



# Commercial Forms of Fermented Sesame Cake By S. Boulardii

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# Outline

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# Introduction

- **Sesame** (*Sesamum indicum* L.) is a plant of high nutritious value with a high amount of **proteins** composed mainly of sulfur-amino acids (methionine), **essential fatty acids**, **vitamins and minerals**, amongst them, **calcium** is found in high concentration .
- When calcium content is compared to traditional calcium sources, such as cow milk (123 mg of calcium/100 mL of milk) , high calcium concentration (1500 mg/100 g) is obtained from sesame .



- The process of extraction of sesame oil by mechanical press, semi-defatted sesame cake (SDSC) .
- Sesame seeds also contain a large group of fat-soluble antioxidants (sesamin, sesamol, sesamolin and tocopherols), which play an important role on health-promoting effects, acting especially against oxidative processes in cells .
- Sesame cake is also a very interesting source of crude fiber (10.8 g/100 g) .
- Moreover, sesame cake contains anti-nutritional factor known as phytate hinders its use for human.

## Important to know :

- Sesame oil cake must be used directly after the processing because if left at room temperature ( 20-25 C) it will be **spoiled**.
- This means that it comprises of good nutritional sources for microorganisms.
- We can use it to feed beneficial microorganisms.

- Microorganisms play an important role in our health.
- probiotics, such as *Lactobacillus* , bifidobacteria and *Saccharomyces boulardii* were reported to be healthful and promote host health by balancing the gut microsystem.
- *Saccharomyces boulardii* was chosen to be used on sesame oil cake as probiotic .
- *S. boulardii* is known to produce phytase that can hydrolyze phytate.

# *Saccharomyces boulardii*

The nonpathogenic yeast *Saccharomyces boulardii* has been prescribed in the past 30 years for prophylaxis and treatment of diarrheal diseases caused by bacteria .

Several mechanisms of action have been identified directed against the host as well as pathogenic microorganisms which **include**

- regulation of intestinal microbial homeostasis.
- interference with the ability of pathogens to colonize and infect the mucosa
- modulation of local and systemic immune responses
- stabilization of the gastrointestinal barrier function
- induction of enzymatic activity favoring absorption and nutrition

# Solid state fermentation

- **Solid-state fermentation** has emerged as a potential technology for the production of microbial products such as feed, fuel, food and pharmaceutical products .
- Utilisation of agro-industrial residues as substrates in SSF processes provides an additional nutritional value to non-utilised residues .
- Lower water activity (less contamination)
- Maximum substrate conversion
- Cheap and easy



# Objective

To utilize sesame oil cake in production of *S. boulardii* using SSF.

# Materials & Method

- Sesame oil cake preparation:** sesame cake was obtained from local market and handled as follows:

Remove oil by pressing using hands



Drying ( 48 hour on 56 C )



Grinding



Autoclaving ( 30 min on 120 C )



2- *Saccharomyces Boulardii* :obtained from bolardi flor (Italy)



The following procedures were used to activate the cells:

1 capsule + 100 ml PDB

↓ ( 24 h in incubator at 37C )

Serial dilution  $10^5$  to assure purity

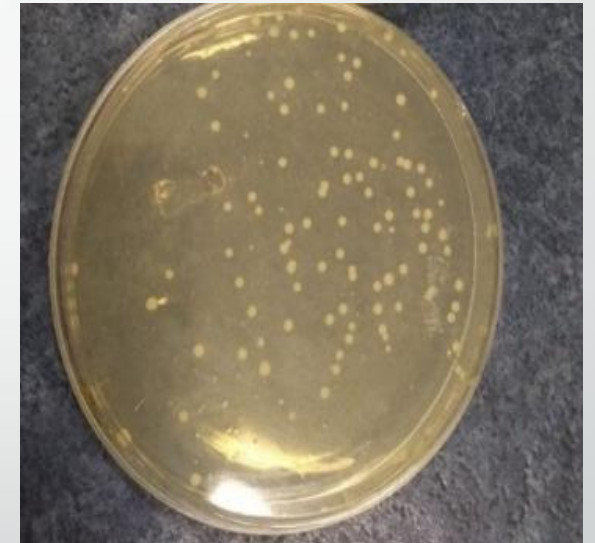
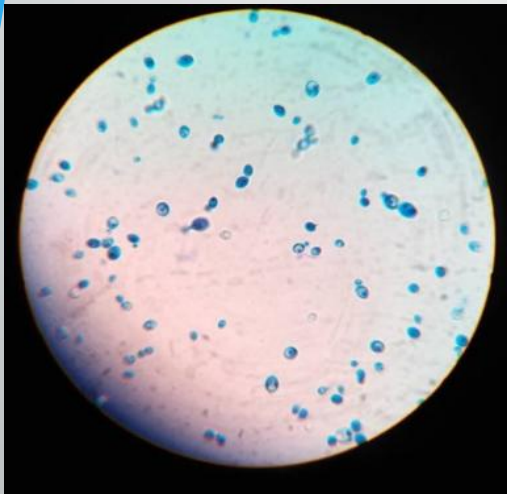


