

DETAILED PROJECT REPORT
DEHYDRATED FENUGREEK LEAVES MANUFACTURING UNIT.



INDIAN INSTITUTE OF FOOD PROCESSING TECHNOLOGY

Ministry of Food Processing Industries, Govt. of India

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Project At a Glance

1	Name of the Project	Dehydrated fenugreek leaves
2	Name of the entrepreneur/FPO/SHG/Cooperative	
3	Nature of proposed project	Proprietorship/Company/ Partnership
4	Registered office	
5	Project site/location	
6	Names of Partner (if partnership)	
7	No of share holders (if company/FPC)	
8	Technical advisor	
9	Marketing advisor/partners	
10	Proposed project capacity	60 MT/annum (55, 65, 75,90 & 100% capacity utilization in the 2 nd , 3 rd , 4 th , 5 th & 6 th years' onwards respectively
11	Raw materials	Fenugreek
12	Major product outputs	Dehydrated fenugreek leaves
13	Total project cost (Lakhs)	29.60
	Land development, building & civil construction	5.18
	Machinery and equipments	17.98
	Utilities (Power & water facilities)	0.8
	Miscellaneous fixed assets	0.9
	Pre-operative expenses	0.90
	Contingencies	1.20
	Working capital margin	2.64
14	Working capital Management (In Lakhs)	
	Second Year	7.93
	Third Year	9.37
	Fourth Year	12.78
15	Means of Finance	
	Subsidy grant by MoFPI (max 10 lakhs)	9.91
	Promoter's contribution (min 20%)	6.36
	Term loan (45%)	13.2
16	Debt-equity ratio	2.09 : 1
17	Profit after Depreciation, Interest & Tax	
	2nd year	19.52
	3rd year	22.99
	4th year	27.84
18	Average DSCR	2.16
	Benefit Cost Ratio	1.99
	Term Loan Payment	7 Years with 1 year grace period
	Pay Back Period for investment	2 Years

Note: All the data/contents of this DPR are taken from the available information on IIFPT site.

1 GENERAL OVERVIEW OF FENUGREEK PRODUCTION, CLUSTERS, POST-HARVEST MANAGEMENT AND VALUE ADDITION IN INDIA

1.1 INTRODUCTION

Fenugreek (*Trigonella foenum-graecum* L.) is an annual diploid species, popularly known by its vernacular name “methi” belonging to the sub-family “Papilionaceae” of the family “Fabaceae”. It is native crop of the countries bordering the eastern shores of Mediterranean region and extended to central Asia. Fenugreek leaves are an ancient spice used for flavoring various dishes. The leaves have a bitter taste, but when added to the recipe, titillate the taste buds. Apart from the dried leaves, the green leaves and the seeds are also commonly used while cooking. The yellow-amber coloured seeds are added in the preparation of pickles, vegetables, and spice mixes like sambar powder. Fenugreek seeds are available both in powdered and grounded form. The seeds are roasted to reduce the bitterness and enhance the aromatic flavor. The herb is also sold in powdered form or dried leaves form which can be bought and powdered.

India is the largest fenugreek producer in the world but due to high internal consumption do not have a major share of the global fenugreek trade. The crop has been recommended for the dry and semiarid regions of Asia, Africa and Latin America. The plant has been used traditionally in Indian Ayurveda medicines as well as in traditional Tibetan and Chinese medication for several centuries. Modern research has also demonstrated that fenugreek seed and leaves are useful in the treatment of a number of diseases including successfully reducing blood sugar and blood cholesterol levels in both animals and human subjects in experimental trials. The crop has the potential to act as a panacea in treatment of diabetic, microbial and cancer disease. Hence, the crop has huge international demand in the associated pharmaceutical, nutraceutical and functional food industries. Being known as a chemurgic crop, fenugreek has a widespread adoption in industrial sectors.

1.2 ORIGIN, DISTRIBUTION AND PRODUCTION OF FENUGREEK

Fenugreek plant is a traditional spice crop that has been grown for centuries across the Indian subcontinent. In addition to South Asia the crop is also grown in some parts of North Africa, Middle East, Mediterranean Europe, China, South East (SE) Asia, Australia, the USA, Argentina and Canada. The use of Fenugreek dates back as far as six thousand years ago. Through discoveries, Archaeologists believe this spice was used as early as 4000 BC, when remains of this herb were discovered in Tell Halal, Iraq. Fenugreek was considered to be a medicinal drug and used by the Ancient Egyptians for this purpose. The Greek physician, Hippocrates, used it as a soothing herb. Other ancient Greeks used Fenugreek as a cure for infections. The ancient Romans used it to treat fevers and respiratory and intestinal issues. They also used it to help heal wounds. Today, India is the world's leading producer of Fenugreek, followed by Nepal, Pakistan, Bangladesh, the Mediterranean and Argentina.. Fenugreek is an ancient and multipurpose crop in various geographical latitudes. Species of fenugreek have been identified in the five continents of Asia, Africa, Europa and Australia; being cultivated mostly in North America, West and South Asia, Australia, Russia, Middle East, North West of Africa. Potential areas for fenugreek production are parts of South East Asia, Japan, Central Asia (Mongolia), wide parts of Africa and South America

Fenugreek is also well known as a global spice crop grown in all the major continents (depending on soil and climatic conditions) across the globe including parts of North Africa, Mediterranean Europe, Russia, Middle East, China, India, Pakistan, Iran, Afghanistan, parts of Far East and SE Asia, Australia, the USA, Canada and Argentina. India once maintained and still holds the largest fenugreek harvested area in the world.

