

боза

Ancient Sourdough
Fermented Beverage



#HOMEBREWCON



Homebrew Con

Recording Archive



<https://www.homebrewersassociation.org/seminars/>





ROBERT GEORGE

OWNER/ALCHEMIST

THE UMAMI FACTORY



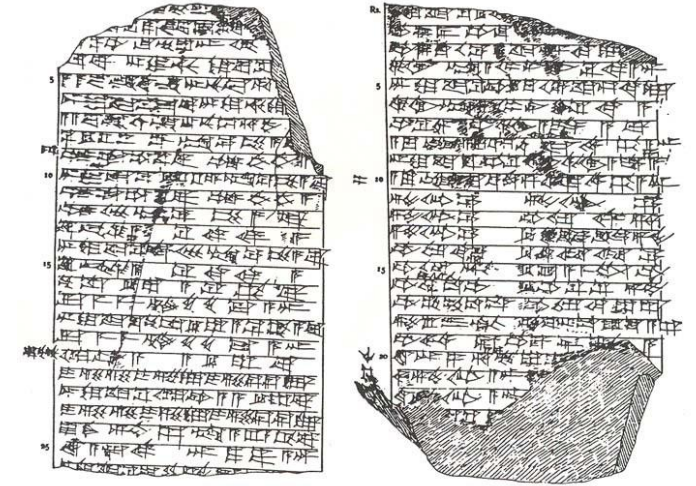
Relax,
don't worry,
have a
homebrew!



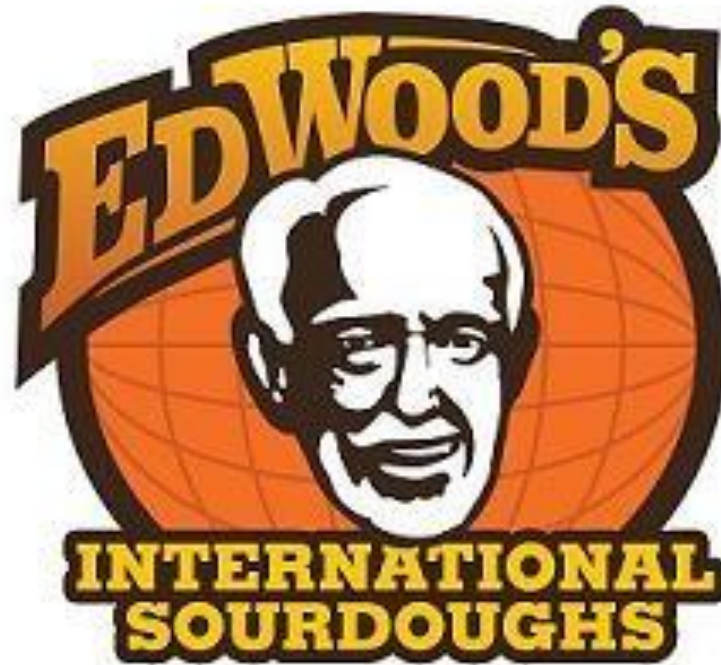
And on the first day they made bappir. Author Charlie Papazian participates with Anchor Brewing Company staff in preparing hundreds of loaves of bappir. Bappir, a twice-baked hard loaf of bread of barley, malt and honey, was later used as a main ingredient by the brewery in the making of an ancient Sumerian-style beer called Ninkasi.



