

酵母菌杂交育种 I. 酵母菌麦芽糖基因对麦芽糖发酵力的效应

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摘要 为了研究酵母菌麦芽糖基因对麦芽糖发酵力的效应, 我们从酵母菌分离出4个不连锁的麦芽糖基因。MALA, MALB和MALC是从啤酒酵母分离出的, MAL6是从卡尔斯伯酵母分离出的。用显微操作技术共组成20种不同基因组合和“个杂种。用不同基因型的二倍体杂种测定麦芽糖基因对麦芽糖发酵力的效应, 结果表明: (1)根据单因子杂种产生CO₂的量可分为两类杂种, 含MALA和MALB单因子杂种比含MALC和MAL6单因子杂种产生的CO₂量多。(2)含MALA与MALB基因的纯合子与杂合子麦芽糖发酵力一样, 而含其余两个基因的纯合子比杂合子产生CO₂量多。(3)双因子杂种产生CO₂的量变化很大(2.8-4.9克), 值得注意的是双因子杂种(MALB x MALA)产生的CO₂量最高, 同时发现凡由MALB与另一MAL基因组成的双因子杂种表现出麦芽糖发酵力的相加效应(杂种优势), 而由其他三个MAL基因组成的双因子杂种发酵力和亲株一样。(4)多因子杂种(三因子、四因子杂种)麦芽糖发酵力和其双因子杂种相同。这些实验结果提示在MAL基因和麦芽糖发酵力间有明显的相关性。

关键词

分类号

HYBRIDIZATION AND SELECTION OF YEASTS EFFECT OF MALTULOSE GENES ON MALTULOSE FERMENTATION ABILITY IN SACCHAROMYCES

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Abstract

In an attempt to examine the effect of maltose genes (MAL genes) on maltose fermentation in yeast, we have isolated 4 unlinked MAL genes from two species of Saccharomyces. MALA, MALB, and MALC (not yet identified with standard MAL genes) were derived from Saccharomyces cerevisiae and MAL6 from Saccharomyces carlsbergensis. Twenty different combinations of these 4 MAL genes and 65 hybrids were constructed by means of micromanipulation technique. In our test with diploid hybrids of different genotypes to examine the effect of MAL genes on maltose fermentation ability, the data are presented in Table 3 and can be summarized as follows.

(1) Two different groups of hybrids can be distinguished on basis of the CO₂ production by hybrids, containing one of the 4 MAL genes. The two monohybrids, containing one of MALA and MALB genes produced more CO₂, than other two monohybrids, containing MALC and MAL6.

(2) The activity of maltose fermentation is very similar in homozygotic and heterozygotic hybrids, containing MALA and MALB. However, homozygotic hybrids containing MALC and MAL6 produced more CO₂ than their heterozygotes

(3) The total amount of CO₂ produced by diploids heterozygous for two MAL genes varied over a wide range (2.8-4.9). Also noteworthy is the highest level of CO₂ production by dihybrids (MALB x MALA). An additive effect of maltose fermentation ability of dihybrids constructed with MALB gene and one of other 3 MAL genes was observed (heterosis). In contract to these hybrids, the level of CO₂ production by dihybrids constructed with MALA, MALC and MAL6 appears slightly hialier than that of their parental strains.

(4) The ability of maltose fermentation in polyhybrids (trmydrilas ana tetrahvbrids) is almost identical with their dihybrids.

These results suggest an obvious correlation between MAL genes ana the maltose fermentation ability in hybrids yeasts.

Key words

扩展功能

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