

Mitotic and meiotic polyploidization in lily hybrids for transferring *Botrytis* resistance

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Introduction

To lower the use of chemical compounds in the culture of lilies breeding for resistance to *Botrytis* should have a high priority. In the lily assortment resistance for *Botrytis* is especially present in the Oriental lilies, while resistance to *Fusarium oxysporum* and Lily Mottle Virus only occurs only in the Asiatic hybrid group. To combine the resistances the OA-hybrids (Oriental x Asiatic) are developed. A large number of F₁-hybrids are produced, which are in general sterile. To overcome this sterility two approaches were used. First, the somatic chromosome number of the F₁s was doubled by treating with oryzalin that resulted in allotetraploids (mitotic doubling). These allotetraploids were used for crossing with the Asiatic and Oriental hybrids. Second, 2*n* gametes were used directly for crossing with the parents for producing sexual polyploids (meiotic doubling). It is typical for allotetraploids to produce uniformly a single genotype of 2*x* gametes containing both parental genomes because of autosynthetic pairing so that there is not scope for genetic variation. On the contrary, in the case of meiotic polyploids intergenomic recombination occurs between the alien chromosomes that could lead to considerable amount of genetic variation the two types of BC₁ progenies were monitored for resistance against *Botrytis elliptica* through a “leaf tip test”.

Material and methods

Six leaf tips per genotype in two replications were tested in Well's plates. The boxes were transferred to a climate room of 20 °C. Two µl spore suspension was dropped on every abaxial side of the leaf tip. The leaf tips were screened for symptoms 3-4 days after inoculation. The DSS-values (disease severity score) which were used, ranged from 1= no lesion to 6 = highest degree of infection (Figure 1).

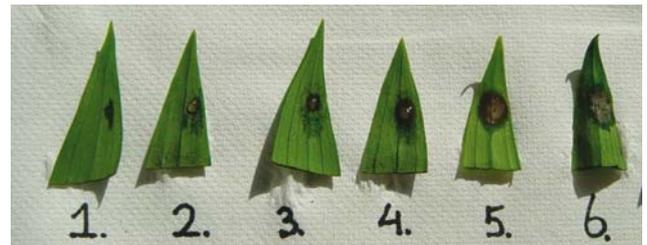


Figure 1. Disease severity (DSS) score in the leaf tip test for testing *Botrytis*-resistance.

Results

A large variation from very susceptible to resistant was found in both type mitotic and meiotic populations. Eight out of 101 genotypes of the mitotic population showed transgression. The other genotypes showed a response between the values of the parents. Also in the meiotic populations, although the number of seedlings was much lower, a large variation from very susceptible to resistant was found. Six out of 20 seedlings obtained via meiotic polyploidization showed transgression (Figure 2).

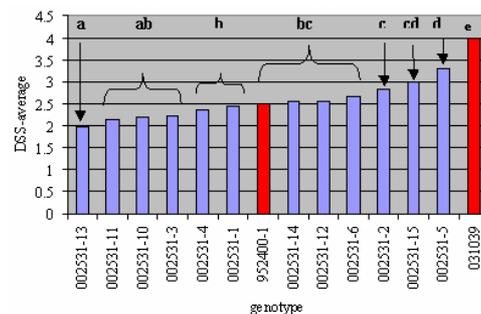


Figure 2. DSS-score for a meiotic derived population with parents (red) and progeny (blue).

Conclusions

Although different parents were used in case of the mitotic and the meiotic populations, a preliminary conclusion can be drawn that due to intergenomic recombination more variation is found in the meiotic populations. In addition to this the actual frequency of intergenomic recombination has to be determined.