India is the largest producer of fenugreek in the world. It is being cultivated in an area of 123.4 thousand hectares, with the production of 130.8 thousand MT and productivity of 1.1 MT/ha. In India, the major fenugreek producing states where fenugreek is grown on commercial scale are Rajasthan, Gujarat, Uttarakhand, Uttar Pradesh,

Madhya Pradesh, Maharashtra, Haryana and Punjab. From the world production of fenugreek, it can be estimated that more than half is produced in India. India consumes domestically 90 percent of its own production and claims 70-80 percent of the world exports in fenugreek. Fenugreek is primarily used as a spice in countries where it is grown. The seeds and green leaves of fenugreek are used in food as well as in medicinal application that is the old practice of human history. It has been used to increase the flavoring and color, and also modifies the texture of food materials. Seeds of fenugreek spice have medicinal properties such as hypocholesterolemic, lactation aid, antibacterial, gastric stimulant, for anorexia, antidiabetic agent, galactagogue, hepatoprotective effect and anticancer. These beneficial physiological effects including the antidiabetic and hypocholesterolemic effects of fenugreek are mainly attributable to the intrinsic dietary fiber constituent which have promising nutraceutical value. It is well known for its fiber, gum, other chemical constituents and volatile contents. Dietary fiber of fenugreek seed is about 25% which changes the texture of food. These days it is used as food stabilizer, adhesive and emulsifying agent due to its high fiber, protein and gum content.

1.3 VARIETIES

There are noticeable discrepancies in the range of reported species of fenugreek (around 70–97) in the literature; however, older taxonomies like Linnaeus have explicitly accentuated on the existence of 260 species. Across the mentioned species of fenugreek, the following are mostly celebrated as for their medicinal and pharmaceutical properties: *T. foenumgraecum*, *T. balansae*, *T. corniculata*, *T. maritima*, *T. spicata*, *T. occulta*, *T. polycerata*, *T. calliceras*, *T. cretica*, *T. caerulea*, *T. lilacina*, *T. radiata*, *T. spinosa*. Among which *T. foenum-graecum* is widely cultivated throughout the world. The genus name, *Trigonella* meaning ‘little triangle’ resemble the triangular shape of its small yellowish-white flowers. The species name *foenumgraecum* meaning ‘Greek hay’ in reference to its initial introgression from Greece. To date different indigenous names have been ascribing to the plant depending on the nations, local

language and culture on which the crop is grown and/or consumed. For instance, fenugreek in Arabic is called Hulba; in Persian called Shanbalilae; in Greek called Tili, Tipilina, Trigoniskos, Tintelis, Tsimeni and Moschositaro; in Uzbekistani called Boidana, Ul'ba and Khul'ba; in Armenian called Shambala; in Chinese called K'u-Tou; in Ethiopian called Abish; in Japanese called Koroba; in England called fenugreek or Fenigrec; in Pakistani and Indian called Methi; in Italian called Fieno Greco; in Russian called Pazhitnik; and in French called Senegre.

Sl No.	Variety	Pedigree/Parentage	*Av. yield (kg/ha)	Duration (days)	Salient features
1	Co.1	Reselection from TG-2356 introduced for North India	680	80-85	A quick growing, dual purpose, early maturing variety tolerant to root rot disease. Seeds contain 21.7% protein.
2	Co 2	Selection from CF 390	480	85-90	Short duration dual purpose variety, field tolerant to <i>Rhizoctonia</i> root rot disease, suitable for both kharif and rabi season. Early maturity, short duration.
3	Rajendra kanti	Pure line selection from Reghunathpur collection	1300		Medium sized bushy plant; early maturity, suitable for intercropping in kharif and rabi season, field tolerant to <i>cercospora</i> leaf spot, powdery mildew and aphids.
4	RMt. 1i	Pure line selection from Nagpur local	1400		Vigorous semi erect medium sized, moderately branched growth habit, medium sized, bold and attractive typically yellow coloured grains, moderately resistant to root knot nematode and powdery mildew

					and aphids
5	Lam sel.1	Selection from germplasm collection of Uttar Pradesh	740		Dual purpose varieties, early maturing, bushy type and medium height, more number of branches and green matter. When cultivated for green leaf purpose it gives an average green yield of 12 tonnes per hectare. Field tolerant to major pests and ases.
6	Hisar Sonali	Pure line selection from gerpplasm	1700		Tall and bushy vigorous growing variety, dual purpose variety, late maturity (140-145 days), suitable for cultivation under irrigated condition. Moderately resistant to root rot and aphids.
7	Hisar suvarna	Pureline selection from local germplasm	1600		A quick growing, erect and tall, dual purpose, medium maturity (130-140days), moderately resistant to percospora and powdery mildew. Wider adaptability, suitable for cultivation throughout the country.
8	Hisar Madhavi	Pureline selection from local germplasm of UP	1900		A quick growing, erect and tall, dual purpose, medium maturity (130-140days), moderately resistant to powdery mildew and to downy mildew .A variety with under adaptability suitable for both irrigated and rain fed condition.
9	Hisar Muktha	Pureline selection natural green seed coated mutant line from UP	2000		A quick growing seed type variety, medium maturity (135-140days) , moderately resistant to powdery mildew and to downy mildew. Erect and tall plants. Wide adaptability. Suitable for both irrigated and rain fed condition

10	RMt 303	Mutation breeding from variety RMt 1	1900		Medium maturity variety (145- 150 days) seeds bold ,with typical yellow colour ,less susceptible to powdery mildew
11	RMt305	Mutation breeding from variety RMt 1	1300		First determinant type, multipodant, early maturing, wider adaptability, resistant to powdery mildew and root knot nematodes .Seeds bold, attractive and yellow, duration 120-125 days.
12	Guj Methi 1	Recurrent selection based on pure line selection from J. Fenu 102	1864		The first variety from Gujarat released for the state. Plant dwarf.
13	RMt143	RMt143	1600	140-150	Moderately resistant to powdery mildew, seeds bold yellow colour, suitable for heavier soils.
14	Rajendra Abha (Kasuri Methi)	NA	NA	NA	NA
15	Pant Ragini	Selection from local germplasm	1200	170-175	A dual purpose tall bushy type resistant to downy mildew and root rots, medium maturity. Seed contain 2-2.5% essential oil
16	Rajendra Khushba	NA	NA	NA	NA
17	Pusa Early bunchy	NA	NA	NA	NA
18	AM-01-	Selection from local	1720		Dual purpose, tolerant to powdery

