

ISSUE NO:20

DECEMBER'17



ESSEN RIVESTA

ENTWINE WORLD & NUTRITION



Fermented foods

Contents....

- 02 A folktale on fermented foods
- 04 Cereal based fermented foods
- 06 Probiotic Powerhouse
- 07 Grape seed Extract Preservative
- 08 Clay Packaging
- 10 Anaerobic Fermentation Monitor
- 12 Edible Sensors
- 14 Industrial Updates
- 15 A Visit to TANTEA





Fermented foods



A folk tale on fermented foods... ER₄

As we all know “Fermentation”, the principle behind fermented foods is the process of converting carbohydrates to alcohol and carbon dioxide or organic acids using microorganisms such as bacteria or yeast in anaerobic condition and its mainly applied in beverage industries.



But actually, fermentation is a preservation technique employed to increase the shelf life of a product to make it available in all seasons and it also reduces the toxicity of foods. There are an ample number of fermented products with traditional and cultural value in the market. Our idly batter and buttermilk dates before Pasteur's discovery about fermentation.

This shows that the process of fermentation dates at least 6000 years back and probably originated from microbial interactions of an acceptable nature. The main bacterial species involved in fermentation includes lactobacillus, leuconostoc, pediococcus and streptococcus.

The importance given to fermentation in modern life can be noted by the wide spectrum of fermented foods marketed both in developing as well as industrialized countries, not only for the benefit of preservation, but also for

their sensory attributes, nutritional quality and digestibility. Fermentation plays a great deal in preserving perishable raw materials in a cheap and energy efficient way. Fermented foods are generally described as a palatable and wholesome food and its advantage include optimization of immune system against diseases as most of the fermented foods have live and beneficial microorganisms which is also responsible for the proper functioning of gut and also helps to control diabetes and fight against obesity, helps in detoxification and contains many nutritional value. Most of the fermented foods fall under the following categories which includes bean-based, grain based, vegetable based, fruit based, dairy based, meat based and fish based. The best examples of fermented foods are sauerkraut, kimchi, kombucha, cheese, kefir, yogurt etc. This edition encompasses different kinds of fermented foods , their preparation and their benefits.

Reference: www.soyinfocentre.com

www.sciencedirect.com

Compiled by

Bhavadharini B

Do you know:

- * Avocado has the highest protein content of all fruits.
- * Lemon contains more sugar than strawberries

Devipriya K

III B.Tech FPE



Cereal based Fermented foods

As we all know cereals are the major nutrients of all over the world, but it is deficient in some components like essential amino acid. Fermentation plays a important role to improve the nutrients



Koozhu (Khangri):

A food is from Tamil-Nadu. It is prepared by a cup of ragi flour is mixed with two cups of water and left overnight to sour. It is cooked using medium-low heat till most of water is evaporated and ragi is well cooked and when is at right consistency, a tablespoon of cooked rice is added. A preparation mixed with yoghurt and salt for consumption. It is made with sorghum, pearl millet, little millet, foxtail millet.

Idly / Dosa / Dhokla:

These are originated from South India. It is low calorie starchy food. Each plain idly has approximately 39calories, 2grams protein, 2 grams dietary fiber, 8 grams carbohydrates and no fat. Dosa is a favorite fermented food. It is a kind of flat pancake made from fermented batter of rice and black lentils. It is made on a hot tava greased with oil. Varied forms of dosa also available like onion dosa, ghee dosa, adai dosa, rava dosa etc. The dhokla is prepared by the fermented batter is poured into a greased tray and steamed in open condition for 10mins.



Kenkey:

It is a popular traditional fermented food made from maize and is a staple for most of the peoples in the coastal regions of Ghana. It is a sour tasting cooked stuff porridge of elastic consistency made from fermented whole meal maize dough shaped into balls and wrapped in plantain leaves.

**Akpan:**

It is a yoghurt-like product prepared from a partially fermented cooked maize gruel, named OGI. It is usually mixed with condensed milk, ice and sugar by street vendors just before consumption.

Fermented rice (pazhaya sooru):

It is originated from Tamil Nadu. It is easily digestible. It is prepared by water is added to cooked rice and allowed to ferment overnight.

Ambali:

It is easily digestible food for infants and invalids. It is prepared by millet flour is combined with water to make a thick batter and fermented for 14 to 16 hours. The batter is added to partially cooked rice with continuous stirring.

