Ministry of Food Processing Industries
Government of India

सत्यमेव जयते

NIFTEM
Knowledge. Innovation. Outreach

PROCESSING OF SOYA PANEER

AATMANIRBHAR BHARAT

PM Formalisation of Micro Food Processing Enterprises Scheme (PM FME Scheme)

INTRODUCTION

Industrial Overview:

- Soya Soy Paneer/Tofu is a milk Soy Paneer that is similar to normal.
- Soya Soy Paneer is also known as "Tofu," a soft cheese prepared with a liquid by curding soy milk.
- High levels of cholesterol, salt, and calories are linked with the ingestion of animal protein.
- raising the risk of heart disease, high blood sugar, and obesity, people show an attraction towards the vegan source of protein.
- Soy milk is rich in calcium, low in carbohydrates and fats, and does not produce cholesterol.

INTRODUCTION

Industrial Overview:

- As it contains vegetable protein that is very nutritious and easy to digest.
- it is an excellent food for infants, children, elderly people and pregnant and lactating mothers.
- Tofu is a versatile food as it can be used in a variety of dishes.
- It is believed that Chinese people invented tofu around 2000 years ago.
- This has provided a strong forum for development in the tofu industry.

INTRODUCTION

Market Potential:

- It is a plant-based protein.
- Tofu is considered a healthy and gluten-free food.
- In addition to having elevated nutritional values, soy milk is suitable for people with diabetes and lactose intolerance.
- Tofu is incorporated in the preparation of a variety of foods such as burgers, hot dogs, sauces, ice creams, shakes, and desserts among others.
- Growing consumer preference for premium products is anticipated to significantly impact the demand for organic tofu.

INTRODUCTION

Raw Material Description

- In the main food groups of protein, sugar, and carbohydrates, as well as vitamins and minerals, soybeans are perfectly healthy.
- Glycine max is the scientific name for the soybean and it is part of the Leguminosae botanical family.
- The soya plant has a somewhat woody stalk and is 30-36 inches long.
- The pods grow in length from 1-2 inches, each containing two or three seeds that develop into soybeans.

INTRODUCTION

Types of Raw Material:

The following variety are consider as High-yielding varieties of soybean for

S. no.	Varieties	Av. yield (kg/ha)	Special character
1.	PS 1347	3100	Determinate compact plant type, tawny pubescence and yellow bold seeds, maturity 123 days. Resistant to YMV, Rhizoctonia aerial blight, bacterial pustule, SMV and charcoal rot.
2.	SL 688	2500	Determinate and erect plants, brown pubescence, protein content 40.3% and oil content 19.4%, maturity 125 days. Resistant to YMV
3.	Pusa 97-12	NA	Resistant YMV, Charcoal rot
4.	Birsa Safed Soybean-2	2500	Resistant to bacterial pastules, cercopsora leaf spot, blue beetle and bihar hairy cater pillar, moderately resistant to frog eye leaf spot.

INTRODUCTION

Types of Raw Material:

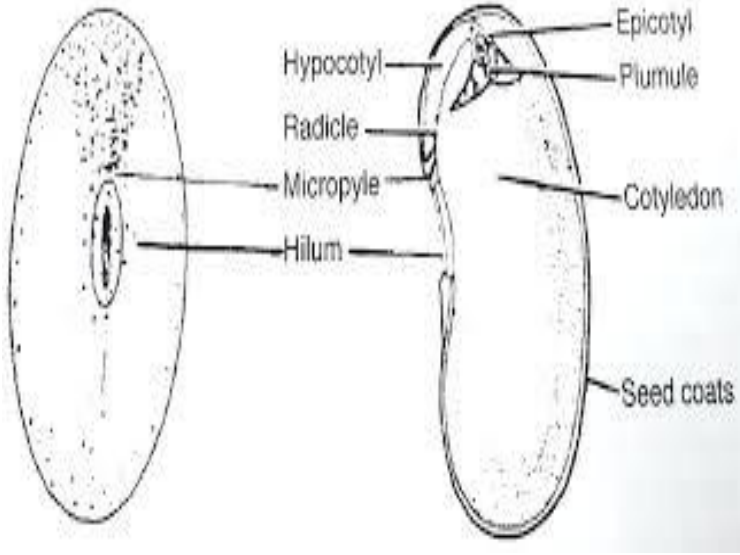
The following variety are consider as High-yielding varieties of soybean for

