Chapter 4
Conclusion

In conclusion, the comparison of candidate mutant rice lines with controls (standards) using various physiological and biochemical indicators showed that the selected heat tolerant mutant lines exhibited less electrolyte leakage and reduced levels of MDA, both indicative of improved plant performance under stress.

These results indicated that response of rice to heat stress tolerance could be assessed at the seedling and reproductive stages. There is a close correlation between the screening results of seedlings and plants at reproductive stages in the field and the laboratory—physiological and biochemical—of these genotypes, thus validating that the protocols developed can reliably identify heat stress tolerant genotypes in a mutation breeding program. Moreover, the field data showed good correlations with the pre-field screening results at both the seedling and flowering stages, with ~70% of the heat tolerant genotypes screened during the pre-field tests showing improved heat tolerance in the field. Thus, reducing the numbers from a few thousands to less than 100 potential individuals or lines that can be tested further in the field where they can be validated under more rigorous field conditions using replicated row or plot trials. This important finding indicates that heat tolerant genotypes may be selected in the green house/growth chamber conditions prior to field trials.

Heat stress tolerance may involve different mechanisms. These protocols are primarily designed to be used by rice breeders who need practical high-throughput screens to process large populations such as mutant populations, but also segregating populations, advanced generations and germplasm collections for heat stress tolerance. The techniques described here can facilitate the identification of different sources of heat stress tolerance offering opportunities for pyramiding traits and developing high yielding heat tolerant rice varieties. Thereby developed protocols allow plant breeders to screen large rice germplasms in growth chamber conditions

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at the seedling as well as reproductive stage to identify the potential resilience of rice mutant population/lines to heat stress and to define phenotypic and physiological traits that are associated with heat stress adaptation.