NEW BREEDING TECHNIQUE FOR MAKING 'BETTER TULIPS'

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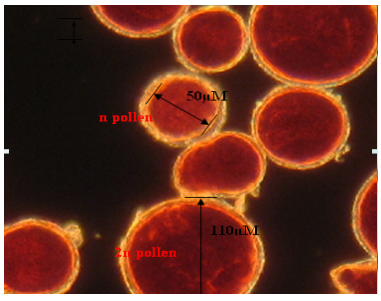
When foreign people talk about The Netherlands, they always mention tulips because tulip is already known worldwide as the symbol of The Netherlands. Splendid wide range of colours, elegant shapes...many other attractive characters have made tulip as a favourable choice for landscaping, pot flower and pot plant. Up till now, The Netherlands produces about 3 billion tulip bulbs and 2 billion of which are exported. For centuries, Dutch tulip breeders have been trying to breed ideal cultivars which are not only have charming characters but also with higher quality for cultivation and comercial traits. VHL student Shurui Zhang has participated in tulip breeding project of PRI (Plant Research International) which supported by TTIgg (Technology Top Institute Green Genetics) in Wageningen, The Netherlands for breeding new tulip cultivars with multiple resistance to diseases and high commercial values.

Generally speaking, interspecific crossing is a traditional tool for tulip breeding, which brings new opportunities for making tulip becoming 'better'. Crosses were made between two tulip species - one *Tulipa. fosteriana(F)* with disease resistance and another *Tuplia. gesneriana (G)*, the main cultivar group, having in general good commercial value. The polyploidization plays an important role in the interspecific breeding of tulips, the reasons for using polyploidization in tulip breeding are larger flowers, stronger stems and restore F1 fertility at the tetraploid level. In this case, the use of unreduced (2*n*) gametes was invented.

Pollen fertility testing was an efficient tool for selecting pollen grains for crossing, based on pollen gemination rate on media, pollen fertility from different 171 tulip genotypes were assessed, after that, in order to find out which genotype proces high percentage of 2*n* pollen grains, pollen size measurement was used as a tool to detect large pollen grains under the microscopic view. Based on pollen grain sizes, 6 different genotypes which were able to produce bigger pollen grains were selected as 2*n* pollen producers, and flow cytometry testing was carried out. In total 308 tulip F1 seedlings which crossed by selected 2*n* pollen producers were tested by flow cytometry.

Based on flow cytometry testing result, crosses made between diploid *T. gesneriana* and diploid GF 2*n* producers did not give expected high percent triploid progenies, but crosses between triploid *T. gesneriana* and diploid GF 2*n* producers did give high percentage of pentaploid progenies. This is because the ploidy level of embryo/ endosperm ratio in 2x X 2x will lead to embryo death in an earlier stage if 2*n* pollen was functional because such embryos may be at a disadvantage in competition with normal embryos. But in 3x X 2x crosses the competition between different products of fertilization may not be as great as in 2x X 2x crosses, this might be the reason for the occurrence of pentaploid progenies in 3x X 2x crosses.



The new technique and pentaploid tulip progenies provided supportive information for current and future tulip breeding processes. /**Shurui Zhang (IHM)**