BEST PRACTICES

DIASTATICUS

WHAT IS S. CEREVISIAE VAR. DIASTATICUS?

Saccharomyces cerevisiae var. diastaticus is a variance of *S. cerevisiae* that possess STA (1, 2 or 3) genes. These genes cause yeast to produce and excrete glucoamylase. Glucoamylase is an enzyme that hydrolyzes α-1,4 and α-1,6 linkages in dextrins. This then produces smaller, simple sugars that the yeast can take into the cell, which causes a very high degree of attenuation (>90%). Diastaticus is also known to be temperature and alcohol tolerant.

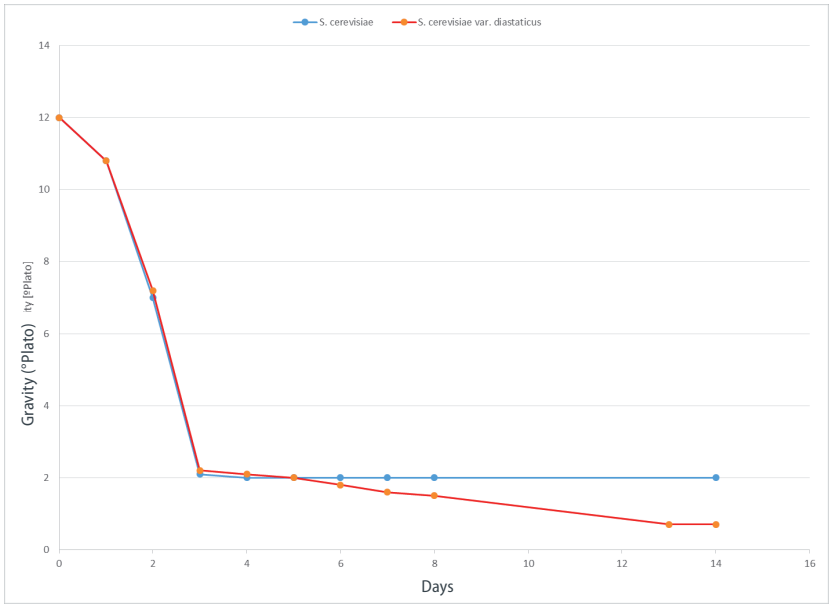
But when handled correctly, *S. cerevisiae var. diastaticus* is a magnificent yeast that can produce great flavors and beers.

WHAT ARE COMMON SOURCES OF DIASTATICUS CONTAMINATION?

Diastaticus is found in many environments. Because of this, cleaning and sanitation are highly important. We encourage you to speak with your local chemical representatives to establish a cleaning and sanitation regimen conducive to your brewery and specific needs.

Sources:

- Poor Hygiene
  - Bottling/canning lines (>70% of reported cases)*
  - Brewhouse
  - Fermentation cellar
  - Storage cellar
- Raw Materials
  - Yeast
  - Hop (dry hopping)

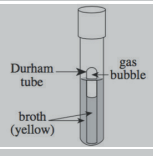


Saccharomyces cerevisiae **fermentation vs** *S. cerevisiae var. diastaticus*

HOW CAN I DETECT IT?

There are a handful of options for detection of diastaticus - lets focus on plating, PCR, overattenuation tests, and monitoring.

There is no selective media yet available to distinguish diastaticus. The methods provided below are other options, but each have their own challenges.

NAME	DESCRIPTION	PROS	CONS
LCSM Plates	Lin's Cupric Sulfate Medium – used for the detection and quantitative determination of wild yeast populations in brewing culture yeast.	• Low cost	• Non -diastaticus strains can grow on this media which can produce false negatives • Low sample volume
Starch Plates	Plates with high starch content - S.cerevisiae cannot ferment starch but S. cerevisiae var. diastaticus can – will see growth if diastaticus is in sample.	• Low cost	• Low sample volume • Only detects presence or absence
PCR Genetic Test	PCR is a common laboratory technique that can detect the presence or absence of specific DNA fragments.	• Fast and specific results	• Initial investment required (approx. $10k) •Non-quantitative • Low sample volume
Real time PCR (qPCR)	Real Time PCR is a more sensitive PCR technique that quantifies the amount of the targeted DNA that is present in the sample.	• More sensitive than regular PCR • Faster than regular PCR • Quantitative results	• Higher initial investment required (approx. $50-80K) • Low sample volume
Modified Durham Test 	This is a simple test that is run by adding 1g or 1 ml of yeast to fully attenuated beer and monitoring possible gas production over 2 weeks.	• Low cost • Can detect small amount of diastaticus cells (ex: 10 cells of *S. cerevisiae var. diastaticus* in 1 billion cells of brewer's yeast)	• Long waiting time – up to 2 weeks • Dry yeast might give false positive results due to more robust cells • Low sample volume
Ankom Test	A shake flask test, Similar to modified Durham test for 25g sample.	• Shorter wait time; • Larger sample volume (25g vs 1g of Modified Durham Test)	• Intracellular storage carbohydrates will produce gas as well and can give false positive results

NOTES: For packaging breweries – Run sensory & monitor beers over time – have a beer library available to screen; check the alcohol and CO2 levels. Take any off flavors into consideration as a contamination. Documentation is highly important to notice any deviations.

* Meier-Dörnberg, T., Jacob, F., Michel, M., & Hutzler, M. (2017). Incidence of *Saccharomyces cerevisiae var. diastaticus* in the Beverage Industry: Cases of Contamination , 2008 – 2017, 54(4), 140–148.

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