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MORPHOCYTOGENETICS OF *BRASSICA NAPUS* L. X *SINAPIS ALBA* L. SEXUAL HYBRIDS

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ABSTRACT

Meiotic analysis of *B. napus* x *S. alba* sexual hybrids at MI showed a mean chromosome pairing ratio of 16.5 I, 6.97 II (rings + rods), 0.47 III and 0.13 IV per meiocyte. Partial fertility of the F_1 hybrids and the ease of obtaining BC_1 seeds when crossed to *B. napus* suggest the possibility of transferring useful gene(s) to the cultivars of *B. napus*.

Key words: *Brassica napus, Sinapis alba,* sexual hybrids.

Yellow or white mustard (*Sinapis alba* L. 2n=2x=24, Sal Sal) is highly resistant to nematodes [1], black spot, white rust and powdery mildew. It is well adapted to drought conditions and sufficiently rich in erucic acid [2, 3] which finds considerable use as a lubricant, plasticizer, slipping and antiblocking material, antifoam agent and in perfume-, aroma- and pharmaceutical industries [4]. This species is also a potential source of proteins in human diet [5]. Thus, genetic traits of *S. alba* could be valuable for *B. napus* (2n=4x=38, AACC) improvement.

Interspecific hybrids between *B. napus* and *S. alba* have been obtained both through protoplast fusion [6] and by sexual crossing via embryo rescue [7]. However, sexual hybridization between the two species by conventional breeding methods has not been accomplished so far. Here we report the morphocytogenetics of the first conventional hybrids of *B. napus* with *S. alba*

MATERIALS AND METHODS

Buds of *B. napus* were pollinated with freshly collected pollen of *S. alba*. Pollinated flowers were bagged and left on the mother plant(s) until fruit maturity. Neither pre- or post-pollination hormone treatment nor embryo rescue was necessary.

Carnoy's fixative and acetocarmine squash method were used to study meiotic chromosomes in pollen mother cells (PMCs).

RESULTS AND DISCUSSION

Of the 35 crosses made between *B. napus* and *S. alba* seven seeds were obtained at maturity. Of these 5 germinated and produced the normal plants. All but one were confirmed to be true hybrids. *S. alba* x *B. napus* sexual hybrids via embryo rescue were obtained only when *S. alba* was used as the female parent and the resultant hybrid was completely male sterile [7]. In the present study, *B. napus* x *S. alba* sexual hybrids have been obtained using *B. napus* as the female parent. The phenotype of *B. napus* x *S. alba* hybrid plants was similar to *B. napus* but the siliquae were remarkably smaller than those of the female parent, *B. napus* (Fig. 1). Average stainability of the pollen from the F_1 hybrids was 40%. Crossing the F_1 hybrids back to *B. napus* gave good seed setting (32.5%), however, the recovery of BC_1 seeds with *S. alba* as male was relatively difficult (< 2.0% seed set). Over 50 pollinations of the F_1 hybrids with *S. alba* could produce only one BC_1 seed.

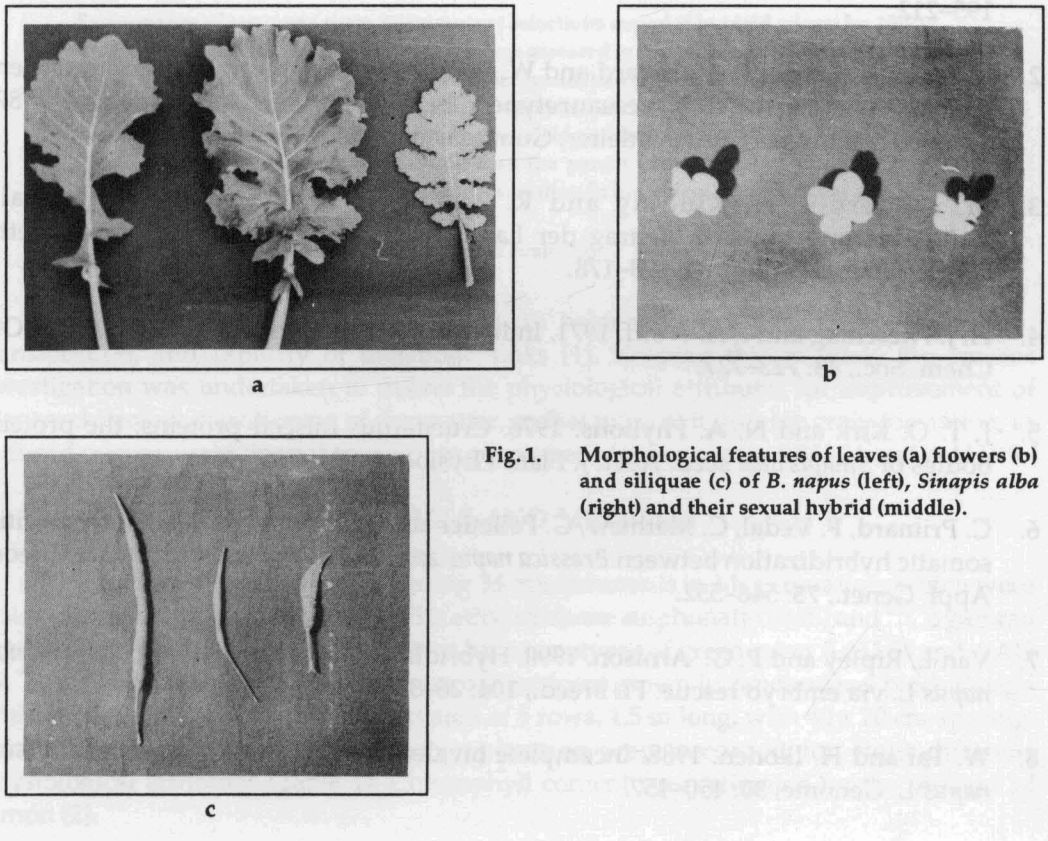

Fig. 1. Morphological features of leaves (a) flowers (b) and siliquae (c) of *B. napus* (left), *Sinapis alba* (right) and their sexual hybrid (middle).

Meiotic analysis of 30 PMCs of the 31-chromosome trigenomic hybrids (10A+9C+12 Sal) at metaphase I showed the mean chromosome pairing ratio of 16.5 I, 6.97 II (rings + rods), 0.47 III and 0.13 IV per meiocyte. The extent of chromosome pairing was almost similar to that observed in *S. alba* x *B. napus* hybrid (6 II + III + 2 IV) [7]. The presence of 6.97 II (rods + rings) does not necessarily indicate homology between *B. napus* and *S. alba* because intergenomic pairing between A and C genomes in dihaploids of *B. napus* has been reported to be 7.73 II [8]. However, a maximum of 8 to 10 ring bivalents in some of the cells coupled with the presence of multivalents (trivalents and quadrivalents) in 26.6% of the meiocytes analysed indicates some nonhomologous recombination between A, C and Sal genomes.

Partial fertility of *B. napus* x *S. alba* hybrids and the ease of obtaining BC_1 seeds with *B. napus* indicates the possibility of transferring useful genes to the target genotypes of *B. napus*.

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