

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



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## SCREENING PROTOCOLS FOR HEAT TOLERANT MUTANTS IN RICE

Breeding heat tolerant rice is one of several strategies to mitigate the effect of climate change, particularly in major rice growing regions that are vulnerable to increased temperatures. We present simple, robust pre-field screening protocols that would allow plant breeders to screen for enhanced tolerance to heat stress in rice in a breeding programme using a controlled environment. The protocols are based on the use of a hydroponics system and/or pot experiments in a glasshouse in combination with a controlled growth chamber where the heat stress treatment is applied. The methods include a new protocol for screening heat tolerance of rice at the seedling stage: young seedlings were exposed to heat stress of 45°C/28°C; the seedling test takes 4-5 weeks and involves the visual scoring of symptoms which allows hundreds of seedlings to be evaluated in a short time. The visual screening method was validated through laboratory, glasshouse, and field-based experiments. We also provide a protocol for screening heat tolerant mutant lines at the flowering (reproductive) stage that has been specifically adapted for a mutation breeding program. Here, plants were treated from the first day of anthesis at different temperatures (35.0-39.0°C/28°C) for different durations and spikelet fertility at maturity was determined as a parameter to assess the heat tolerance of the selected genotypes. Selected heat tolerant mutant rice genotypes were tested for physiological and biochemical indicators associated with the pre-field screen protocols. Furthermore, the candidate heat tolerant mutant lines were also tested in the field in hot spot areas in Cuba, Pakistan and the United Republic of Tanzania to evaluate their performance under field conditions in heat stressed growing environments.

### Country or International Organization

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