Reference:

- www.bbcgoodfood.com
- [www.after.fp-7.eu/en/products/cereal based products](http://www.after.fp-7.eu/en/products/cereal-based-products)

K.Vinitha**III B.Tech FPE**

Probiotic Powerhouse

ER₈

Kefir

A probiotic cultured drink, it contains multiple strains of bacteria and yeast. It is rich in minerals and vitamins particularly vitamin B,K.

Sauerkraut

It is a fermented cabbage dish has been around for centuries. It is rich in fibre, vitamins A,C,K and various B vitamins. It is a good source of iron, manganese, copper, sodium, magnesium and calcium. It is to make at home.

Tempeh

It's another version of fermented soy beans, it is a rich protein source so a good choice for vegetarians.

Yogurt

Lactobacilli bacteria convert lactose sugar in milk into glucose and galactose, which break down further into lactic acid, giving it's a sour taste.

Lassi

It is made from soured milk, drunk as a pre-dinner yogurt drink for centuries. It is a popular way of achieving probiotic bacteria

REFERENCE:

www.bdu.ac.in

K.Vinitha

III B.Tech FPE



Grape seed extract-

A meat preservative

Grape seed is the by-product of food industry and forms the cheap source of natural anti-oxidant and anti-microbial property due to its phenolic contents.

The quantity of the seed should contains 15% of the net weight of the fruit.. To retard the quality loss and deterioration, synthetic anti-oxidants and microbial agents have been used. To avoid the harmful consequences caused by the synthetic anti-oxidants, on the other the group of natural anti-oxidants and anti-microbial agents is emerging as an effective

method to control auto-oxidation and microbial spoilage in food and acts as a preservative. Grape seed extract is a viable natural alternative to synthetic ingredients that preserve meat quality in precooked ready-to-eat meals. Grape seed extract is a viable natural alternative to synthetic ingredients that preserve meat quality in precooked ready-to-eat meals. The grape seed extract contains rich phenolic compounds so the concentration of 0.02% of grape seed extract reduce the formation of off-odours associated with lipid oxidation in process the meat without affecting the colour of the meat.

Addition of grape seed extract did not change colour measures of redness, yellowness or colour intensity. It did not affect the sensory profile of the meat.

The high concentration of the grape seed extract yielded better results than synthetic preservatives. Grape seed extract contains some of the volatile aroma compounds at low level.

Reference:

<https://www.bakeryandsnacks.com>

Sivaranjany G S

III B.Tech(FPE)

Clay Packaging

Hayriye Unal, Ph.D., Sabanci University discussed at American Chemical society 254th National meeting in Washington DC. They developed a packaging film coated with clay nano tubes packed with an antibacterial essential oil that provides 1-2 punch preventing both over ripening and microbial growth. The hope is that new film could improve shelf life of perishable. The team experimented by wrapping the tomatoes, bananas in film to test its effectiveness over varying amount of time and compared them to food wrapped in plain polythene . After few days, tomatoes wrapped in new film were better preserved than control one. The film retained its colour and were free of brown spots whereas the control banana had darker colour and were full of brown spots. The film worked well on chickens. It was created to address the issues of bacterial contamination and permeability to both oxygen and water.

It also designed to prevent too much of ethylene, which is a compound naturally released by fruits and vegetables that aids in ripening process but an excessive amount trapped underneath the packaging film cause over ripening or rotting around foods. In an effort to scavenge for ethylene and provide a gas barrier group incorporated clay "halloystie nanotubes" which are small hollow cylinder into its film and prevent water vapour and other gases from entering. It can be even loaded with natural anti-bacterial oil like carvarcol, they can be coated on inner surfaces of packaging film with loaded nanotubes to kill microbes.

Kowsika.N

II B.Tech FPE

WHO AM I?

Hi Everybody! My origin is from Korea. I'm a traditional fermented dish made from vegetables including cabbage and some seasonings such as chilly powder, ginger and garlic . My delicacy dates back to 7th century. I'm known to improve cardiovascular and digestive health problems. In traditional preparations I was stored underground in jars to keep cool and unfrozen during winter months. I'm mostly available in winter season. I promote digestion, regulate cholesterol, have some antioxidant properties, boost your immune system and prevent cancer. Is your mouth watering?

Can you guess who am I?

