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# A SEXUAL HYBRID BETWEEN *BRASSICA JUNCEA* AND *DIPLOTAXIS MURALIS*

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## ABSTRACT

**An intergeneric sexual hybrid, *B. juncea* x *D. muralis*, was produced. Morphological and cytological studies confirmed the hybrid nature of the plant. Pollen stainability was 52% and the hybrid plant was partially fertile. The PMCs showed 34 to 39 chromosomes. Mean chromosome associations were 5.9 I, 9.9 II (mostly ring), 1.6 III and 1.8 IV per meiocyte.**

**Key words:** *B. juncea, D. muralis,* sexual hybrid.

*Diplotaxis muralis* (L.) DC (2n=2x=42, DD), a wild crucifer, is a potential source of cytoplasmic male sterility [1], drought tolerance and other useful genetic traits. Introgression of these traits could greatly enhance the genetic variability of *Brassica juncea* (L.) Czern & Coss (2n=4x=36, AABB)—a major oil yielding crop of the Indian subcontinent. While somatic hybrids between *B. juncea* and *D. muralis* have been reported [2], the production of sexual hybrids of the two species has been limited by strong species barriers. We report the morphology and cytogenetics of the first intergeneric sexual hybrid between *B. juncea* and *D. muralis*.

## MATERIALS AND METHODS

Twenty seven immature buds of *Brassica juncea* var. Pusa Bahar were pollinated with freshly collected pollen of *Diplotaxis muralis* immediately after emasculation. The pollinated flowers were bagged and left on the plant until fruit maturity. Embryo culture or hormone application was not necessary.

For meiotic studies, flower buds of appropriate size were fixed in acetic alcohol (1:3) for 24 h and squashed in 2% acetocarmine.

## RESULTS AND DISCUSSION

Of the 3 seeds obtained at maturity, only one germinated and developed into a normal plant. The $F_1$ hybrid was intermediate to both parents with regard to leaf, inflorescence and other morphological traits (Fig. 1, left). Nodes of the hybrid plant were characterized by distinct knot-like swellings (Fig. 1, right), and a few flowers had 7 petals. Pollen stainability varied from 12–60% and the hybrid plant produced selfed/$BC_1$ seeds.

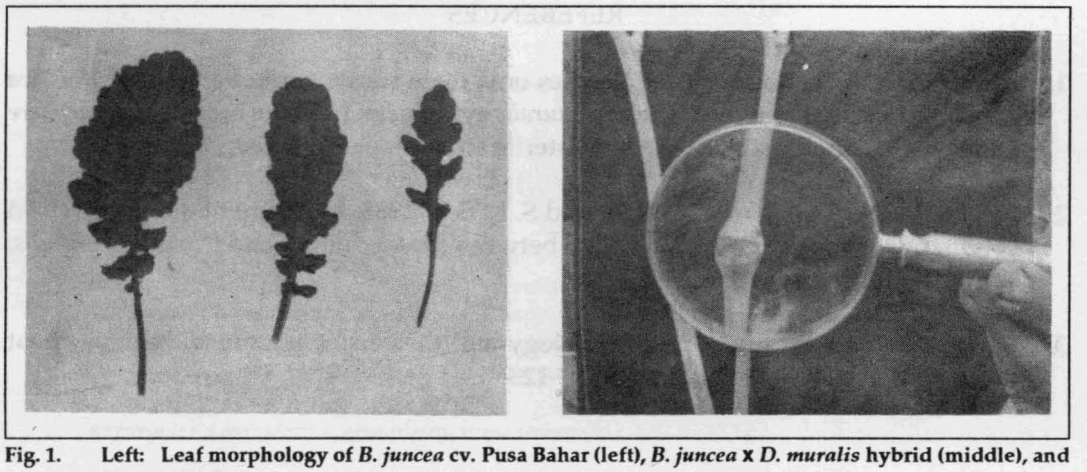

**Fig. 1.** **Left: Leaf morphology of *B. juncea* cv. Pusa Bahar (left), *B. juncea* x *D. muralis* hybrid (middle), and *D. muralis* (right).**
**Right: Node of the *B. juncea* x *D. muralis* hybrid showing characteristic swelling.**

Cytological analysis of 30 PMCs at MI showed chromosome numbers ranging from 34 to 39 in the hybrid. A mean of 5.9 I, 9.9 II (range 6–13), 1.6 III and 1.8 IV per meiocyte were observed. Multivalent associations were present in all the cells analyzed. Anaphase I showed laggards/fragments and unequal chromosomal distribution to the poles. The high frequency of bivalents observed in the present study is indicative of a considerable degree of homologous pairing between the chromosomes of the parental genomes. However, the possibility that some of these bivalents could have arisen from homoeologous associations cannot be ruled out. Fewer univalents in conjunction with a high frequency of multivalents lends further support to the occurrence of intergenomic (homoeologous) pairing between the parental genomes. Chromosome elimination is fairly common in wide hybrids and could be attributed to abnormal premeiotic mitoses in archespore cells [3]. A high degree of pollen sterility could be due to meiotic abnormalities.

Results of the present investigation clearly demonstrate that incompatibility barriers limiting the hybridization of *B. juncea* with *D. muralis* can be successfully overcome by bud pollination. Chromosome homology and high fertility of the $F_1$ hybrid also suggests a

considerable degree of genetic homology in A, B and D genomes that may permit the introgression of useful genes from *D. muralis* into *B. juncea.*

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