35

germplasm

mildew

* Yield Kg/ha (Dry)

1.4 HEALTH BENEFITS AND NUTRITIONAL INFORMATION

Fenugreek (*Trigonella foenum graecum*) is an annual plant belongs to the family Leguminosae. It is the famous spices in human food. The seeds and green leaves of fenugreek are used in food as well as in medicinal application that is the old practice of human history. It has been used to increase the flavoring and color, and also modifies the texture of food materials. Seeds of fenugreek spice have medicinal properties such as hypo-cholesterolemic, lactation aid, antibacterial, gastric stimulant, for anorexia, antidiabetic agent, galactagogue, hepato protective effect and anticancer. These beneficial physiological effects including the anti-diabetic and hypo-cholesterolemic effects of fenugreek are mainly attributable to the intrinsic dietary fiber constituent which has promising nutraceutical value (Srinivasan, 2006). It is well known for its fiber, gum, other chemical constituents and volatile contents. Dietary fiber of fenugreek seed is about 25% which changes the texture of food. These days it is used as food stabilizer, adhesive and emulsifying agent due to its high fiber, protein and gum content. The protein of fenugreek is found to be more soluble at alkaline pH (Meghwal and Goswami, 2012). Fenugreek is having beneficial influence on digestion and also has the ability to modify the food.

Its seed contains 45-60 % carbohydrates, mainly mucilaginous fiber (galactomannans), 20-30 % proteins high in lysine and tryptophan, 5-10 % fixed oils (lipids), pyridine alkaloids mainly trigonelline (0.2-0.38 %), choline (0.5 %), gentianine and carpaine, the flavonoids apigenin, luteolin, orientin, quercetin, vitexin and isovitexin, free amino acids, such as 4-hydroxyisoleucine (0.09 %), arginine, histidine and lysine, calcium, iron, saponins (0.6-1.7%), glycosides yielding steroidal saponins on

hydrolysis (diosgenin, yamogenin, tigogenin, neotigogenin), cholesterol and sitosterol, vitamins A, vitamin B1, vitamin C and nicotinic acid.

Nutritional value:

The nutrition fact for Fenugreek leaves (100 g):

Nutritional value per 100 g (3.5 oz)	
Energy	1,352 KJ (323 kcal)
Carbohydrates	58 g
Dietary fiber	25 g
Fat	6.4 g
Protein	23 g
Vitamins	Quantity % DV†
Thiamine (B1)	28%, 0.322 mg
Riboflavin (B2)	31%, 0.366 mg
Niacin (B3)	11%, 1.64 mg
Vitamin B6	46%, 0.6 mg
Vitamin C	4%, 3 mg

CONSTITUENTS AND HEALTH BENEFITS OF FENUGREEKS

Health benefits:

Fenugreek is one of the oldest medicinally used plants, with roots in both traditional Indian and Chinese systems of medicine.

1. May help control diabetes and blood sugar levels

Fenugreek may aid metabolic conditions, such as diabetes. It seems to affect both types 1 and 2 diabetes, along with increasing general carb tolerance in people without these conditions. It also controls blood sugar levels and reductions in total and LDL (bad) cholesterol. These benefits may be due to fenugreek's role in:

- reduce intestinal glucose absorption
- delay gastric emptying
- improve insulin sensitivity and action
- reduce concentrations of lipid-binding protein

2. Improve milk production and flow

Fenugreek may help stimulate breast milk production and ease the flow. Practitioners of traditional Asian medicine have long recommended fenugreek for this purpose.

3. Aids in Weight loss:

Fenugreek may suppress the appetite and increase feelings of fullness, which could help reduce overeating and lead to weight loss. Because of the fiber content, fenugreek fiber extract powders may also lead to a feeling of fullness.

4. Reduce inflammation

The substantial levels of antioxidants in fenugreek give it great potential as an anti-inflammatory agent.

5. Reduce the risk of heart and blood pressure conditions

Fenugreek may help regulate cholesterol levels and improve blood pressure, which can reduce the risk of developing heart conditions and improve heart health.

6. Pain relief

Fenugreek has long been used for pain relief in traditional systems of medicine. The compounds called alkaloids in the herb help block sensory receptors that allow the brain to Perceive Pain.

Pharmacological Profile of Fenugreek Leaves

1. Antiadhesive properties
2. Anticarcinogenesis effects
3. Antitumor activity
4. Antioxidant activity
5. Antiplatelet activity
6. Exercise recovery effects
7. Hepatoprotective activity
8. Lipid-lowering effects
9. Galactagogue effects
10. Analgesic effects

1.5 CULTIVATION, BEARING & POST HARVEST MANAGEMENT:-

Fenugreek (*Trigonella foenum-graecum* L.) is an annual herbaceous legume suitable for dryland areas where moisture is not sufficient for berseem, for example. Fenugreek plant and seeds have a characteristic strong odour (Ecocrop, 2017). The seeds are used as condiments. Fenugreek is sometimes used as a short-rotation catch crop after sugarcane or cotton. It is a dicotyledonous plant with branched stems with trifoliolate leaves and it bears white flowers which produce golden yellow seeds.