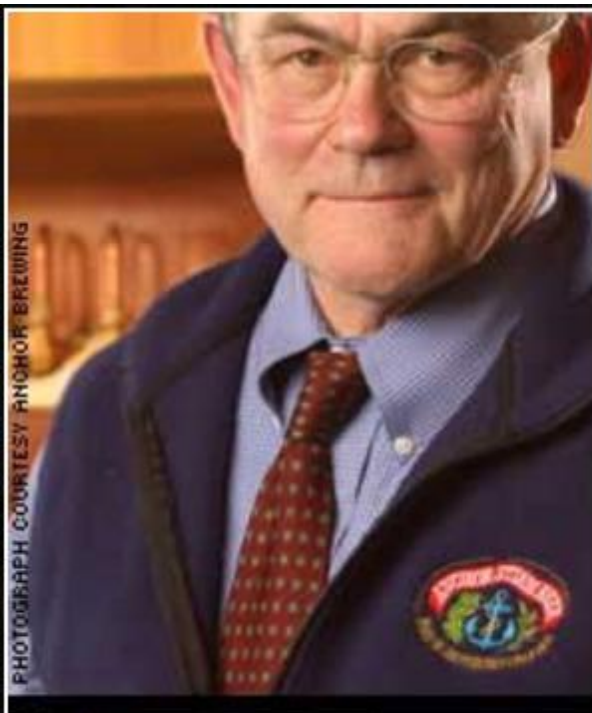
Making Sumerian Sikaru in 1989



The Hymn to Ninkasi, inscribed on a nineteenth-century B.C. tablet, contains a recipe for Sumerian beer.



Which led me
to this guy!
Sourdo.com



Fritz Maytag

We brewers don't make beer, we
just get all the ingredients together
and the beer makes itself.

— Fritz Maytag —

Premier
Modern
Craft
Brewing
Innovator!

Anchor Brewing Co.

INTRODUCTION TO boza

WHAT IS BOZA? HISTORY TO PRESENT

HOW IS BOZA MADE?

HEALTH AND NUTRITIONAL BENEFITS OF BOZA

HOW IS BOZA CONSUMED?



MESOPOTAMIA

9000 BP – 1000 CE





Mesopotamia, AKA The Fertile Crescent

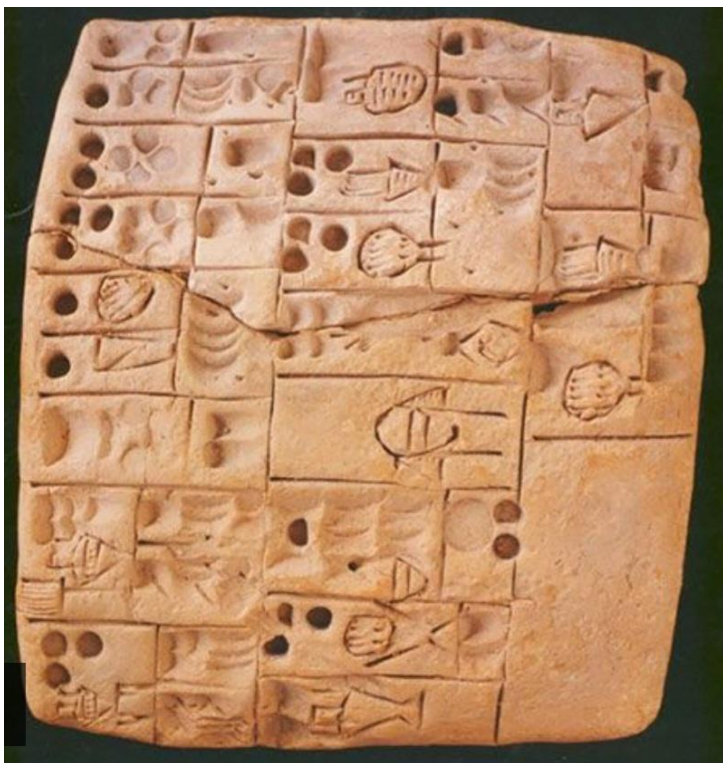


Uruk: Then and Now



Ninkasi

Goddess of Brewing



Sumerian records of beer making



5000-year-old
beer vessels
from Godin Tepe,
Sumerian trading
settlement in Iran



Boza migrates
to Türkiye

OTTOMAN EMPIRE

1299 CE – 1923 CE





Osman the First United the Tribes of Anatolia



Orhan Gazi

1326-1360

Formed the
Yenîçeri Guard



يڭيچرى (Yenïçeri)