S. no.	Varieties	Av. yield (kg/ha)	Special character
5.	JS 97-52	2500-3000	While flower, tawny pubescence, large number of plant per plant, tolerance to excessive soil moisture, good seed longevity, maturity 100 days. Resistance to YMV and Collar rot, moderately resistant to Rhizoctonia aerial blight, moderately resistance to insects
6.	PS 1225	3000-3200	Grey pubescence, light brown hilum, Improved seed longevity. Shattering and lodging resistance, maturity 125 days. Multiple disease resistance. Resistant to resistant YMV, bacterial pustule, collar rot anthracnose, pod blight and SMV.
7.	MAUS-158	2260	Tolerant to bacterial pustules, Rhizoctonia root rot & aerial blight, collar rot and charcoal rot.

PROCESS & MACHINERY REQUIREMENT

Raw Material Aspects:

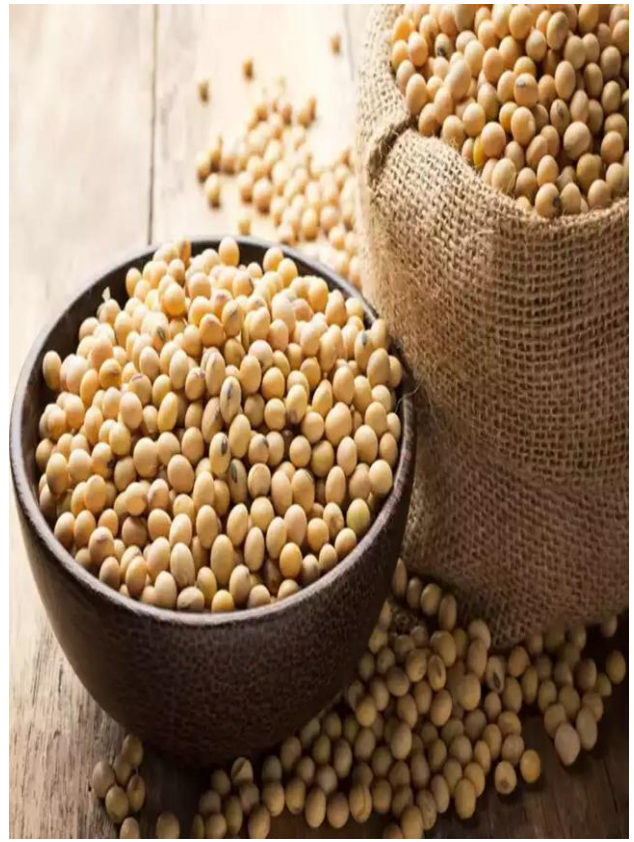
- With soybean seeds losing moisture, it shifts from large to smaller, almost round kidney bean-shaped.
- The seed contains around 40% protein, 21% fat, 34% carbohydrates, and 5% ash when dry.
- Traditional unfermented food uses of soybeans include soy milk, from which tofu and tofu skin are made.



PROCESS & MACHINERY REQUIREMENT

Source of Raw Material:

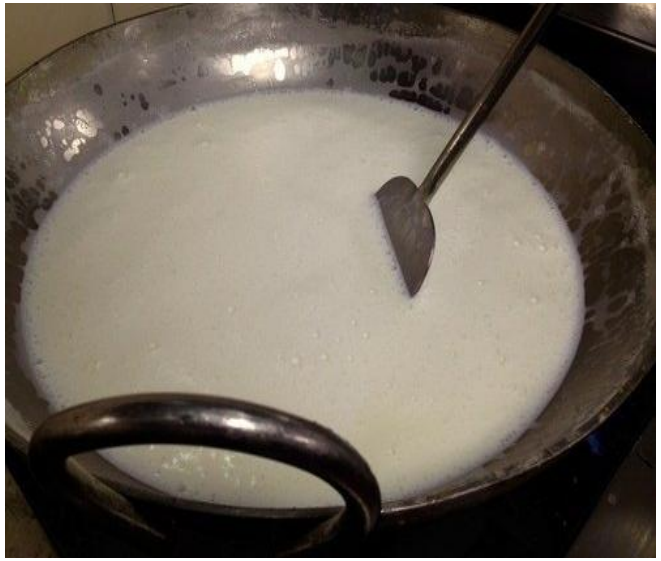
- Maharashtra and Madhya Pradesh dominate soybean production in India, contributing 89 percent of the total production.
- The remaining 11 percent of production contribute by Rajasthan, Andhra Pradesh, Karnataka, Chhattisgarh, and Gujarat.
- The whole soybeans can be procured and processed to obtain soya milk and its product.
- There are various online platform provided soya seed for the further processing.