Fenugreek is an annual herb reaching a height of about 0.9 m, leaves are light green, pinnately trifoliolate, flowers – papilionaceous, fruits – legume, long, narrow, curved, tapering with a slender point and containing small deeply furrowed seeds. There are two species of the genus *Trigonella*, which are of economic importance viz., *T.foenum graecum*, the common methi and *T.corniculata*, the Kasuri methi. These two differ in their growth habit and yield. The latter one is a slow growing type and remains in rosette condition during most of its vegetative growth period. Fenugreek is an erect, smooth, herbaceous plant that can grow up to a height of 40-80 cm (Ecocrop, 2017). It is taprooted. Its stems are erect, up to 50 cm high, sometimes branched. The leaves are alternate, compound, trifoliolate, 7-12 cm long, light green in colour. The leaflets are oval, up to 5 cm long, hairy on their lower face. The flowers are papilionaceous, borne in leaf axils, white, lemon-yellow or purplish blue in colour (Ecocrop, 2017). The fruits occur as straight or sickle-like pods of 2-10 cm, long, thin and pointed, and contain 10-20 seeds. The seeds are 6-8 mm long, oblong or square, green-olive or brownish in colour, with a very strong and spicy odour (Ecocrop, 2017; Alaoui, 2005).

Cultivation and Bearing:-

It has a wide adaptability and is successfully cultivated both in the tropics as well as temperate regions. It is tolerant to frost and freezing weather. It does well in places

receiving moderate or low rainfall areas but not in heavy rainfall area. It is cool season crop. The areas where rains are heavy and continuous, growing methi should be avoided.

It can be grown on a wide variety of soils but clayey loam is relatively better. The optimum soil pH should be 6.0 to 7.0 for its better growth and development. A rich well drained loamy soil is best suited for fenugreek cultivation. The favorable soil pH is 6-7.

Land is prepared by ploughing thrice and beds of uniform size are prepared. Broadcasting the seed in the bed and raking the surface to cover the seeds is normally followed. But, line sowing is advocated in rows at 20 to 25 cm apart which facilitates the intercultural operations. Spray pre-emergence herbicide Fluchloralin 700 ml in 500 lit of water per ha. Sowing in the plains is generally taken up in September to November while in the hills, it is grown from March. Approximately 20 to 25 kg of seed is required for one hectare and the seed takes about 6-8 days to complete its germination.

Besides 15 tonnes of farm yard manure, a fertilizer dose of 25 kg Nitrogen, 25 kg Phosphorus and 50 kg Potash per ha is recommended. Half of the nitrogen dose and the entire quantity of phosphorus and potash are applied basally and the remaining half Nitrogen is applied 30 days after sowing. To obtain more successful leafy growth, nitrogen should be applied after each cutting. First irrigation is given immediately after sowing and subsequent irrigation is applied at 7 to 10 days interval.

Fenugreek is harvested before the seed stalks develop. Whole plant is cut off the tap root for fresh market while it is cut off about an inch above the soil for processing by different machines. Fenugreek should not be harvested after heavy rain as the leaves become crisp and sensitive to break when wet. Leaves and stems should be protected from damaging and bruising during harvesting and handling. Rotten and yellow leaves should be discarded at the time of harvest as these leaves can adversely affect the quality of fresh leaves. Fenugreek loose moisture rapidly and sag, so it should be harvested in cooler

periods of the day. Fenugreek is usually washed, repacked in round baskets, crates, and humpers, and iced in a central location before shipping in refrigerated vehicles to storage areas or retail stores. Fenugreek is recommended to be cooled rapidly upon harvesting and is recommended to be stored, distributed, and retailed at temperatures near 0°C at high relative humidities (95–98% RH). Major quality losses in fenugreek during storage include wilting, yellowing, decay, and vitamin C loss. After harvesting of fenugreek it bounded in ‘Judi’ and packed in cloth or netted bags or put in bamboo basket. After the seeds have matured, uproot the plants and hang to dry. When seeds are completely dry, thresh and separate them. Grind seeds if required. Store whole dried seeds or ground fenugreek powder in airtight containers. A yield of 1200 to 1500 kg of seeds and about 800 to 100 kg of leaves may be obtained per hectare in crops grown for both the purposes.

1.6 PROCESSING & VALUE ADDITION:-

Fenugreek leaves can be cleaned and packaged as whole or precut forms for fresh use. Minimally processed ready-to-use fresh produce is more perishable than intact produce. Thus, it is important to start with a high quality raw material and strictly apply the necessary processing and storage requirements for such products. Minimally processed fenugreek product can be fresh, whole baby or regular leaves and fresh-cut leaves packaged in modified atmosphere conditions among which the former is more common. After the leaves are trimmed, sorted, and cleaned with sanitizers as described in the previous section, the leaves are usually used as intact (individual baby leaves) or can also be cut into smaller pieces (not common in practice) for further processing. It is important to note that cutting must be done with sharp knives to decrease the degree of physical injuries to the tissues. The cut leaves may be treated with antimicrobial and antioxidant solutions to retard microbial and oxidative degradations in the product. If whole intact leaves are to be packaged, they must be rinsed with water containing appropriate sanitizers to reduce the microbial load on them. Excess surface water on the leaves must be removed by centrifugation with a spinner before packaging. Moisture on the surface can increase

microbial decay of the product. Fenugreek is consumed as fresh or processed into different forms including frozen, canned, or dried.

