the University of Tucson (USA). Numerous morphological data were collected from seedling stage to seed maturity. Results revealed a very good genetic uniformity among the 30 individuals. Each plant exhibited in a rather similar assortment a mixture of intermediate, *vulgaris* - like and *filiformis* - like characters. Intermediate characters concerned stem thickness, width and length of terminal leaflet, number of nodes per raceme, hairiness and number of veins per bracteoles, flower size. *Vulgaris* - like characters were mainly internode length of the stem and stem and flower pigmentation. *Filiformis* - like characters were shape of bracteoles and peduncle/rachis ratio of the racemes. Each plant produced between 150-200 selfed pods; each pod had a fecundity index (number of seeds/ number of ovules X 100) averaging 25 %. Very few multivalents were observed at Metaphase I stage. An intensive crossing programme was carried out between the allopolyploids and the diploid NI 34 *vulgaris* parent in both ways. A very high percentage of pod abortion was observed from the 3000 crosses using NI 34 as pollen parent and from the 430 crosses using the allotetraploids as pollen parent. Only five seeds from four pods were harvested at the ripening stage. Their hybrid character (putative triploid nature) will be checked next season. With the utilization of a fluorescent microscope with reflected light system, pollen tubes could be observed at the upper and medium part of the style after pollen germination and especially in the ovary after they penetrate the ovules. Incompatibility barriers between the allopolyploids and the diploids occur therefore most probably after the fertilization process, as it is the general rule with *Phaseolus* interspecific hybridization.

References

- HUBBELING N. 1957. New aspects of breeding for disease resistance in beans (*Phaseolus vulgaris* L.). *Euphytica* 6: 11-141.
- WEILENMANN de TAU E., BAUDOIN J.P. and MARECHAL R. 1986. Obtention d'allopolyploides fertiles chez le croisement entre *Phaseolus vulgaris* et *Phaseolus filiformis*. *Bull.Rech.Agron.Gembloux* 21, 35-46.