Yenîçeriler
armed with
muskets



Suleiman the Magnificent

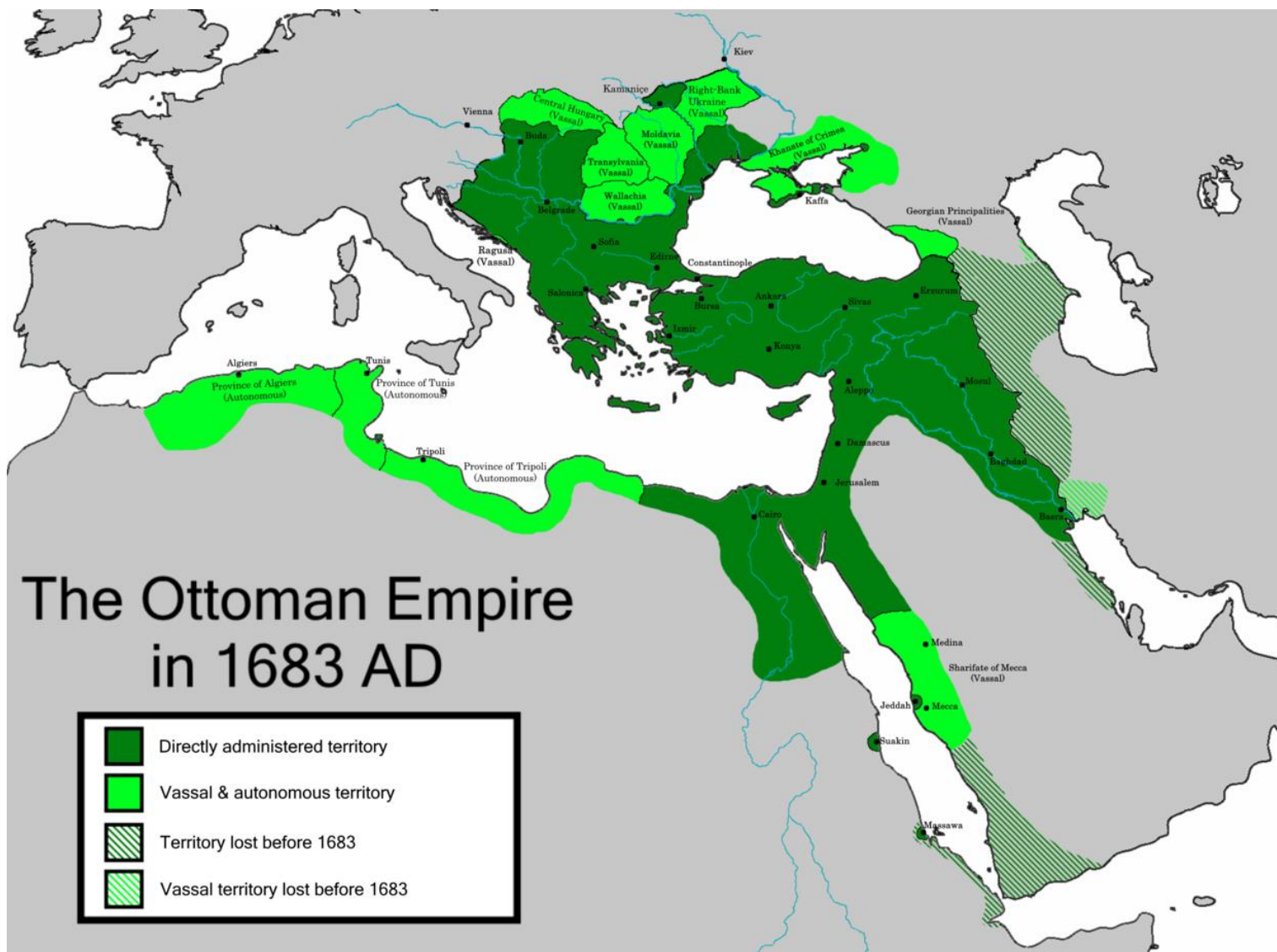
1520-1566

Presided over the golden age of the Ottoman Empire



Sultan Murad IV 1623-1640

Banned alcohol,
tobacco, coffee,
under penalty of
death



Extent of the Ottoman Empire in spread of Boza consumption

MODERN TURKISH BOZA

1850 CE – PRESENT





Vefa Bozacısı



Vefa Boza

Secret Ingredients:

Corn Semolina (polenta)