Frozen Fenugreek:

Fenugreek can be frozen to increase its shelf life. Freezing inhibits growth of microorganisms and retards degradative biochemical and enzymatic reactions in the product. The process involves sorting, trimming, washing, blanching, draining, freezing, and packaging. Frozen fenugreek can be presented in one of the following forms: whole fenugreek (intact plant with roots removed), leaf fenugreek (whole leaves separated from the root crown), cut-leaf fenugreek, and pureed fenugreek. Thus, depending on the type of the product to be produced, a size reduction is applied to trimmed, sorted/graded, and cleaned fenugreek. Blanching is one of the most critical steps in freezing of fenugreek. It involves brief immersion of the fresh product in water at 85–100°C or steaming at 100°C primarily to inactivate enzymes such as lipoxygenases (LO), peroxidases (PO), and polyphenol oxidases (PPO), which cause degradations in color, flavor, texture, and nutritional value. It also kills vegetative microbial cells and decreases any pesticide residues on the product. Blanched fenugreek is cooled and usually packaged before freezing, although individual quick freezing of unpackaged fenugreek can also be done followed by packaging.

Dehydrated Fenugreek:

Large-leafed fenugreek is preferred for production of dehydrated fenugreek. The fenugreek is trimmed and sorted carefully to remove roots, older yellowed or decayed leaves before washing. The leaves are dried at 80°C until the moisture content drops to below 6.5%. Drying can also be conducted with microwaves at 750 W power level, which can be advantageous in terms of drying time, energy consumption, ascorbic acid, and color. Premium quality dried fenugreek can be produced by freeze drying which retains the valuable nutrients and color to a larger extent.

Canned Fenugreek:

Harvested fenugreek in crates, directly from the field or in boxes, can be preserved by canning. Fenugreek is trimmed, sorted, and graded to remove the crowns, heavy stalks, decayed and yellowed leaves followed by washing. Washing is generally done by passing the leaves through a revolving reel immersed in water with additional sprays or through a tank on a mesh belt to remove soil, dirt, and insects thoroughly.

2. MODEL DEHYDRATED FENUGREEK LEAVES PROCESSING UNDER FME SCHEME

2.1 LOCATION OF THE PROPOSED PROJECT AND LAND

The entrepreneur must provide description of the proposed location, site of the project, distance from the targeted local and distant markets; and the reasons/advantages thereof i.e. in terms of raw materials availability, market accessibility, logistics support, basic infrastructure availability etc. The major fenugreek producing states where fenugreek is grown on commercial scale are Rajasthan, Gujarat, Uttarakhand, Uttar Pradesh, Madhya Pradesh, Maharashtra, Haryana and Punjab.

2.2 INSTALLED CAPACITY OF THE DEHYDRATED FENUGREEK LEAVES PROCESSING UNIT

The maximum installed capacity of the Dehydrated fenugreek leaves manufacturing unit in the present model project is proposed as 60 tonns/annum or 200 kg/day Dehydrated fenugreek leaves. The unit is assumed to operate 300 days/annum @ 8-10 hrs/day The 1st year is assumed to be construction/expansion period of the project; and in the 2nd year 55 percent capacity, 3rd year 65 percent capacity, 4th year 75 percent capacity, 5th year 90 percent capacity & 6th year onwards 100 percent capacity utilization is assumed in this model project.

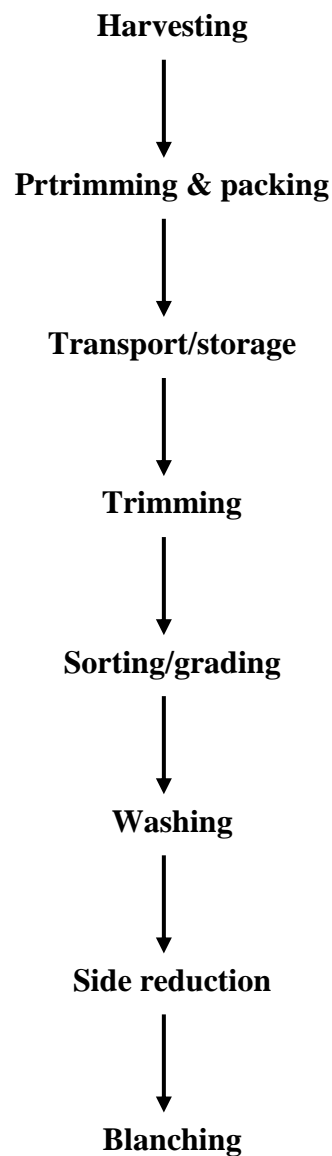
2.3 RAW MATERIAL REQUIREMENTS FOR THE UNIT

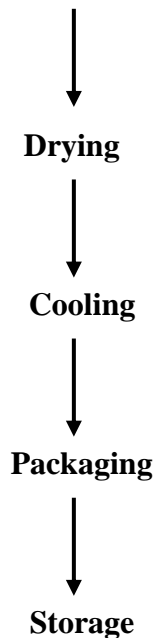
A sustainable food processing unit must ensure maximum capacity utilization and thus requires an operation of minimum 280-300 days per year to get reasonable profit. Therefore, ensuring uninterrupted raw materials supply requires maintenance of adequate raw material inventory. The processor must have linkage with producer organizations preferably FPCs through legal contract to get adequate quantity and quality of raw materials which otherwise get spoiled. In the Dehydrated fenugreek leaves manufacturing project, the unit requires

2062.5 kg/day, 2437.5 kg/day, 2812.5 kg/day, 3375 Kg/day & 3570 kg/day Fenugreek vegetable at 55, 65, 75, 90 & 100 percent capacity utilization, respectively.

2.4 MANUFACTURING PROCESS OF THE DEHYDRATED FENUGREEK LEAVES

Flow chart for dehydrated fenugreek leaves:





Fenugreek leaves are highly perishable due to their high moisture content ranges from (80-92% w.b) and available for very short period of time. This creates a considerable gap between demand and non-availability. The storage life of green leafy vegetables is extremely short and varies from few hours to 2-3 days depending upon the temperature and the relative humidity of the storage condition. In proper post-harvest handling leads to the loss of large amount (around 32%) of vegetables. Due to its high perishability and round the year demand almost it needs to be processed into dehydrated form. The various methods of dehydration of fenugreek leaves are sun drying, shade drying, fluidized bed drying, tray drying and microwave drying etc.

