Saccharomyces cerevisiae strains suitable for the production of baker's yeasts which are osmotolerant and which exhibit intrinsic resistance to weak organic acids, methods for the preparation thereof and uses

PARENT APPLICATION

The present application claims the priority of French application number FR 1151354 filed on February 18, 2011~~, the content of which is incorporated by way of reference~~.

FIELD OF THE INVENTION

The present invention relates to the field of *Saccharomyces cerevisiae* strains capable of producing baker's yeasts, for the methods for the preparation thereof, to the baker's yeasts produced from these strains, to the baker's dough(s) containing them and also to the breadmaking methods and bread products which can be obtained using these doughs. More especially, the present invention relates, in its most general aspect, to "industrial" *Saccharomyces cerevisiae* strains capable of producing baker's yeasts which are osmotolerant and which exhibit intrinsic resistance to weak organic acids.

PRIOR ART

Document WO 96/38538 teaches yeasts derived from improved *S. cerevisiae* strains which exhibit increased osmotolerance in that they give off gases (production of CO_2) advantageous in loaf doughs containing high concentrations of sugar from 16% to 25% (baker's percentages). This document is silent as to the behavior of these yeasts in the presence of mold inhibitors, such as weak organic acids.

Document US 4 318 991 discloses a process for the production of baker's yeasts which have a high fermentative activity in a baker's dough even in the presence of mold-inhibiting agents, such as weak organic acids, for instance acetic acid or propionic acid. This process comprises a step of adding such an acid, in particular during the multiplication of the yeast, in the final stage of its propagation so as to "adapt" the yeast to said acid, in particular present in

CLAIMS

1. A ~~*S.*~~ *Saccharomyces cerevisiae* strain ~~which can be~~ obtained by means of a hybridization process or of a random mutation process of the industrial strain of ~~*S.*~~ *Saccharomyces cerevisiae* deposited on July 8, 2010 with the CNCM under No. I-4341, or from an industrial strain related thereto via its Ty profile and/or via quantitative trait locus mapping (QTL mapping), ~~characterized in that it is capable of producing~~ wherein said *Saccharomyces cerevisiae* strain is capable of producing, by multiplication in the absence of adaptation to the presence of weak acid(s), a baker's yeast which exhibits osmotolerance and an intrinsic resistance to weak organic acids.

2. The *Saccharomyces cerevisiae* strain ~~as claimed in~~according to claim 1, ~~characterized in that said~~ wherein the hybridization process comprises a step of hybridization of ~~said~~ the industrial strain with the strain deposited on February 9, 2011 with the CNCM under No. I-4448 and at least one step of selection of the hybrid obtained, wherein the step of selection is selected selected from the group consisting of:

   i. measuring a fermentative activity using, ~~measured with~~ a Burrows and Harrison fermentometer in at least one of tests A5' and A6', wherein the hybrid selected is~~being~~ such that its gas release is at least 10% ~~and preferably from 15% to 25%~~ greater than that of a control strain consisting of the ~~*S.*~~ *Saccharomyces cerevisiae* strain deposited on July 8, 2010 with the CNCM under No. I-4341,

   ii. measuring a proof time in a No-Time Dough scheme on dough containing, in baker's percentages, 15%, 18%, 23% or 25% of sugar ~~(baker's percentages)~~ in the presence of 0.4% of calcium propionate, wherein the hybrids selected ~~being capable of producing~~produce baker's yeasts by multiplication, in the absence of adaptation to calcium propionate, which give a proof time of between 85% and 105% ~~and preferably between 95% and 105%~~ of the proof time given by a control baker's yeast produced from the industrial strain of ~~*S.*~~ *Saccharomyces cerevisiae*

deposited on July 8, 2010 with the CNCM under No. I-4341 by multiplication with adaptation to the presence of calcium propionate of said strain.

3. The *Saccharomyces cerevisiae* strain ~~as claimed in~~according to claim 2, wherein said strain was deposited on May 11, 2010 with the CNCM under No. I-4312.

4. The *Saccharomyces cerevisiae* strain ~~as claimed in~~according to claim 2, wherein said strain was deposited on May 11, 2010 with the CNCM under No. I-4313.

5. The *Saccharomyces cerevisiae* strain ~~as claimed in~~ according to claim 1, ~~characterized in that said~~ wherein the random mutation process comprises a step of mutagenesis of ~~said~~ the industrial strain and at least one step of selection of the mutant obtained, wherein the step of selection is selected ~~chosen~~ from the group consisting of:

   i. measuring a fermentative activity using, ~~measured with~~ a Burrows and Harrison fermentometer in test A5'', wherein the mutant selected is~~being~~ such that its gas release is from 5% to 20% greater than that of a control strain consisting of the ~~S.~~ *Saccharomyces cerevisiae* strain deposited on July 8, 2010 with the CNCM under No. I-4341;

   ii. measuring a proof time in a No-Time Dough scheme on dough containing, in baker's percentages, 15%, 18% or 23% of sugar ~~(baker's percentages)~~ in the presence of 0.4% of calcium propionate, wherein the mutant selected ~~being capable of producing~~produces baker's yeasts by multiplication, in the absence of adaptation to calcium propionate which give a proof time of between 90% and 105% of ~~that~~ the proof time given by a control baker's yeast produced from the ~~S.~~ *Saccharomyces cerevisiae* strain deposited on July 8, 2010 with the CNCM under No. I-4341 by multiplication with adaptation to the presence of calcium propionate of said strain.