PROCESS & MACHINERY REQUIREMENT

Technologies:

- In a larger iron pot, soy milk is heated.
- The coagulant is added to hot milk and mixed with a ladle till the coagulation is over.
- To wash off the whey, the contents of the vessel are poured over a piece of coarse cloth.
- Until all the milk is coagulated, the whole process is repeated.
- After draining the whey, the coagulated mass is gathered and pressed to extract more whey.
- Finally, in chilled water, the product is then dipped.



PROCESS & MACHINERY REQUIREMENT

Technologies:

Modern techniques

- The required fate and protein ratio is standardized for Soya Milk.
- Milk is heated in jacketed vessels to 90 °C and cooled down to 70 °C.
- By slowly adding 1 to 1.5 percent citric acid solution (70 ° C).
- continuous stirring until a clean whey is separated at (pH 5.30 to 5.35).
- The coagulated mass thus obtained is filled into muslin or cheesecloth-lined hoops.
- For 2-3 hours, the pressed Paneer blocks are separated from the hoops and immersed in chilled water.

PROCESS & MACHINERY REQUIREMENT

Manufacturing Process:

- Raw material is procured from the local vendor
- All raw materials are placed in the inventory
- Dry beans are soaked in water for a minimum of 3 hours
- Rehydrated beans then undergo wet grinding with added water
- The ratio of water to beans on a weight basis is 10:1
- Soy Milk is extracted from ground pulp or puree.

PROCESS & MACHINERY REQUIREMENT

Manufacturing Process:

- Soy Milk is cooked to improve taste by inactivating trypsin inhibitor
- The other major role of cooking is to inhibit microbial growth
- Soy Milk is then cooled to required temperature for coagulation
- Coagulation is most important step in tofu manufacturing
- Different coagulants are used to produce different types of tofu
- Commonly used coagulants types are salts, acids, and enzymes

PROCESS & MACHINERY REQUIREMENT

Manufacturing Process:

- Coagulants are added in concentrations between 1.5 & 5.0 g/kg
- Coagulants are added at temperatures between 60°C & 90°C
- Coagulated mass is then extracted from coagulation tank
- This coagulated mass is pressed to obtain soy Paneer
- These tofu are then cut in appropriate sizes, packed & dispatched

PROCESS & MACHINERY REQUIREMENT

Flow Chart:

Machine	Description	Machine Image.
Soybean Soaking & Washing Machine	❑ It's a washer class machine, used to wash soybean. ❑ Some machine performs soaking, sorting & washing together.	
Grinding & Separating Machine	❑ It's a grinder class machine, used to grind soybean ❑ It simultaneously extracts soy milk by separating Okara.	

PROCESS & MACHINERY REQUIREMENT

Flow Chart:

Machine	Description	Machine Image.
Soymilk Cooking Machine	❑ It's a cooking vessel class machine designed to cook soy milk. ❑ They can be used for other similar products.	
Coagulation Tank with Mould Filling Machine	❑ Contains coagulation tank, filtration array & mould filling machine ❑ This machine is specifically used for Paneer & Cheese.	

PROCESS & MACHINERY REQUIREMENT

Flow Chart:

Machine	Description	Machine Image.
Paneer & Cheese Press	❑ It's a press type machine used for Cheese & Paneer production ❑ It's used to press coagulated mass into required shape.	
Vacuum packaging machine	❑ This machine is used for packaging the Paneer in appropriate size.	