Blanching: Blanching are necessary steps in the processing of vegetables and the partial cooking which the vegetable are heated on water before processing to dehydration, freezing etc. It can be carried out in different methods like water blanching, steam blanching, microwave blanching etc. to inactivate the enzyme, remove raw or bitter flavor, stabilize the color and texture, and reduce bacterial load and desirable additives. Blanching increases the carotenoid content, reduces the non-enzymatic browning and encouraged carotenoid destruction.

Dehydration/ Drying Techniques:

Methods of fenugreek leave Dehydration

Sun Drying: - This is a traditional method of drying of crops and grains and probably being followed by the farmers since man has developed art of cultivation. Still, in India, major portion of crops is left in the field and threshing yard for drying under. Sun is a very large nuclear fusion reactor, which converts 40 lakhs tones of hydrogen to helium in one second. Although earth absorbs a minute portion of energy, but the amount of energy received is approximately of 5.4 Joule/yr.

Shade Drying: - Shade drying requires full air circulation. It should not be undertaken inside conventional buildings, but in an open side shed purposely built for shade drying most products are to be dried are sliced as sliced products dry thoroughly and quickly. The materials should be placed on meters or tray and well above the ground in order to avoid contamination from dust or soil. The material is stirred occasionally to ensure faster drying. The principles for shade drying are the same as for sun drying under dry conditions when there is a good circulation of dry air, shade drying takes more time then is normally required for drying in full sunlight. The limitation of shade drying is that drying cannot be accomplished in rainy season and when initial moisture content of product is higher.

Fluidized bed drying: - In this method of drying, products are being denied under fluidized bed dryer. The samples are fluidized by drying air with sufficiently high velocity to cause suspension. In this drying process, higher rates of moisture migration take place. Since every surface of product is in contact with drying air, uniform drying of product take place. This method is normally used for the materials, which have high initial moisture content and are to lighter and the same time requires to be dried quickly such as vegetable leaves. The fluidized bed drying technique yields an important position among modern drying methods. It is used mainly for granular material; it is also applicable in the drying of solutions, pasts and liquids sprayed in to the fluidized bed. The principle of operation of fluidized bed dryer is to provide sufficient air pressure to fluidize a thin bed of grain/product being excellent air/grain contact.

Tray Drying: - In a tray dryer, many shallow trays are kept one above the other with a gap in between, in the drying chamber. Tray dryer are generally used for drying of vegetable and similar semi perishables. The tray may or not have perforated bottom. Perforated trays are used when the platinum chamber is at the bottom of drying chamber. If the hot air is coming from the sides of the drying chamber the trays may not have perforated bottom. The gap in between the group of trays permits air ventilation. Products are kept in the layers in the tray.

Microwave Drying: - Microwave drying is a drying technique which is currently available in fresh leaves processing industry Wray. It allows rapid evaporation of water from food, providing relatively shorter drying times compared to many drying methods (convective drying, shade and sun drying, freeze drying) and decreased energy consumption in the drying process. Microwave-dried products showed less shrinkage, better color and rehydration capacity compared to hot-air drying. The quality of microwave-dried products is influenced by drying parameters such as microwave power (W), drying time, the initial moisture content of the product, and the dielectric properties of the materials.

2.5 MARKET DEMAND AND SUPPLY FOR DEHYDRATED FENUGREEK LEAVES

Growing consumer consciousness regarding health and healthy practices has raised the demand for Fenugreek Powder globally. Fenugreek Powder is essentially fenugreek seeds in grinded form. Fenugreek is very common in the Indian subcontinent, where it is known as "methi." Methi is an herb, scientifically referred to as *Trigonella foenum-graecum*. Fenugreek Powder contains many nutrients. For instance, one tablespoon of Fenugreek Powder contains 6 grams of carbs, 3 grams of protein, 3 grams of fiber and 7% of daily required magnesium. Dehydrated fenugreek leaves and Fenugreek Powder is used as a spice in India as well as in other regions of Asia Pacific. Since dehydrated fenugreek leaves and Fenugreek Powder is derived from a natural source and offers various health benefits, consumers show more interest towards it. Dehydrated fenugreek leaves and

Fenugreek Powder is known to increase production of milk in breastfeeding mothers and it controls cholesterol, diabetes and blood sugar levels. Due to its various benefits, dehydrated fenugreek leaves and Fenugreek Powder are highly utilized in nutraceuticals. Fenugreek Powder supplements is found to be advantageous for boosting testosterone level and libido in men. Due to the presence of lutein, zeaxanthin and lycopene, Fenugreek Powders is also used for treating common cold, flu, gallstones, diarrhea, constipation, high blood pressure, etc.

The Fenugreek Market report is a valuable source of insightful data for business strategists. It offers the industry overview with growth analysis and historical & futuristic cost, revenue, demand, and supply data (as applicable). The report explores the current outlook in global and key regions from the perspectives of players, countries, product type, and end industries. This Fenugreek Market study provides comprehensive data that enhances the understanding, scope, and application of this report.

Huge demand for dehydrated fenugreek leaves and Fenugreek Powder has been experienced in recent years as consumers, these days, prefer natural health care products. Dehydrated fenugreek leaves and Fenugreek Powder is not only used as a food ingredient and spice but also finds a number of applications in the healthcare industry. Fenugreek Powder is used to increase the production of milk in breastfeeding mothers as Fenugreek Powder is used in numerous dishes to provide aroma and flavor. Along with food, Fenugreek Powder is also used as a natural remedy for hair treatment and is known to control baldness. Fenugreek Powder has been witnessing high demand from cosmetics and personal care products and people use it as a natural remedy to reduce wrinkles.

