

# FAO/IAEA International Symposium on Plant Mutation Breeding and Biotechnology



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## RADIATION EXPOSURE OF BARLEY SEEDS CAN IMPROVE PLANTS' DEVELOPMENT

Identification of mechanisms of plant adaptive response to weak external radiation exposure is a complex and interesting problem that might need consideration in plant biology. Such responses include the effect of radiation hormesis which is the stimulating effect of low doses of ionizing radiation. The reactions of barley seeds in terms of the root and sprout lengths, the germination rate and the root mass variation were studied after  $\gamma$ -irradiation with doses in the range of 2-50 Gy. The dose range in which plants' growth stimulation appear to occur was identified as being between 16 and 20 Gy. It was shown that increased size of seedlings after irradiation with stimulating doses was due to the enhancing pace of development rather than an earlier germination. The activity of most of the enzymes involved in plant germination and early growth notably increased within the range of doses that cause stimulation of seedlings development. The dose rate, the quality of seeds, their moisture and the time interval between irradiation and initiation of germination has a major influence on the manifestation of the effects of radiation. The experimental data were significantly better explained by mathematical models that consider the hormetic effect. It was shown that irradiation of seeds significantly influenced the development of plants throughout the vegetative period. The duration of the initial stages of ontogenesis was shortened, and the phase of full ripeness came on 5-7 days earlier than in the control. Various agronomic traits such as, the length of the stems, the weight of 1000 grains, the number of grains per ear, the number of productive stems, the weight of straw and ears showed notable increase. Our study showed that the dependence of traits, including economically important traits on the dose of  $\gamma$ -irradiation of seeds may be significantly better described by models that ponder the effects of hormesis. It was shown that realization of the effect of hormesis specifically depends on the conditions in which the plants developed.

### Country or International Organization

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