Ground Wheat



Serving Turkish Boza All Day

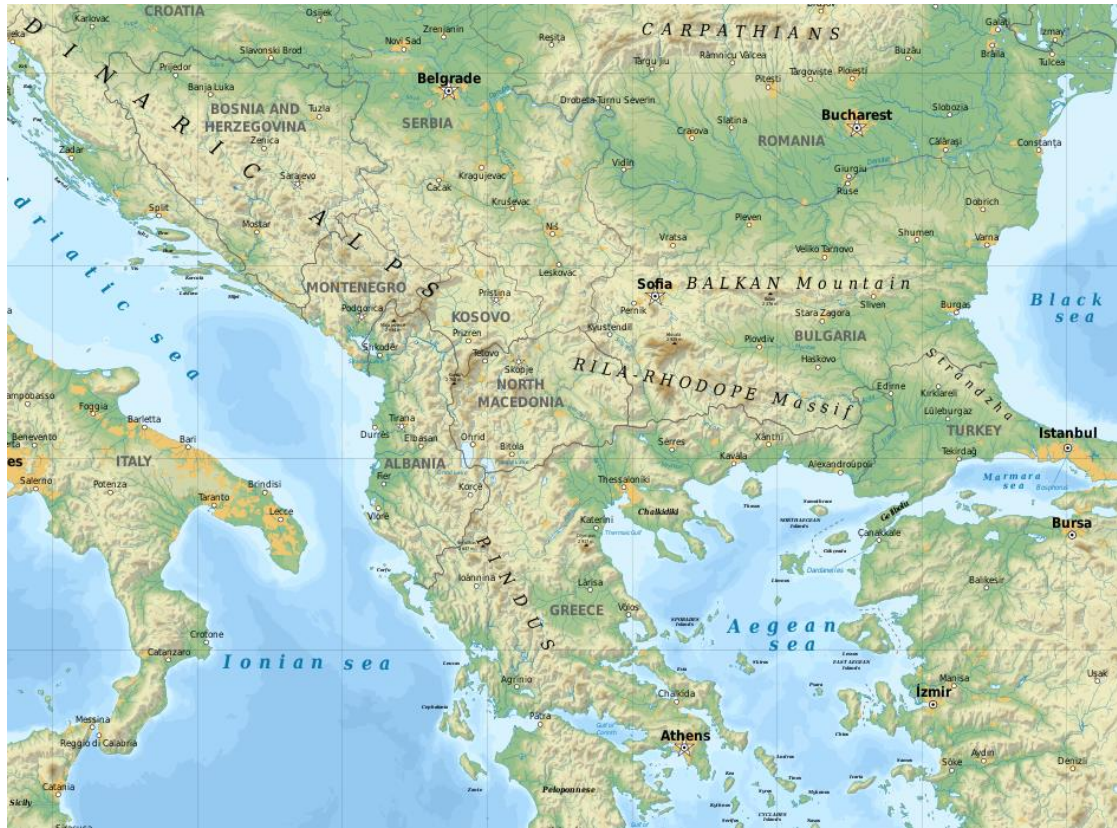
#HOMEBREWCON



BALKAN AND CAUCASUS REGIONS

1500 CE -- PRESENT





BALKANS



CAUCASUS



Selling Bulgarian Boza





Now I've
found
something
else!

EGYPT AND LEVANT

THE REALM OF BARLEY AND CHICKPEAS



LEVANT BOZA: WHY CHICKPEAS

- Arabic word for chickpea is hummus
- 9500 YO evidence found of chickpea cultivation in the Middle East
- Wild ancestor originated in Southeast Turkey where it still grows
- Chickpeas high in protein
- Liquid from cooked/canned beans called aquafaba
 - good thickener, makes meringue topper for boza



بوظة

BOUZA: EGYPTIAN HOMEBREW

- Partially baked bread
- Barley, Malt, Dates, Honey
- Giza or Red Sea Starter
- Up to 7% ABV



Lion's Tail (*Leonotis*)



Mint (*Menta*)



Egyptian *Keshkab*

Bouza with botanicals

Pepper (*Piper*)



Lemon Leaf (*Citrus*)



Rue (*Ruta*)



Kalonji (*Nigella*)



Blue Lotus (*Nymphaea*)



