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The induced mutagenesis and the genetic progress in the work with sour cherry

We used radiation breeding for improving sour cherry varieties since 1958. X- and gamma-rays and also other physical factors have been applied to cuttings, seeds, flower parts and whole plants as well as in-vitro cultures. Doses of 30-60 Gy appeared to be most effective for inducing mutations when cuttings were irradiated. The main number of mutations occurred in  $M_1$  and  $M_2$ . Mutations were divided into 5 main classes concerning morphological characters, tree growth, dates of fruit bearing, biochemical composition, system of propagation. As a result of x-irradiation of a sour cherry/bird cherry hybrid "Padocerus", immune to Coccomyces hiemalis, a highly fertile mutant "Padocerus M" has been obtained. A dominant gene has been identified, controlling resistance to Coccomyces hiemalis. By obtaining "Padocerus M" the possibilities of increasing the genetic resources have been expanded. "Almaz" is the monogenic donor of resistance to C. hiemalis. In literature there are indications of the possibility of obtaining apomictic forms by mutagenesis. As a result of irradiating "Padocerus" plants in the gamma field during three years a mutant has been found in which the basic mass of seeds is formed as a result of apomixis-autonomous diplosporic parthenogenesis. Apomixis seems to be controlled by a small number of major and minor genes. The mutant is called "Padocerus A" and is used in hybridisation with other sour cherry varieties; segregation for the apomictic type of propagation has been found.

A population of Prunus fructicosa has been studied in the region of the so-called Tatar bank in the Tambov district. Large-fruited forms have been selected which may be the result of accumulating spontaneous mutations. Mutations of a different type have been obtained when using chemical mutagens or a laser beam.

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Isolation of hardy and high-yielding mutants in citronella (Cymbopogon winterianus)

Citronella bears an essential oil of medicinal and aromatic importance. But little has been done for its genetic improvement. It is a clonally propagated crop and the genetic variability is too low for effective selection. Besides, various reproductive anomalies limit the scope for cross-breeding. With this in view, a mutation induction experiment was conducted. This crop is mostly grown in marginal lands and hardy genotypes are required. Exposure of vegetative slips of an improved strain (KS-CW-S-I) to x-rays at 3,6 and 9kR paved the way for selection of 53 elite  $M_1V_2$ clumps on the basis of the yield component characters. Mass screening under minimal cultural practices in a drought-prone zone in Western Orissa (India) led to identification of 16 potentially hardy clones (OJC-12 from 3kR, OJC-1, 3, 11, 18 and 20 from 6kR and OJC-4, 5, 6, 15, 21, 22, 24, 26, 30 and 31 from 9kR). The clones were planted with 3 replications in mid-monsoon, established during the remaining months of monsoon and grown thereafter under minimal cultural practices, i.e. no manure, fertiliser, irrigation, weeding or plant protection. Data on yield of fresh leaf and oil extracted from fresh leaves were recorded at harvest 6 months after planting at 5 to 6 leaf stage. The results revealed a highly significant variation with regard to yield of both leaf and oil. Six clones out-yielded the mother line for leaf as well as oil, and two clones surpassed the mother line in leaf yield only. The performance of clone OJC-3 was particularly encouraging. With 1.25



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kg/plant leaf, 9.63cc/plant oil it superseded the yield of the mother line and other cultivars of this species (all around 0.6 kg/plant leaf, 5cc/plant oil) even when grown with irrigation.

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Evaluation of winter rye (*Secale cereale* L.) and triticale after using physical and chemical mutagens

It was decided to induce mutations separately in rye and triticale to obtain forms resistant to lodging. Seeds of rye cv. "Dankowskie Zlote" and triticale cv. "Lasko" were irradiated with fast neutrons and treated with MNH, rye cv. "LAD 2T80" was treated with only MNH. The mutant selection was made in M<sub>3</sub> and the progenies were evaluated with regard to plant height. In total, 226 changed forms were found, most of them shorter than the control. Some of them should be useful as a source of resistance to lodging.

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The use of plant tissue culture system in the mutagenesis of *Secale cereale* L.

Among cereals, *Secale cereale* L. is the worst species for "in vitro" mutagenesis. In the case of seed mutagenesis of rye each seed is expected to be a different genotype and only somatic embryogenesis assures propagation towards numerous individuals possessing the same genotype. Therefore, another system of in-vitro mutagenesis is explored. Immature embryos were isolated from spikes of field growing plants. The established cultures were irradiated with 0.5; 1.0 and 1.5 kR gamma rays on the first day of the culture and after 6 weeks in culture. After irradiation all cultures were subcultured. For mutagenesis in general uniformity of the original material is very important. Therefore, in rye, irradiation of regenerated somatic embryos may be a good approach.

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Effect of gamma radiation on immature winter wheat embryo culture

The aim was to study the effect of mutagenic treatment on callus initiation, shoot differentiation and enhancement of the variation frequency and spectrum. Seven winter wheat genotypes were used as donors for immature embryos. Spikes 14 days after anthesis were treated with 4 Gy gamma rays, then embryos were isolated. According to the effect of gamma rays on the callus induction frequency (CIF) the genotypes were divided into three groups. In the first group we observed CIF stimulation (Kiyanka, Stepnyak, UK-8, Ironovskaya 61) as compared with the control (C); the second group - CIF on the C level (Mironovskaya 808, Kharkovskaya II) and the third group - CIF is lower than in C (*Lutescens* 7). Regeneration frequency was reduced greatly in all genotypes under mutagenic treatment. Variation has been found for plant height, number of productive tillers, length of vegetation period, spike morphology and size, awn type.

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