

## CHAPTER IV

### CONCLUSIONS

1. By functional analyses and BLAST searches of the TIGR rice database, a maximum number of 243 proteins that possibly have EF-hand motifs were identified in the rice genome.
2. Using a neighbor-joining tree based on amino acid sequence similarity, a group of genes encoding CaM and CML proteins that do not possess functional domains other than the Ca<sup>2+</sup>-binding EF-hand motifs was identified which include one group of 5 loci defined as *Cam* genes and five groups of 32 *CML* genes.
3. The five *Cam* genes encode three different CaM isoforms of 148 amino acids in length comprising four EF-hand motifs and sharing more than 98% amino acid sequence identity with typical CaMs from other plant species and to one another.
4. OsCML proteins consist of 145 to 250 amino acids which comprise 1-4 EF-hand motifs and share between 30.2% to 84.6% of amino acid sequence identity with OsCaM1.
5. Out of 37 *OsCam* and *OsCML* genes, 13 genes contain intron(s) and all *OsCam* genes contain a single intron which interrupts their coding region within the codon encoding Gly26, a typical rearrangement of all plant *Cam* genes.
6. *OsCam* and *OsCML* genes are distributed across 11 chromosomes of rice of which several pairs of closely related genes are located within duplicated genome segments indicating that they have arisen through segmental duplication.
7. Rice and Arabidopsis plants appear to have more or less similar numbers of EF-hand-containing and CaM-like proteins.

8. Each of the five *OsCam* and *OsCML1* genes are expressed in leaves, roots, flowers, seeds and calli.
9. Sequence alignments of the isolated cDNAs of *OsCam1-1* and *OsCML1* genes from KDML105, an indica rice and those from Nipponbare, a japonica rice indicated that they are highly conserved, especially the *OsCam1-1* gene.
10. In leaves of both KDML105 and FL530, salt stress increased the mRNA level of *OsCam1-1* whereas, in roots, the expression of *OsCam1-1* gene was not induced by salt stress during 4 hours of treatment compared with controls.
11. Spraying increased the expression of *OsCam1-1* mRNA of KDML105 leaves and roots but it did not have an effect on the induction of *OsCam1-1* gene in leaves and roots of FL530.
12. ABA did not have an effect on the induction of *OsCam1-1* gene in FL530 leaves. Conversely, ABA probably counters the effect of *OsCam1-1* induction of KDML105 leaves by spraying as well as by salt stress.
13. ABA increased the expression of *OsCam1-1* gene in roots of both KDML105 and FL530 suggesting its role in mediating ABA actions in roots.
14. In FL530 roots with exogenous ABA application, the induction of *OsCam1-1* mRNA level occurred to a lesser extent without salt stress treatment and was prolonged under salt stress indicating that *OsCam1-1* gene has an important role in salt stress response mediated by ABA in rice plants.