SOURDOUGH STARTER

BIOLOGY AND ECOLOGY



STARTER PRECAUTIONS

- Wheat and corn flours may contain live fungi: *Aspergillus*, *Fusarium*
- Farmers and millers take precautions to minimize contamination
- Consumers can further lower risk:
 - Spread flour thinly on baking sheet and heat to 71-77°C (160-170°F) for 10 min
 - Mix sourdough starter with pasteurized flour addition

BOZA CHEATER STARTER

- Combine
 - One teaspoon of sugar
 - ½ cup of lukewarm water
 - 1 tablespoon of pasteurized flour
 - 5gr of active dry yeast (not instant)
- Allow to sit until foamy, then add
 - 1 tablespoon of active plain yogurt



HOMEMADE SOURDOUGH STARTER

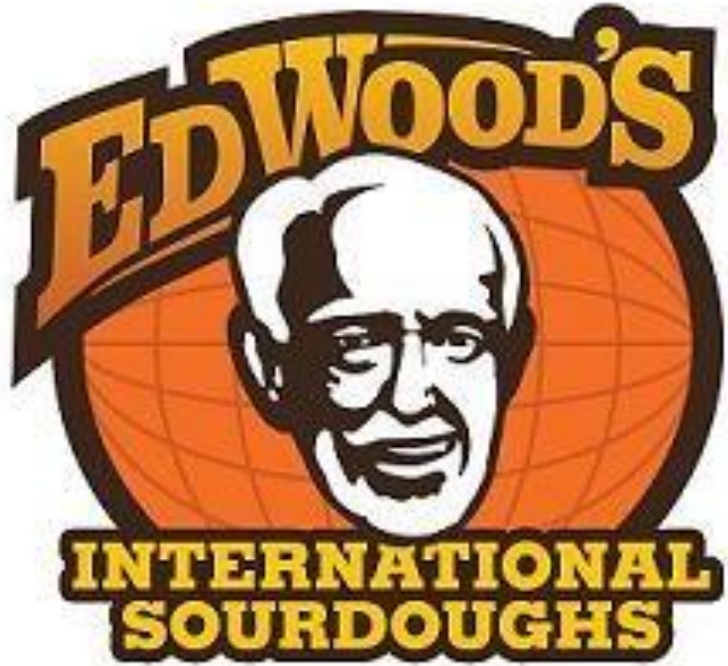
- Combine in glass jar
 - 100gr stoneground organic whole wheat or rye flour
 - 100ml unchlorinated water
- Keep warm at 70°F (21°C) 24 hours (oven with light on is good)
- Mix in 100gr unbleached all-purpose flour, 100ml water, rest 24 hrs
- Discard half, add back 100gr flour and 100ml water, rest 24 hrs
- Repeat above step twice, resting 12 hours in between additions
- Continue until starter is very active, bubbly and foamy
- Store starter in fridge



SOURDOUGH TERROIR VARIANT

- Proceed as homemade
- Cover vessel with fine mesh screen
- Expose grain mash to ambient atmosphere
- Hope for a good wild lacto/yeast combo
- Repeat as necessary

ANCIENT SOURDOUGH STARTERS



Sourdo.com

- Bahrain
- Saudi Arabian
- Red Sea
- Giza
- Austrian
- Polish

WHAT CRITTERS ARE IN BOZA STARTER?