Fenugreek Seed Extract is a derivative obtained from a series of processing of fenugreek seeds. Fenugreek seed extract and oil are known to possess antioxidant, antidiabetic, antimicrobial, and antitumorigenic properties. Fenugreek Seed Extract is used as a thickening agent and an emulsifier. It is also used as a spice and flavoring agent in food preparation. Fenugreek is gaining importance both in food and medicines.

Concerning food use, to limit the use of maple syrup, fenugreek seed extract is used as a flavoring agent as an imitation. Fenugreek seed extracts are used along with other flavoring ingredients occasionally. However, it is commonly used in pickles and cheese as a flavoring agent.

2.6 MARKETING STRATEGY FOR DEHYDRATED FENUGREEK LEAVES

The increasing urbanization and income offers huge scope for marketing of vegetable based products. Urban organized platforms such as departmental stores, malls, super markets can be attractive platforms to sell well packaged and branded fenugreek products.

2.7 DETAILED PROJECT ASSUMPTIONS

This model DPR for Dehydrated fenugreek leaves unit is basically prepared as a template based on certain assumptions that may vary with capacity, location, raw materials availability etc. An entrepreneur can use this model DPR format and modify as per requirement and suitability. The assumptions made in preparation of this particular DPR are given in This DPR assumes expansion of existing vegetable processing unit by adding new juice manufacturing line. Therefore, land and civil infrastructures are assumed as already available with the entrepreneurs.

- Herewith in this DPR, we have considered the assumptions as listed below in the tables of different costs, which may vary as per region, seasons and machinery designs and supplier.
 1. Fenugreek cost considered @ Rs.8/-per kg.
 2. 1 kg Fenugreek will produce 14% recovery.
 3. 1 Batch size is approximately 200 kg.
 4. No. of hours per day are approximately 8-10 hours.
 5. Batch yield is 95%

Detailed Project Assumptions		
Parameter	Assumption	
Capacity of Dehydrated fenugreek leaves Unit	60	MT/annum
Utilization of capacity	1st Year Implementation, 55% in second, 65% in third, 75% in fourth year, 90% in fifth years, & 100% in sixth years onwards respectively.	
Working days per year	300	days
Working hours per day	10	hours
Interest on term and working capital loan	12%	
Repayment period	Seven year with one year grace period is considered.	
Average prices of raw material	8	
Average sale prices per Kg	180	Rs/kg
Pulp extraction	14	
DEHYDRATED FENUGREEK LEAVES	7.14 Kg Fenugreek for 1 kg Dehydrated Fenugreek leaves	

2.8 FIXED CAPITAL INVESTMENT

2.8.1 MACHINERY AND EQUIPMENT

Sr No.	Equipment	Capacity	Quantity	Price (Rs. In Lacs)
1	Cold store sq. meter	1	15000 Kg	10
2	Rotary type washing machine	1	200 kg/hr	0.8

3	Leaf separator (mechanical)	4	1000 kg/hr	1.2
4	Vegetable cutter/slicer	4	200 kg/hr	1.6
5	Blanching kettle Gas operated	1	100 Liter	0.6
6	Dryer	1	120 kg /batch	2.2
7	Induction sealer	1	Suitable	0.3
8	Shrink tunnel	1	Suitable	0.35
9	Continuous sealing machine	1	Suitable	0.25
10	Batch coding machine	1	Suitable	0.12
11	Weighing balance	1	Suitable	0.06
12	Accessories	1	Suitable	0.5
			Total	17.98

2.8.2 OTHER COSTS:-

Utilities and Fittings:-

Utilities and Fittings	
1. Water	Rs. 0.8Lacs total
2. Power	

Other Fixed Assets:

Other Fixed Assets	
1. Furniture & Fixtures	Rs. 0.9 lac total
2. Plastic tray capacity	
3. Electrical fittings	

Pre-operative expenses

Pre-operative Expenses

Legal expenses, Start-up expenses, Establishment cost, consultancy fees, trials and others.	0.9 LAC
Total preoperative expenses	0.9 LAC

Contingency cost to be added as approx.1.2 Lac.

So total startup cost at own land & Premise may be somewhat similar to 29.60 lacs. This is according to survey done at X location India. This may vary on location, situation and design change over.

2.9 WORKING CAPITAL REQUIREMENTS

Particulars	Period	Year 2 (55%)	Year 3 (65%)	Year 4 (75%)
Raw material stock	7 days	0.85	1.01	1.37
Work in progress	15 days	1.70	2.01	2.74
Packing material	15 days	0.18	0.21	0.29
Finished goods' stock	15 days	2.37	2.80	3.82
Receivables	30 days	4.74	5.60	7.64
Working expenses	30 days	0.73	0.87	1.18
Total current assets		10.57	12.50	17.04
Trade creditors		0.00	0.00	0.00
Working capital gap		10.57	12.50	17.04
Margin money (25%)		2.64	3.12	4.26
Bank finance		7.93	9.37	12.78

2.10 TOTAL PROJECT COST AND MEANS OF FINANCES

Particulars	Amount in Lakhs
i. Land and building (20 x 32 x 12 ft - LxBxH)	5.18
ii. Plant and machinery	17.98
iii. Utilities & Fittings	0.8
iv. Other Fixed assets	0.9
v. Pre-operative expenses	0.90
vi. Contingencies	1.20
vii. Working capital margin	2.64
Total project cost (i to vii)	29.60
Means Of finance	
i. Subsidy	9.92
ii. Promoters Contribution	6.36
iii. Term Loan (@10%)	13.32

2.11 MANPOWER REQUIREMENTS

Total Monthly Salary (Rs.)	No	Wages	Total Monthly	Total Annualy
Supervisor (can be the owner)	1	15000	15000	180000
Technician	1	12000	12000	144000
Helper	1	5500	5500	66000
Sales man	1	8000	8000	96000
			40500	728400

