Abstract
Deletion of the PHO91 Gene Leads to Impaired Ability to Consume Methanol in Cells of the Methylotrophic Yeast Ogataea Parapolymorpha †

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Abstract: The PHO91 and PHO87 are parts of yeast’s phosphate metabolism system. We investigated the influence of PHO91 deletion on the methanol utilization as a sole carbon source in Ogataea parapolymorpha through comparison of wet biomass, protein content, methanol oxidase (MOX) activity and acid-soluble and acid-insoluble inorganic polyphosphate (polyP) content, while growing on methanol and without any carbon source other than trace amounts from the yeast extract. The Δpho91 strain has a lack of wet biomass, protein content and MOX activity while grown on methanol (as a ΔMOX strain) and has the same numbers as a WT strain in media without methanol. We found two ways of recovering methanol utilizing capabilities for Δpho91 mutant—either adding MOX on plasmid under constitutive promoter control, or adding a Δpho87 mutation. Both Δpho91 + MOX and Δpho91Δpho87 strains showed all the parameters as a WT strain on methanol as a sole carbon source and without methanol addition. Further, we compare the polyP content of the strains in methanol media, media without a sole carbon source and media with glucose. All of the WT, Δpho91 + MOX and Δpho91Δpho87 strains showed all the parameters as a WT strain on methanol as a sole carbon source and without methanol addition. Further, we compare the polyP content of the strains in methanol media, media without a sole carbon source and media with glucose. All of the WT, Δpho91 + MOX and Δpho91Δpho87 strains, capable of utilizing methanol, have the Pi, acid-soluble and acid-insoluble polyP at the same levels with some variations. The ΔMOX and Δpho91 strains, despite both not being able to utilize methanol, showed very different levels of Pi and polyP’s, which can be interpreted as different mechanisms of the inner cell, leading to a loss of capability utilizing methanol in both of these strains.

Keywords: PHO91; methanol utilization; yeasts; Ogataea parapolymorpha

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