ANSWER

A. Haniya Azfar Fathima

Refer page no: 15

B. II B.Tech FPE

Technical innovation

Anaerobic Fermentation Monitor (AFM)

The Anaerobic Fermentation Monitor (AFM) is a robust and user-friendly laboratory parallel bioreactor that allows for accurate comparisons of carbon conversion rates and yields for six simultaneous anaerobic fermentations. Monitoring the amount of CO₂ that evolves from a fermentation broth under well controlled conditions is a reliable comparison method that has proven to be very useful in all industries that use anaerobic fermentations. The AFM is equipped with very strong magnetic stirrers, able to handle viscous media and feedstocks such as .

lignocellulose hydrolysates For each fermenter, stirrer speed and temperature can be set independently. Time-dependent programs are also easy with the AFM. Fully controlled with user-friendly PC software, the Alcohol Fermentation Monitor uses Microsoft Excel for generating advanced reports containing all measured data, data analysis tables and corresponding graphs. The software is intuitively designed with a “no need for a manual” approach. The entire operation of the AFM can be mastered within 10 minutes, even by untrained staff. Each fermenter flask is

controlled individually and can be started and stopped and started again at any time during other running experiments. Conversion rates and yields can be measured as a function of feedstock, yeast strains or other process conditions such as medium temperature. The AFM control software is password protected, all user actions are logged and stored automatically and data is stored in encrypted form.

educated laboratory staff, which is an important money-saving feature.

Applications

Quality control of regular/ commercial yeast and traditional feed-stock such as molasses. Conversion of wort into beer. Conversion of grape juice into wine. Alcohol tolerance and toxicity studies. Many satisfied users involved in biomass to ethanol conversion processes describe the AFM not only as the perfect screening machine for general research on anaerobic yeast



fermentations, but also as a powerful time saving tool for design and process optimization. A very accurate characterization of the fermentation quality can be obtained without the need for highly educated laboratory staff, which is an important money-saving feature.

A.Haniya Azfar Fathima

II B.Tech

Broccoli contains twice the vitamin C of the orange.

Chewing coffee beans can help to eliminate bad breath.

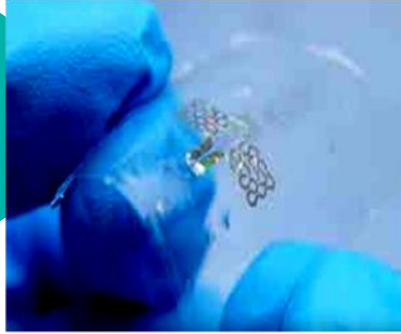
Smell an green apple to prevent claustrophobia

Vinu J

III B.Tech FPE

Edible sensors

ER₁₄



A sensor is a device which detects and responds to the input signal and transmits them electrically over a network for reading and further processing. Edible sensors are ultra-thin sensors which are five times thinner than human hair. These sensors are biodegradable and are made up of polymer obtained from corn and potato starch, magnesium (which can be digestible), water soluble silicon dioxide and nitride. These sensors are 16 micro-meters thin and were encapsulated in compostable polymer. They were not only edible but also viable during rough handling of produce. They can be crumbled and folded and poses no threat to the consumers on consuming it. These sensors are of contact type and sense the temperature of the produces and are helpful in detecting its freshness. The sensor is connected to the micro battery and then to the microprocessor from where the signals are transmitted through biodegradable cables. Researches are being undertaken to transmit sensor data wirelessly through biocompatible energy source which were time intensive and expensive.

Reference:

<https://www.engadget.com>

B.GOKUL AARTHI

III B.TECH FPE

Kefir gives a good night's sleep. (kefir is a protein rich drink which provides you a 20% of the daily calcium you need)

Depiction of the cover.....

The cover is made awesome with the purple cabbage and grated beets, which gives it this beautiful vibrant color. The recipe points towards the Beetroot and Cabbage sauerkraut. It's incredibly good for our health.

The simple fermentation process, an ancient way of preserving food, has amazing cancer fighting and immunity building properties, similar to the healthy probiotics in yogurt, but without the dairy and fat. As cabbage

replenish the good bacteria in our bodies and help stop the growth of bad bacteria, boosting our whole immune system. The making of sauerkraut is very easy and we can flavour it however we like..!

Nevetha R

III B.Tech (FPE)

Find me???

Hi everybody...My origin is Japan
I am traditional Japanese seasoning produced by fermenting soybeans with salt and koji(the fungus *Aspergillus oryzae*).
I am a thick paste used for sauces and spreads, pickling vegetables or meats.
They use me widely in japan, both in traditional and modern cooking.
I am high in proteins and rich in vitamins and minerals.
I play a major nutritional role in FEUDAL JAPAN.

Prathibha R.S.

