An objective of the present invention is to provide a *Saccharomyces sp.* microorganism having improved productivity of lactic acid.

Another objective of the present invention is to provide a method for producing lactic acid using the *Saccharomyces sp.* microorganism.

[Summary of Invention]

In a first aspect, the present invention is directed to an isolated Saccharomyces cerevisiae microorganism having enhanced productivity of lactic acid, wherein the microorganism is modified so that a) the activity of pyruvate decarboxylase (PDC) of the microorganism is decreased compared to that of a non-modified lactic acid-producing strain; and b) the activities of aldehyde dehydrogenase (ALD) and acetyl-CoA synthetase (ACS) of the microorganism are enhanced compared to that of the non-modified lactic acid-producing strain. In another aspect, the present invention refers to a method for producing lactic acid comprising a) culturing the microorganism according to the present invention in the culture medium; and b) recovering lactic acid from the culture medium or the microorganism in step a).

[Technical Solution]

In one example, there is provided a *Saccharomyces sp.* microorganism having improved productivity of lactic acid, in which the microorganism is mutated so that (a) the activity of pyruvate decarboxylase is decreased compared to that of a non-mutated lactic acid-producing strain; and (b) the activities of aldehyde dehydrogenase and acetyl-CoA synthetase are improved compared to that of a non-mutated lactic acid-producing strain.

Generally, a lactic acid-producing *Saccharomyces sp.* microorganism produces lactic acid via lactic acid dehydrogenase (LDH) using pyruvate as a substrate. Ethanol fermentation pathway and acetayl-CoA production pathway, the representative metabolic pathways utilizing pyruvate as a common substrate, were blocked. Decreasing PDC activity may be helpful in the production of lactic

acid and the yield improvement thereof, however, when the level of decrease reached a certain level, insufficient amount of cytosolic acetyl-CoA was produced, which in turn, blocked the cell growth, and thus the normal fermentation was not achieved. Accordingly, the present inventor developed a *Saccharomyces sp.* microorganism having improved productivity of lactic acid by improving the overall lactic acid fermentation productivity, in which the growth rate of the microorganism was maintained with improved lactic acid productivity yield by regulating the acetyl-CoA pathway at a minimum level.

The term "pyruvate decarboxylase (PDC) used herein refers to a protein having an activity capable of mediating a reaction responsible for producing carbonic acid and acetaldehyde from