YEASTS AND OTHER FUNGUS
BACTERIA



7 Candida

6 Geotrichum

3 Saccharomyces

Genus	Species	Reference
Candida	<i>C. diversa</i>	Botes et al. 2007
	<i>C. glabrata</i>	Gotcheva et al. 2000, 2001
	<i>C. inconspicua</i>	Botes et al. 2007, Caputo et al. 2012
	<i>C. pararugosa</i>	Botes et al. 2007
	<i>C. quercitrusa</i>	Caputo et al. 2012
	<i>C. silvae</i>	Caputo et al. 2012
	<i>C. tropicalis</i>	Gotcheva et al. 2000, 2001
Clavispora	<i>Cl. lusitaniae</i>	Caputo et al. 2012
Coniochaeta	<i>Con. pulveracea</i>	Caputo et al. 2012
Cryptococcus	<i>Cr. albidus</i>	Caputo et al. 2012
Cystofilobasidium	<i>Cyst. infirmominiatum</i>	Caputo et al. 2012
Galactomyces	<i>Gal. geotricum</i>	Osimani et al. 2015
	<i>Gal. candidum</i>	Osimani et al. 2015
Geotrichum	<i>Geotrichum</i> spp.	Caputo et al. 2012
	<i>G. candidum</i>	Gotcheva et al. 2000, Uysal et al. 2009, Caputo et al. 2012
	<i>G. klebahnii</i>	Caputo et al. 2012
	<i>G. penicillatum</i>	Gotcheva et al. 2000
	<i>G. fragrans</i>	Osimani et al. 2015
	<i>G. capitatum</i>	Uysal et al. 2009
Issatchenkia	<i>I. orientalis</i>	Botes et al. 2007
Rhodotorula	<i>Rhodotorula araucariae</i>	Göcmen et al. 2000
	<i>R. mucilaginoso</i>	Botes et al. 2007, Caputo et al. 2012
Saccharomyces	<i>S. uvarum</i>	Hancıoğlu and Karapinar 1997
	<i>S. cerevisiae</i>	Hancıoğlu and Karapinar 1997, Gotcheva et al. 2001, Caputo et al. 2012, Osimani et al. 2015
	<i>S. kluyveri</i>	Göcmen et al. 2000
Pichia	<i>P. norvegensis</i>	Botes et al. 2007, Osimani et al. 2015
	<i>P. guilliermondii</i>	Botes et al. 2007, Osimani et al. 2015
	<i>P. fermentans</i>	Botes et al. 2007, Caputo et al. 2012, Osimani et al. 2015
Torulaspora	<i>Torulaspora</i> spp.	Osimani et al. 2015
	<i>T. delbrueckii</i>	Göcmen et al. 2000, Botes et al. 2007, Caputo et al. 2012
Trichosporon	<i>Tr. moniliforme</i>	Caputo et al. 2012
	<i>Tr. coremiiforme</i>	Caputo et al. 2012
	<i>Tr. cutaneum</i>	Göcmen et al. 2000
Aspergillus	<i>A. fumigatus</i>	Uysal et al. 2009
Penicillium	<i>P. chrysogenum</i>	Uysal et al. 2009
Fusarium	<i>F. oxysporum</i>	Uysal et al. 2009
Acremonium	<i>Acremonium</i> spp.	Uysal et al. 2009

Yeast and fungus strains isolated from various boza samples

15 Lactobacillus

7 Leuconostoc

2 Weissella

Genus	Species	Reference
Lactobacillus	<i>Lb. plantarum</i>	Gotcheva et al. 2000, 2001, Todorov and Dicks 2006, Botes et al. 2007, Todorov 2010, Petrova et al. 2010, Kivanç et al. 2011, Blagoeva and Gotcheva 2013
	<i>Lb. paraplantarum</i>	Kivanç et al. 2011
	<i>Lb. pentosus</i>	Botes et al. 2007, Todorov and Dicks 2006, Petrova et al. 2010, Blagoeva and Gotcheva 2013
	<i>Lb. acidophilus</i>	Gotcheva et al. 2000, 2001
	<i>Lb. casei</i>	Blagoeva and Gotcheva 2013, Osimani et al. 2015
	<i>Lb. paracasei</i>	Todorov and Dicks 2006, Botes et al. 2007, Kivanç et al. 2011, Petrova and Petrov 2012, Blagoeva and Gotcheva 2013, Osimani et al. 2015
	<i>Lb. rhamnosus</i>	Todorov and Dicks 2006, Botes et al. 2007
	<i>Lb. brevis</i>	Gotcheva et al. 2000, Botes et al. 2007, Kivanç et al. 2011
	<i>Lb. buchneri</i>	Osimani et al. 2015
	<i>Lb. parabuchneri</i>	Osimani et al. 2015
	<i>Lb. fermentum</i>	Hancioğlu and Karapinar 1997, Gotcheva et al. 2000, 2001, Botes et al. 2007, Osimani et al. 2015
	<i>Lb. coryniformis</i>	Hancioğlu and Karapinar 1997, Osimani et al. 2015
	<i>Lb. graminis</i>	Kivanç et al. 2011
	<i>Lb. sanfrancisco</i>	Hancioğlu and Karapinar 1997
	<i>Lb. coprophilus</i>	Gotcheva et al. 2000
Leuconostoc	<i>Leuc. citreum</i>	Kivanç et al. 2011, Osimani et al. 2015
	<i>Leuc. lactis</i>	Todorov 2010
	<i>Leuc. mesenteroides</i>	Gotcheva et al. 2000
	<i>Leuc. mesenteroides</i> subsp. <i>dextranicum</i>	Hancioğlu and Karapinar 1997, Todorov and Dicks (2004)
	<i>Leuc. mesenteroides</i> subsp. <i>mesenteroides</i>	Hancioğlu and Karapinar 1997
	<i>Leuc. paramesenteroides</i>	Hancioğlu and Karapinar 1997
	<i>Leuc. raffinolactis</i>	Gotcheva et al. 2000
Weissella	<i>Weissella oryzae</i>	Osimani et al. 2015
	<i>Weissella confusa</i>	Hancioğlu and Karapinar 1997, Gotcheva et al. 2000, Osimani et al. 2015