6. The *Saccharomyces cerevisiae* strain ~~as claimed in~~according to claim 5, wherein said strain was deposited with the CNCM under No. I-4409.

7. The *Saccharomyces cerevisiae* strain ~~as claimed in~~according to claim 5, wherein said strain was deposited with the CNCM under No I-4410.

8. A baker's yeast ~~which can be~~ obtained by multiplication, without adaptation to the presence of weak acid(s), of a strain ~~as claimed in~~according to any one of claims 3, 4, 6 or 7 or obtained by means of ~~a~~ the process ~~as claimed in~~defined in any one of claims 1, 2 and 5.

~~9. A baker's yeast which can be obtained by multiplication, with adaptation to the presence of weak acid(s), of a strain as claimed in any one of claims 3, 4, 6 or 7 or obtained by means of a process as claimed in any one of claims 1, 2 and 5.~~

~~10.~~9. A baker's dough comprising ~~containing~~ a baker's yeast ~~as claimed in~~according to claim 8 ~~or 9~~.

~~11.~~10. The baker's dough ~~as claimed in~~according to claim ~~10~~9, ~~characterized in that it is chosen~~ wherein said dough is selected from doughs in which the fermentation is carried out both in the presence of an osmotic pressure due to the presence of at least 15% of sugar~~,~~ ~~preferably at least 18% of sugar and more preferably at least 23% of sugar (baker's percentages)~~ and in the presence of a mold inhibitor of weak organic acid type, preferably in the form of calcium propionate, wherein the percentages are baker's percentages.

~~12.~~11. A process for preparing a baked bread product by using a baker's dough ~~as claimed in either one of claims 10 and 11~~ according to claim 10.

~~13.~~12. A bread product ~~which can be~~ obtained by means of the process ~~as claimed in~~according to claim ~~12~~11.

13. A method for obtaining a *Saccharomyces cerevisiae* strain which is capable of producing, by multiplication in the absence of adaptation to the presence of weak acid(s), a baker's yeast which exhibits osmotolerance and an intrinsic resistance to weak organic acids, said method comprising a hybridization process or a random mutation process of the industrial strain of *Saccharomyces cerevisiae* deposited on July 8, 2010 with the CNCM under No. I-4341, or from an industrial strain related thereto via its Ty profile and/or via quantitative trait locus mapping (GTL mapping).

14. The method according to claim 13, wherein the hybridization process comprises a step of hybridization of the industrial strain with the strain deposited on February 9, 2011 with the CNCM under No. I-4448 and at least one step of selection of the hybrid obtained, wherein the step of selection is selected from the group consisting of:

i. measuring a fermentative activity using a Burrows and Harrison fermentometer in at least one of tests A5' and A6', wherein the hybrid selected is such that its gas release is at least 10% greater than that of a

control strain consisting of the *Saccharomyces cerevisiae* strain deposited on July 8, 2010 with the CNCM under No. I-4341,

ii. measuring a proof time in a No-Time Dough scheme on dough containing, in baker's percentages, 15%, 18%, 23% or 25% of sugar in the presence of 0.4% of calcium propionate, wherein the hybrids selected produce baker's yeasts by multiplication, in the absence of adaptation to calcium propionate, which give a proof time of between 85% and 105% of the proof time given by a control baker's yeast produced from the industrial strain of *Saccharomyces cerevisiae* deposited on July 8, 2010 with the CNCM under I-4341 by multiplication with adaptation to the presence of calcium propionate of said strain.

15. The method according to claim 13, wherein the random mutation process comprises a step of mutagenesis of the industrial strain and at least one step of selection of the mutant obtained, wherein the step of selection is selected from the group consisting of:

i. measuring a fermentative activity using a Burrows and Harrison fermentometer in test A5'', wherein the mutant selected is such that its gas release is from 5% to 20% greater than that of a control strain consisting of the *Saccharomyces cerevisiae* strain deposited on July 8, 2010 with the CNCM under No. I-4341,

ii. measuring a proof time in a No-Time Dough scheme on dough containing, in baker's percentages, 15%, 18% or 23% of sugar in the presence of 0.4% of calcium propionate, wherein the mutant selected produces baker's yeasts by multiplication, in the absence of adaptation to calcium propionate, which give a proof time of between 90% and 105% of the proof time given by a control baker's yeast produced from the *Saccharomyces cerevisiae* strain deposited on July 8, 2010 with the CNCM under I-4341 by multiplication with adaptation to the presence of calcium propionate of said strain.