Genome-wide identification of Phosphate Starvation Response1-like binding (P1BS) element in the promoter region of genes in rice

Phosphate deficiency induces the expression of transcription factors like Phosphate Starvation Response1 (PHR1) resulting in the increased expression of Phosphate Starvation-Induced (PSI) genes, cellular Pi concentration, thereby maintaining metabolic processes and thus growth. The PHR1 and PHR1-Like1 (PHL1) are the key regulatory transcription factors belonging to the myeloblastosis (MYB)-type transcription factor family controlling plants' response to Pi starvation. When plants are exposed to deficient Pi condition, PHR1 and PHL1 binds to a cis-element of imperfect palindromic sequence (5'-GNATATNC-3' _ UniProtKB Q94CL7), termed as P1BS element (PHR1-binding site), present in the promoter region of the gene, thereby inducing its expression. Although, PHR1 and PHL1 are known to regulate the PSI genes, but Aleksza et al. (2017) showed that the gene Δ1-pyrroline-carboxylate synthetase (*P5CS1*) which is induced by osmotic stress and ABA and involved in the synthesis of proline is also regulated by PHR1 and PHL1. The gene *P5CS1* possess the P1BS motif in the first intron which is the binding site for these transcription factors. According to this study, PHR1 and PHL1 are also involved in drought response suggesting a wider role of these transcription factors. Therefore, it is hypothesised that all those genes whose promoter region possess the P1BS element is regulated by PHR1 and PHL1, and that these transcription factors play a larger role in other abiotic stresses. The objectives to prove the hypothesis are as follows:

OBJECTIVES:

1. Identification of P1BS motif in the promoter region of whole genome sequence in rice through *in silico* analysis.
2. Validation of identified genes in rice by expression analysis under various abiotic stresses.

P1BS- Phosphorus Starvation Response 1 Binding Site

PHR1- Phosphorus Starvation Response 1

PHL1- Phosphorus Starvation Response 1