**Thesis title:** Behaviour of osmotin protein as cell signaling modulator  
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**Abstract.**  
With increase in the number of completed genomes being published, determining protein function is one of the most important problems of this post-genomic era. In this study, we integrated knowledge based approach with the available standalone as well as online softwares for database searching, homology matching and molecular simulations to get an insight, albeit theoretically, into the behaviour of osmotin as cell signalling molecule. The molecular mechanism by which osmotin modulates the cell signalling cascade especially for proline accumulation and biosynthesis, leading to the adaptations by plants against stress, would be of great importance to the plant scientists.  
On the basis of evidences obtained in our study, we have concluded that apart from antifungal activity, osmotin and its subfamily proteins at molecular level act as cell signalling molecule(s) through a signaling cascade employing HHP1 receptor, β-arrestins like protein and ERK MAP kinases. Using this cascade, they modulate proline metabolism in plants by regulating gene expressions of proline biosynthetic and proline catabolic enzymes, through transcription factor (AtbZIP25). At protein level these signaling molecule enhance synthesis and accumulation of proline in plants by increasing the activity of proline biosynthetic enzyme (P5CS1) while down regulating the activities of proline catabolic enzymes (PROD and P5CDH)] via phosphorylation leading to overall increase in proline biosynthesis and accumulation.