INTRODUCTION

The current rate of climate change predicts that plants will become subject to increasing extremes of environmental stress. Rapid population increases in developing countries also demand higher yield from crop production, often from sub-optimal agricultural areas. Genetic engineering can help meet these needs through the development of crops with greater stress tolerance. Mediator is transcriptional co-activators which convey DNA bound transcriptional regulators and enhancers to the general RNA polymerase II transcription machinery and mediator genes are recently identified in plants (Fig. 1). So far it has showed their great involvement in regulation of plant stress tolerance by controlling transcription of stress genes (Fig. 2). SFR6 (SENSITIVE TO FREEZING6) is one of plant mediator protein which has identified first with its involvement to tolerance against freezing in Arabidopsis. The freezing sensitivity of sfr6 mutant is lack of expression of downstream genes in CBF cold response pathway (Fig. 3). Apart from that there was preliminary evidence that sfr6 mutant is sensitive for other biotic and abiotic stresses. Therefore, the objective of this research was to screen the involvement of SFR6 to regulate other environmental stresses.

MATERIALS AND METHODS

To examine the role of Med 16/SFR6, AtSFR6/A. thaliana was over-expressed in wild type Arabidopsis and sfr6-1 mutant. Then freezing sensitivity and KIN2 expression were measured in transgenic plants. To examine the sensitivity of sfr6 mutant to different environmental stresses, sfr6 mutants were subjected to range of environmental stresses along with wild type Arabidopsis. Homologue was cloned from rice and its orthology was tested transferring OsSFR6 to sfr6-1 mutant.

RESULTS

Complementation of sfr6-1 mutant by wild type AtSFR6

Introducing the wild type SFR6 gene into the sfr6-1 mutant should rescue the mutant phenotype. This assay shows that AtSFR6 transmembrane sfr6-1 mutant compliments mutant phenotypes. The transgenic rescue seedling colour from yellow green to dark green, the plants regain freezing tolerance (Fig. 4A), and express KIN2 gene to wild type levels (Fig. 4B).

Sensitivity of sfr6 mutants to UV radiation and biotic stresses

Sensitivity of sfr6 mutants to range of environmental stresses were tested and found, in addition to known roles of SFR6, SFR6 also has roles in protecting mutants to range of environmental stresses were tested and found, in addition to known roles of SFR6, SFR6 also has roles in protecting against UV irradiance and pathogen infection in Arabidopsis, by showing reduced level of UV (Fig. 6) and pathogens (Fig. 7) induced gene expression.

CONCLUSION

Results demonstrate the requirement of SFR6/ME16 for the activation of many but not all stress response gene expression, and indicated conserved AtSFR6 function in rice. However, the mechanism of regulation of stress induced gene expression via SFR6/ME16 remains to be further investigated. The future research on specific roles of individual subunits and of the whole complex of plant mediator will widen our knowledge of the transcriptional regulation of gene expression in plant and will create new routes to improve crop tolerance to environmental stresses.

REFERENCES


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