Lactic acid
bacteria (LAB)
strains
isolated from
various
boza samples

- Sourdough starter has no natural death like multicellular organisms do
- Yeast reproduces by budding. Individual cells may die but the colony lives forever.
- Apoptosis (Cell suicide) in yeast eliminates damaged or superfluous cells; conserves and provides nutrients for younger cells
- Bacteria reproduce by binary fission and have no natural death
- Feed regularly and manage the pH and it will last for centuries, even millennia
- Dry it out and reconstitute it, won't kill it (freezing will break cell walls however, and kill the starter)

Sourdough starter is an immortal, symbiotic colony of yeast and bacteria



HOW TO MAKE BOZA

REPRESENTATIVE RECIPES



BOZA PRODUCTION PROCEDURE

HINTS:

- ✓ USE STAINLESS STEEL POT FERMENTER
- ✓ INNOCULATE WITH 4% PREVIOUS BATCH
- ✓ KEEP WARM IN OVEN WITH LIGHT ON
- ✓ FERMENT LONGER FOR MORE SOUR
- ✓ USE A PLASTIC STRAINER
- ✓ 2-LITER PET BOTTLES WORK WELL
- ✓ RELEASE PRESSURE ONCE A DAY
- ✓ THIS METHOD MAKES A FIZZY DRINK
- ✓ DECANT CLEAR BOZA, EAT THE PUDDING
- ✓ ADD JUICES OR SYRUPS FOR VARIETY