(2 days at 37 ) on PDA



Microscopic test to examine morphology

1 colony was picked and transferred to a fresh 10 ml of broth  
then incubated for 1 day at 37C



# 3- Solid state fermentation

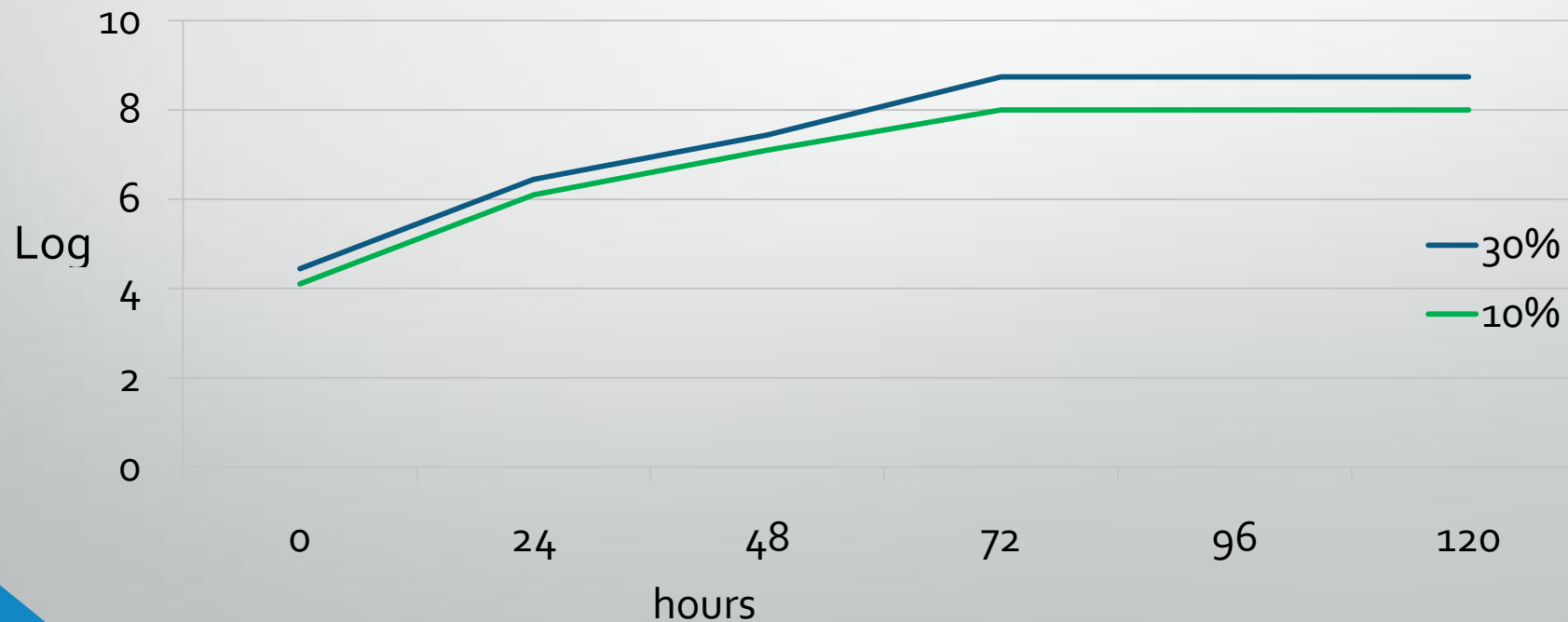
The following conditions were used to assess SSF using *S. boulardii*

	<b>S.Boulardii</b>	<b>Buffer</b>	<b>Sesame oil cake</b>
SSF 1	18 ml (30 % v/w)	7 ml	35 g
SSF 2	6 ml (10 % v/w)	19 ml	35 g
0 %	—	25 ml	35 g

Sampling was conducted at 0, 24, 72 and 96 h to assess viability.