The answer for who am I is "kimchi"



Sugar glass

With antibiotic resistance on the rise, bacterial contamination of food is becoming more problematic. Now in a study scientists have reported that they have developed an antibacterial "sugar-glass" coating in which viruses that destroy bacteria are embedded and are kept stable for up to three months. The coating could someday be used in the food packaging and processing industries to help prevent food-borne illnesses and deaths

The researchers embedded phages into soluble "sugar glasses" or films made with pullulan, a polysaccharide used to prolong the shelf life of fruits and eggs; trehalose, a sugar used as stabilizing agent in freeze drying; or a combination of two substances. Then, they drop-cast or coated the mixtures onto butcher paper and allowed them to air dry overnight at room temperature.

Reference:

www.sciencedaily.com

EU and FAO to C

The EU and the Food and Agriculture Organisation (FAO) of the UN have joined forces to combat global levels of food waste. Both organisations have signed a letter of intent to halve per capita food waste by 2030, a goal established under the new sustainable development goals global agenda. The EU says that globally one-third of all food produce for human consumption_ 1.3 billion tonnes is estimated to be lost or wasted, each year causing massive financial losses while squandering natural resources. In Europe alone, around 88 million tonnes of food are wasted each year with associated costs at 143 billion euros, according to EU estimates. The EU and FAO said they will aim to synchronise efforts to quantify food losses and waste at each stage of the food chain. EU commissioner for health and food safety said: "Food loss and waste represent an unacceptable, unethical and immoral squandering of scarce resources and increase food insecurity." "We are becoming more united more efficient and more strategic in how we tackle these issues, and as such this agreement should be celebrated."

E. Devistri

III B.Tech FPE



An 08/01/2018, the air loaded with excited rustle and expectation, all set to venture into the TANTEA (**Tiger hill**), Conoor. After a three-hour trip of gaping at the nature's aesthetics, we reached the TANTEA industry, cordially received by Mr.Sridhar, Divisional Manager, (**BRANCH**). He provided the insights of the industry.

Origin :

The origin of the industry owes to the establishment of the "Government Tea Project" in the Nilgiris in 1968 by Government of Tamil Nadu. In 1976, the project was brought under corporate management in the name of "Tamil Nadu Plantation Corporation Ltd." Today, TANTEA has endured to possess the largest tea holdings in Tamil Nadu of about 4311.04 hectares with clonal tea plantations, accounting for uniqueness.

Processing:

The routine starts with the **Withering** section, where the tea leaves are withered with 2.5 Kg per sqft. During summer, they are retained for about 12-15 hrs and in winter, hot air is blown. The withered leaves are manually filled into the rollers in the **Rolling** section, which consists of a pressure cap. It is allowed to stand at a low pressure for 10 minutes and this is followed by a stand-by at medium and high pressure for 10 minutes respectively. The **Sieving** process trails after the rolling and tea leaves of I fine, II fine and III fine are obtained. The sieved leaves are subjected to floor **Fermentation** for about 70 minutes to obtain copper colour from green colour. They are then conveyed to the **Drying** section, dried in the smoke channel with the furnace temperature at 200°C for about 21 minutes, conveyed within by feather fins. **The dried leaves are then Graded** into 10 grades by employing vibratory screen. The grades can be classified as: BOP, BOPF, FBOP, FBOPD, FP, BOPD, FOP, GBOP, OP and GD. Then they are further **Winnowed** to remove dust, twigs, etc., if any.

Distribution :

The industry opts for 98% bulk packing and 2% for retail. The grades are transported to different places in accordance to a schedule: Tuesday to Cochin (Dust grade); Wednesday to Cochin (Leaf grade) and Coimbatore; Thursday to Coonoor.



Although the current demand for the TANTEA's orthodox tea met a slight fall, the manufacturers staunchly abide by the authentic procedures only.

Mamathi C A

ER Team feels immense pleasure in announcing that we had came up with logo for our e-magazine. The logo was officially launched by the Dr.D.Sudhakar Registrar(i/c) TNAU,Coimbatore in the presence of Dr S.V Kottiswaran (Dean engg),Dr S.Ganapathy,Professor & Head, Dr.A.Surendrakumar(Staff Advisor) in the eve of **FOOD XPLORE 2017- BRIDGING AGRICULTURE WITH INDUSTRY-Emerging Role of Engineers in Food Processing** on 15 December 2017.



AGRICULTURAL ENGINEERING COLLEGE AND RESEARCH INSTITUTE
TNAU, COIMBATORE.TAMILNADU-641003

Cordially post your feedbacks to essenrivesta@gmail.com

Don't forget to view our publications at: www.foodexploretnau.com

Ph:9843226063,9789743772

