

FAO/IAEA International Symposium on Plant Mutation Breeding and Biotechnology



Contribution ID: 274

Type: Poster

THE USE OF GAMMA RADIATION TO GENERATE RESISTANCE TO FUSARIUM VERTICILLIOIDES IN MAIZE INBRED LINES

Fusarium verticillioides is associated with maize wherever it is grown. The fungus can reduce yield and grain quality, and this is exacerbated by the production of toxic secondary metabolites, called fumonisins. Plant resistance is the best means to control *F. verticillioides*, but such resistance is not readily available in existing maize cultivars. In this study, gamma irradiation was used to generate genetic variability for resistance to *F. verticillioides* and fumonisin accumulation. The irradiation procedure was optimised on a maize hybrid (CRN3505) and subsequently evaluated on three inbred lines (I-9, I-34 and CB-248). Percentage germination, seedling survival and plant height was measured at 7, 21 and 35 days after irradiation (dai) to determine the effective radiation dosage. The seedling height of CRN3505 was significantly affected 7 and 21 dai at <150 Gy. Radio-sensitivity was displayed by lines I-34 and CB-248 at <200 Gy at 7 dai, but inbred line I-9 was only significantly affected at 21 and 35 dai. Approximately 7 000 kernels of seven elite maize inbred lines were then irradiated at a dosage of 250 Gy and field planted. Plants were self-pollinated and artificially inoculated with *F. verticillioides*. All plants that developed <10% FER (Fusarium ear rot) were retained and replanted the next season. They were analysed for FER severity, fungal biomass and fumonisin production at the M4 stage. Field testing revealed that four M4 mutant lines from inbred I-9, five from I-16, six from I-37, three from CB-222 and six from CB-248 were resistant to FER and fumonisin accumulation. These lines can be used to develop *F. verticillioides*-resistant hybrids or serve as donors of resistance alleles for high yielding inbred lines. The comparison of mutated and non-mutated lines could aid in the identification and isolation of resistance genes.

Country or International Organization

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Track Classification: Mutation breeding for adaptation to climate change in seed propagated crops