1 PART
GRAINS

4 PARTS
WATER

SIMMER 1 HOUR

COOL TO HANDLE

WHIRL IN BLENDER

POUR INTO FERMENTER

STIR IN SUGAR/WATER

ADD STARTER

KEEP @ 26°C 12-36 HR

STRAIN OUT THE BITS

ADD FINISHING SUGAR

BOTTLE, STORE @ 4°C



Turkish Boza 2L

200gr bulgur

55gr corn semolina

200gr raw sugar

150ml sourdough starter

1.5 liters water

Cinnamon, leblebi



Balkan Boza 2L

225gr yellow millet

55gr durum semolina

250gr raw sugar

150ml sourdough starter

1.5 liters water

Cinnamon



Levantine Boza 2L

200gr dry chickpeas

55gr corn semolina

200gr Turkish honey

150ml sourdough
starter

1.5 liters water

Lime zest



Egyptian Boza 2L

250gr pot barley

200gr date sugar

150ml sourdough starter

1.5 liters water

100gr date syrup

Toasted ajwain seed

BOZA NUTRITIONAL BENEFITS



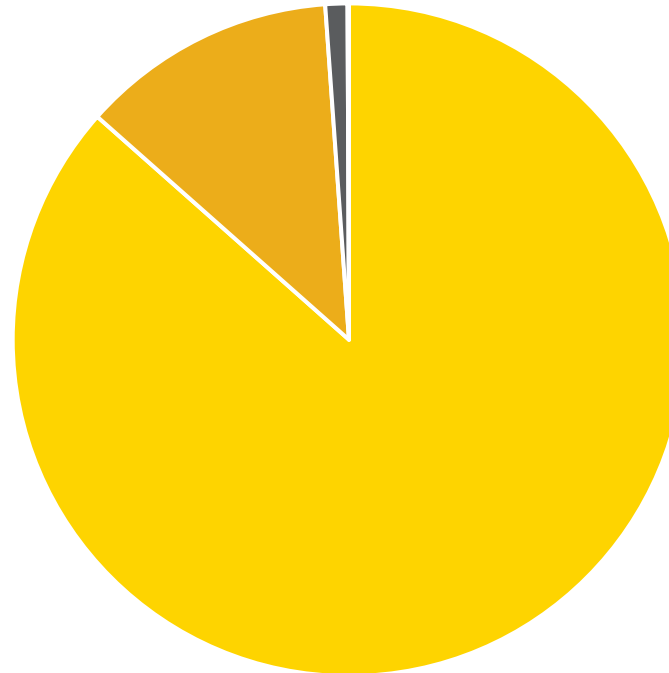
BOZA EFFECT ON HEALTH

- Balance blood pressure
- Improve gut health
- Lower plasma cholesterol
- Increase lactation in nursing mothers
- Facilitate digestion by increasing pancreas and liver function
- Provide Vitamins A, C, E, and four types of Vitamin B
- Provide dietary fiber to control diabetes, cardiovascular disease, cancer



BOZA NUTRITIONAL CONSTITUENTS

Ingredient



■ Water ■ Sugar ■ Protein ■ Fat

BOZA GRAIN NUTRITIONAL CONSTITUENTS

Grain	Composition (%)			
	<i>Carbohydrates</i>	<i>Proteins</i>	<i>Fat</i>	<i>Dietary fibre</i>
Wheat	71.2	12.6	1.5	12.2
Maize	18.7	3.3	1.4	2.0
Millet	72.8	11.0 ¹	4.2 ²	8.5
Barley	77.7	9.9	1.2	15.6
Rye	60.7	8.8	1.7	13.2
Rice	80.0	7.1	0.7	1.3
Leblebi ³	41.1–47.4	21.7–23.4	2.6	13.9–17.6

¹ No gluten

² Of them - 2% are the polyunsaturated Ω -6 fat acids

³ According to Çelik et al. 2016

BOZA PREBIOTICS

- Gluten/protein
- Dietary fiber (plant cell walls)
 - Insoluble: cellulose, lignan, gum, etc.
 - Soluble: beta-glucan, oligosaccharides etc.
 - Fermentable fibers
- Vitamins
- Resistant starch: Lacto and Bifido nutrient



BOZA PROBIOTICS

- LAB—lactic acid bacteria
 - Pathogen interference
 - Immunostimulation/modulation
 - Anticarcinogenic/mutagenic
 - Alleviate lactose intolerance
- Omega 3 and 6 fatty acids
 - Cardiovascular health
- Angiotensin I-converting enzyme (ACE)
 - Blood pressure regulation, salt balance



KEEPING AND SERVING BOZA



BOZA SHELF LIFE

- Temperature dependent
 - Storage at 4°C for 15 days
- Lactobacillus lowers pH, increases shelf life
- Flavor changes over time, aging and maturing like beer
- Culture selection important for flavor, sensory development
 - *Saccaromyces cereviciae*
 - *Leucanostoc mesenteroides*
 - *Weissella confusa*





Boza in the Winter

BOZA FLAVORING



Cinnamon
Cloves
Coconut
Ginger
Mint
Persimmon
Pomegranate
Vanilla

Pekmez (Fruit molasses)



Leblebi snack

- Canned chickpeas
- Dehull
- Season to taste
- Roast in oven



Boza and
Boem snite



Vulgarian
баница
(Banitsa)



Насладете се
на вашата боза!

THANK YOU!

Robert George | robertrg@telus.net

Umami Factory | theumamifactor@gmail.com



| facebook.com/umamifactory

| theumamifactor.com



Related Resources

Find articles, recipes, recordings, and resources—including *Zymurgy* magazine—on [HomebrewersAssociation.org](https://homebrewersassociation.org).

- [4 Sourdough Recipes: Pizza Dough, Popovers, Bread, & Pancakes](#)
- [30+ Homebrew Con Seminars on Historical Topics](#)

