Results of breeding for modified C18-fatty acid composition in Linum

The oil of cultivated linseed (Linum usitatissimum) is characterised by a high level (55-65%) of linolenic acid (C18:3) with comparatively little genetic variability. However, among wild Linum species there are large differences in fatty acid composition. Therefore, interspecific hybridisation between cultivated linseed and wild species may provide material segregating for oil quality. Alternatively, induced mutagenesis may be used for broadening genetic variation. Seeds of 32 Linum species were obtained from botanical gardens and institutes. Plant habitus, flower colour, oil content, fatty acid pattern, 1000-seed weight and seed colour were determined. Crosses between Linum usitatissimum cultivars and wild species were attempted. Where capsule development was not obtained, pollen tube growth was studied by fluorescence microscopy. It was tried to circumvent incompatibility barriers by applying the embryo rescue technique. For that purpose, "heart-shaped" immature embryos of Linum usitatissimum plants were cultured on MONNIER-medium. In a mutation breeding programme, M_5-lines with reduced C18:3-content (35-40%) derived from the cultivars "Bionda" and "Raulinus" by EMS-mutagenesis were intercrossed and the progeny analysed.

Variation in fatty acid composition amongst wild species was 3.5-68.2% for linolenic and 9.2-83.4% for linoleic acid. Variation of oil content was 22.5-46.0% and of 1000-seed weight 0.1-4.4g . Interspecific crosses of cultivated linseed with wild species of low linolenic and high linoleic acid content (especially L. flavum, L. catharticum, and L. campanulatum), were not successful because of pre-fertilisation barriers. Crosses between M_5-lines selected for reduced linolenic acid content (35-40%) were analysed for segregation in the F_2. Here, new recombinant types with only 11-13% linolenic, but nearly 50% oleic and 25-30% linoleic acid content could be identified. Previously, GREEN selected a mutant with very low C18:3-content (2%) which was controlled by two un-linked genes acting in an additive manner. This mutant shows a close negative correlation between linolenic and linoleic acid due to genetic block of oleic and linoleic de-saturation. A genetic block of de-saturation of oleic to linoleic acid seems to be also present in our mutant.

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Effect of different intervals of x-ray split doses on shoot production of in vitro derived explants of Gerbera jamesonii Bolus

Linearity between rising x-ray doses and mutation rate is limited by the simultaneously increasing radiation damage: induced chromosome aberrations eliminate valuable factor mutations. The application of fractionated doses provides the opportunity for repair of a distinct portion of damage. The dose of 30 Gy was fractionated into two identical parts. The periods for repair were 0.5 to 48 hs. The absolute and cumulative number of post-irradiation regenerated axillary shoots on 4 subsequent dates of cutoff were used as parameters to estimate radiosensitivity. From an economical point of view the interval of 4 hs between two dose fractions may be recommended for practice.

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