# Results :

	Zero time	24	72	96 hours
SSF 1 (30%)	$2.8 \times 10^4$ cfu	$1.2 \times 10^6$ cfu	$3 \times 10^8$ cfu	$3 \times 10^8$ cfu
SSF 2 (10%)	$1.4 \times 10^4$ cfu	$0.6 \times 10^6$ cfu	$1 \times 10^8$ cfu	$1 \times 10^8$ cfu
0 %	No growth		No growth	



## 4. Spheronizer :

The fermented sesame cake was further pelleted using spheronizer.

**Spheronization** is the process where extrudes (the output from an extruder) are shaped into small rounded or spherical granules. In practice these usually vary in size from 0.4 to about 3.0 mm. The use of these spheroids can be relevant for a wide variety of industries.





## spheronization stages

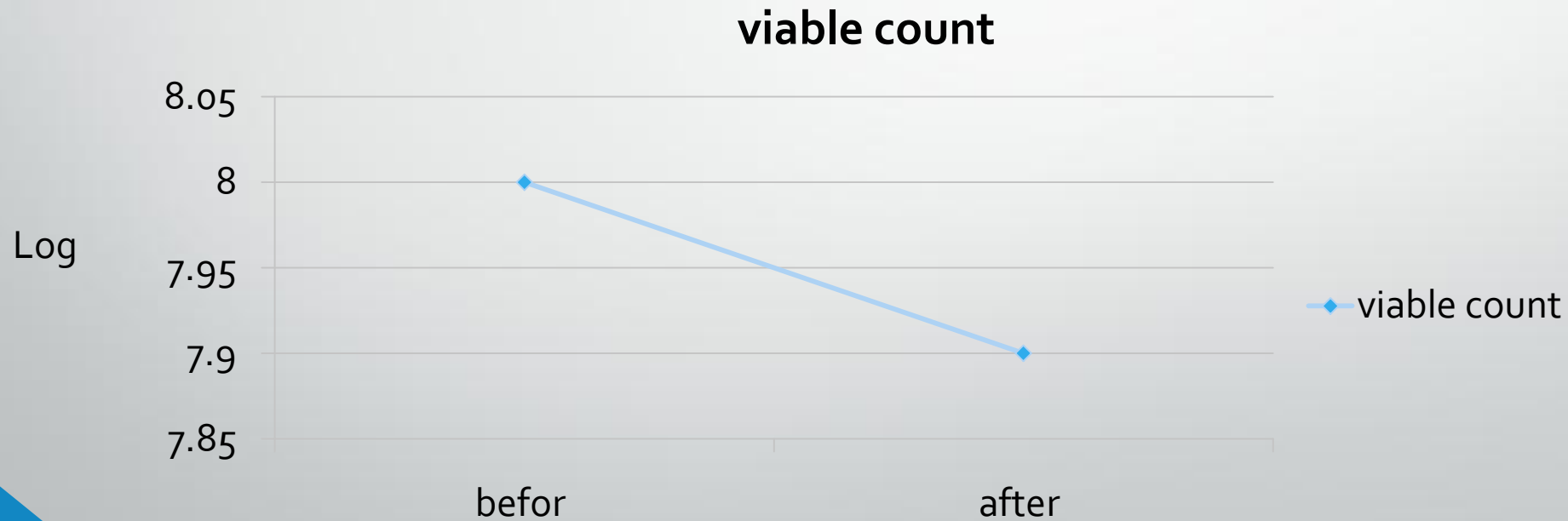
- first use the extruder .
- then use spheronizer .



The following growth results after spheronization SSF<sub>1</sub> :

	Before the formation of pellets	After the formation of pellets
Viable count	$1 \times 10^8$	$0.8 \times 10^8$ cfu

Total viability = 80%





# Discussion

- Sesame cake can maintain and enhance the growth of *S. boulardii*
- Spheronization may delay the reconstitution of pellets which will cause *S. boulardii* to reach lower intestine.
- Spheronisation has declined the viable cell count by Log 0.2, however, this was not a serious decrease.