PROCESS & MACHINERY REQUIREMENT

Additional Machine & Equipment:

Machine Name	Description	Description Image
Boiler	❑ It's steam generating device which simply produce steam ❑ It utilizes heat generated by burning appropriate fuel.	
Belt Conveyor	❑ Used in transportation of bulk materials	

PROCESS & MACHINERY REQUIREMENT

General Failures & Remedies:

S. No.	General Failures	Remedies
1.	Ball bearing failure of various machine	➢ Proper periodic lubrication of all bearings in various machines. ➢ Regular replacement of all bearing to prevent critical failuraes.
2.	Power Drive Overload	➢ Ensure proper weighing & metering specially in case of semi-automatic plant. ➢ Install warning sensor in buffer region of loading capacity to ensure efficient operation.

PROCESS & MACHINERY REQUIREMENT

General Failures & Remedies:

S. No.	General Failures	Remedies
3.	Mechanical Key Failure	➢ Ensure that mechanical keys are replaced as per there pre-defined operational life. ➢ Prevent Overloading.
4.	Loss of Interface	➢ This problem is dominant in newly established automatic plant, one must learn to maintain rules in plant & ensure no employee goes near transmission lines, unless authorised. ➢ Provide proper physical shielding for the connections.

PROCESS & MACHINERY REQUIREMENT

Nutritional Information:

Nutritional Content of Mature Soy Seed per 100g:

S. No	Nutrients	Quantity
1.	Carbohydrates	30.16 g
2.	Sugars	7.33 g
3.	Dietary fiber	9.3 g
4.	Fat	19.94 g
5.	Saturated	2.884 g
6.	Monounsaturated	4.404 g
7.	Polyunsaturated	11.255 g
8.	omega-3	1.330 g
9.	omega-6	9.925 g
10.	Protein	36.49 g

PROCESS & MACHINERY REQUIREMENT

Nutritional Information:

Nutritional Content of Mature Soy Seed per 100g:

S. No	Nutrients	Quantity
11.	Tryptophan	0.591 g
12.	Threonine	1.766 g
13.	Isoleucine	1.971 g
14.	Leucine	3.309 g
15.	Lysine	2.706 g
16.	Methionine	0.547 g
17.	Cystine	0.655 g
18.	Phenylalanine	2.122 g
19.	Tyrosine	1.539 g
20.	Valine	2.029 g

PROCESS & MACHINERY REQUIREMENT

Export Potential & Sales Aspect:

- In 2019 there was a US$ 40.5 trillion in the global soy food industry.
- Today, the United States is one of the world's biggest soybean producers.
- Tofu is largely eaten as an ethnic food or as a vegetarian alternative to meat and cheese that is rich in protein.
- Tofu, including hot dogs, sandwiches, ice cream, sauces, cookies, and shakes, can also be used in a number of other foods.
- Many varieties of tofu are available, including extra hard, firm, soft, and silken tofu.
- Extra firm and firm tofu, respectively, have textures comparable to fried meat and raw meat.

PROCESS & MACHINERY REQUIREMENT

Export Potential & Sales Aspect:

- Three ingredients consist of tofu: soybeans, water and a coagulant.
- Soy milk is the precursor to tofu, prepared with soybeans and water, the way milk is the precursor to cheese.
- Global Tofu market is valued USD 2.42 billion in 2019. Expected to Grow at CAGR of 5.2% from 2019 to 2025.
- Tofu is considered a healthy and gluten-free food. Indian Tofu Market is expected to grow with 3.8% CAGR.

PM-FME SCHEME

The objectives of the scheme are:

- Support for capital investment for up-gradation and formalization with registration for GST, FSSAI hygiene standards and Udyog Aadhar;
- Capacity building through skill training, imparting technical knowledge on food safety, standards & hygiene and quality improvement;
- Hand holding support for preparation of DPR, availing bank loan and up-gradation;
- Support to Farmer Producer Organizations (FPOs), Self Help Groups (SHGs), producers cooperatives for capital investment, common infrastructure and support branding and marketing.
- https://mofpi.nic.in/pmfme/docs/SchemeBrochureI.pdf

For More details Contact:

National Institute of Food Technology and Entrepreneurship and Management
Ministry of Food Processing Industries
Plot No. 97, Sector-56, HSIIDC, Industrial Estate, Kundli,
Sonipat, Haryana-131028

Website: http:www.niftem.ac.in

Email: pmfmecell@niftem.ac.in
Call: 0130-2281089