Evidence of unreduced gamete production from interspecific crosses between *Gossypium hirsutum* and *G. herbaceum*.

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**Introduction**

In order to analyse the gene flow between the allotetraploid cultivated cotton (*Gossypium hirsutum*, AADD, 2n=52) and the wild diploid (*G. herbaceum*, AA, 2n=26), the possibility of natural hybridization between these two cotton species has been investigated. In South Africa and particularly in the KwaZulu Natal Province, where commercialisation of transgenic Bt cotton began in 1998, it is not uncommon to find the wild species (*G. herbaceum*) growing alongside cultivated cotton fields. The rate of interspecific hybridization was assessed from reciprocal crosses without emasculation and genomic structure of hybrids was analysed.

**Flow cytometry** (method described by Eber et al, 1997 with barley as internal standard), morphometry, meiotic behavior and rDNA-FISH analysis were used to characterise the plants obtained.

**G. hirsutum (A1,A2-DD) x G. herbaceum (A1,A2)**

From 504 seeds, 335 plants were obtained. Neither examination of the morphological characteristics (plant architecture; leaf shape; colour, size, shape of flowers…) nor the flow cytometry analysis have shown any to be hybrid plants.

**G. herbaceum (A1,A2) x G. hirsutum (A1,A2-DD)**

From 330 seeds, 148 plants were obtained.

**Flow cytometry**: Three hybrids were detected whose two hybrids showed intermediate value which might correspond to AAD hybrids (H1 and H2). The third (H3) exhibited a value in flow cytometry slightly higher than *G. hirsutum* (Table 1).

**Morphological characterization**: Among the 3 hybrids, H1 and H2 exhibited the same phenotype typical of a triploid hybrid (AAD). The third one (H 3) has shown intermediary phenotype between *G. herbaceum* and the triploid. These two types of hybrid phenotype (Figs. 1-2) have been also observed for flowers: corolla size, red spot intensity and size, stamens colour and size and shape (Fig.3). Hybrid 3 had bigger and brighter spots, intermediary between AAD and *G. herbaceum* which can support the hypothesis that it carries more genome A from *G. herbaceum* than the *G. herbaceum* parent.

Pollen viability evaluated by Alexander and Aceto-carmin staining are presented in Fig. 3. Hybrid 3 considered to be AAAD has shown a slightly higher viability than the two triploid hybrids.

**Meiotic behavior**: The meiotic behavior (Table 2 and Fig. 4) of the two AAD hybrids was established from 26 pollen mother cells (PMCs); only 35% of the cells showed the expected behavior with 13 univalents and 13 bivalents. In the third hybrid, the chromosomes number as well as the high frequency of multivalents, 1 per PMC, are in accordance with the presence of 3 A genomes (Table 2) with a AADD structure.

**Conclusion**

Interspecific hybrids were detected only when *G. herbaceum* is used as female with a rate of 2%. Two hybrids were formed from reduced gametes of the parents but one was obtained from female unreduced gamete giving to a AADD structure. This is, to our knowledge, the first description of the occurrence of a non-reductional meiosis in the species *G. herbaceum*. This plant material could provide a useful tool for the study of the expression of genes duplicated on the A and D cotton genome. The possibility of obtaining an interspecific hybrid between cultivated and diploid cotton through fertilization with an unreduced gamete raises the question of its evolution in natural populations.

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