ALFALFA TRIPLOIDS

A. Binek
Department of Plant Breeding and Seed Science
Agricultural University, 31-140 Cracow, 24 Lobzowska, Street, Poland

Triploids with cytoplasm from the Medicago falcata L. were produced occasionally about 60 years ago in 2x - 4x crosses between diploid M. falcata and tetraploid M. sativa (Ledingham, 1940; Stanford, 1959). A higher frequency of triploids was obtained on the base of cultivated alfalfa in 4x-2x crosses (Cleveland and Stanford, 1959). Further increase of triploids was recorded by using male sterile tetraploids as seed parent (McLennan et al., 1966). The male sterile tetraploid parents or suitable genetic markers with recessive gene for flower color factor were used for control of hybridization (Bingham, 1968).

Alfalfa triploids as the female parents were used in crosses with diploids (Kasha and McLennan, 1967; Binek and Bingham, 1970) and hexaploids (Bingham and Binek, 1969, Smith et al., 1984). Chromosome numbers of the progeny were normally distributed around the ploidy level of the respective male parent (Blake and Bingham, 1986).

The fertility of alfalfa triploids is relatively low because of the gametic imbalance and seed abortion. The average fertility in all families expressed in percent of seeds formed in 3x-2x and 3x-4x crosses was 1.3 and 6.1%, respectively (Binek and Bingham, 1979). These trends to produce slightly more seeds in crosses with higher ploidy level were confirmed in 3x-2x; 3x-4x and 3x-6x crosses with 11, 13 and 15 seeds per 100 flowers pollinated, respectively (Blake and Bingham, 1986).

Pollen grains from triploids varied in size and about 30% pollen were stainable (McLennan et al., 1966), had germinated (Binek and Bingham, 1970) and functioned as pollen parents in crosses and selfs (Blake and Bingham, 1986). There were also some large pollen grains observed, probable with unreduced chromosome number. The records of chromosomes in progeny from 4x-3x and 6x-3x crosses suggested that male gametophytes having approximately the same ploidy as the eggs have a greater chance in fertilization (Blake and Bingham, 1986). The large range of chromosome number (16 to 64) in progeny of triploids obtained in various crosses demonstrate the versatility of alfalfa triploids in chromosome manipulations (Bingham and Saunders, 1974).

Triploids have been useful in producing trisomics after 3x-2x crosses (Kasha and McLennan, 1967) and monosomics after 3x-4x crosses (Stanford, 1959). The frequency of aneuploids obtained in 3x-4x and reciprocal crosses suggests that female gametophytes of triploids may function even when they are deficient for more than one chromosome, whereas most male gametophytes of similar aneuploids do not function (Blake and Bingham, 1986).

The experiments have shown that the efficiency of hybrid production in crosses

of triploids with other ploidy levels depends on parent plant (Binek and Bingham, 1970, Blake and Bingham, 1986) so the selection of the best triploid clones should take place.
The alfalfa triploids are valuable for diploid production, cytogenetic studies and manipulation of ploidy level. They can be used to transfer genes either to diploid, tetraploid and hexaploid levels by back-crossing to the desired ploidy (Bingham 1968). By using triploids derived from Vernal, Saranac, Iroquois and Perry, germplasm from these cultivars was transferred to the diploid level and also to hexaploid and even to octoploid levels (Blake and Bingham, 1986).

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