2.12 EXPENDITURE, REVENUE AND PROFITABILITY ANALYSIS

	Particulars	1st Year	2nd Year	3rd Year	4th Year	5th year	6th year
A	Total Installed Capacity (MT)	1070 MT Fenugreek/Annum	33	39	45	54	60
	Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%
B	Expenditure (Rs. in Lakh)	0					
	Fenugreek (Av. Price @ Rs.8/Kg)	0.00	16.50	19.50	22.50	27.00	30.00
	Sulphur dioxide @ Rs. 150/kg	0.00	0.09	0.11	0.12	0.15	0.16
	Other materials (Rs. 3/kg)	0.00	0.02	0.02	0.03	0.03	0.04
	Packaging materials (Rs 6 per Kg)	0.00	1.98	4.68	5.40	6.48	7.20
	Utilities (Electricity, Fuel)	0.00	1.46	1.72	1.99	2.38	2.65
	Salaries (1st yr only manager's salary)	1.80	4.86	4.86	4.86	4.86	4.86
	Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90
	Insurance	0.30	0.30	0.30	0.30	0.30	0.30
	Miscellaneous expenses	0.50	2.30	2.30	2.30	2.30	2.30
	Total Expenditure	2.60	28.20	34.29	38.39	44.40	48.40
C	Total Sales Revenue (Rs. in Lakh)	0.00	59.40	70.20	81.00	97.20	108.00
	Sale of Dehydrated fenugreek leaves (Av. Sale Price @ Rs.180/kg)	0.00	59.40	70.20	81.00	97.20	108.00
D	PBDIT (Total exp.-Total sales rev.) (Rs. in Lakh)/Cash Inflows	-2.60	31.20	35.91	42.61	52.80	59.60
	Depreciation on civil works @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20
	Depreciation on machinery @ 10% per annum	1.80	1.62	1.46	1.31	1.18	1.06
	Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05

	Interest on term loan @ 12%	1.39	1.34	1.28	1.23	1.16	1.09
	Interest on working capital @ 12%	0.00	0.95	0.95	0.95	0.95	0.95
E	Profit after depreciation and Interest (Rs. in Lakh)	-6.16	27.89	32.85	39.77	50.19	57.19
F	Tax (assumed 30%) (Rs. in Lakh)	0.00	8.37	9.85	11.93	15.06	17.16
G	Profit after depreciation, Interest & Tax (Rs. in Lakh)	-6.16	19.52	22.99	27.84	35.13	40.03
H	Surplus available for repayment (PBDIT-Interest on working capital-Tax) (Rs. in Lakh)	1.39	1.34	1.28	1.23	1.16	1.09
I	Coverage available (Rs. in Lakh)	1.39	1.34	1.28	1.23	1.16	1.09
J	Total Debt Outgo (Rs. in Lakh)	0.46	0.51	0.56	0.62	0.69	0.76
K	Debt Service Coverage Ratio (DSCR)	3.00	2.62	2.28	1.97	1.69	1.44
	Average DSCR	2.16					
L	Cash accruals (PBDIT- Interest-Tax) (Rs. in Lakh)	-3.99	21.49	24.77	29.45	36.58	41.35
M	Payback Period	2.5 Years					
	(on Rs. 29.40 Lakhs initial investment)						

2.13 REPAYMENT SCHEDULE

Year	Beginning	PMT	Interest	Principal	Ending Balance
1	1,332,159.97	184,796.14	138,544.64	46,251.51	1,285,908.47
2	1,285,908.47	184,796.14	133,734.48	51,061.66	1,234,846.80
3	1,234,846.80	184,796.14	128,424.07	56,372.07	1,178,474.73
4	1,178,474.73	184,796.14	122,561.37	62,234.77	1,116,239.96
5	1,116,239.96	184,796.14	116,088.96	68,707.19	1,047,532.77
6	1,047,532.77	184,796.14	108,943.41	75,852.73	971,680.04

7	971,680.04	184,796.14	101,054.72	83,741.42	887,938.62
8	887,938.62	184,796.14	92,345.62	92,450.53	795,488.09
9	795,488.09	184,796.14	82,730.76	102,065.38	693,422.71
10	693,422.71	184,796.14	72,115.96	112,680.18	580,742.53
11	580,742.53	184,796.14	60,397.22	124,398.92	456,343.61
12	456,343.61	184,796.14	47,459.74	137,336.41	319,007.20
13	319,007.20	184,796.14	33,176.75	151,619.39	167,387.81
14	167,387.81	184,796.14	17,408.33	167,387.81	(0.00)
		2,587,146.00	1,254,986.03	1,332,159.97	(1,332,159.97)

2.14 ASSET'S DEPRECIATION

Assets' Depreciation (Down Value Method)	Amounts in Lakhs							
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Civil works	5.18	4.92	4.67	4.44	4.22	4.01	3.81	3.62
Depreciation	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
Depreciated value	4.92	4.67	4.44	4.22	4.01	3.81	3.62	3.44
Plant & Machinery	17.98	16.18	14.56	13.11	11.80	10.62	9.56	8.60
Depreciation	1.80	1.62	1.46	1.31	1.18	1.06	0.96	0.86
Depreciated value	16.18	14.56	13.11	11.80	10.62	9.56	8.60	7.74

Other Fixed Assets	0.80	0.68	0.58	0.49	0.42	0.35	0.30	0.26
Depreciation	0.12	0.10	0.09	0.07	0.06	0.05	0.05	0.04
Depreciated value	0.68	0.58	0.49	0.42	0.35	0.30	0.26	0.22
All Assets	23.96	21.78	19.82	18.04	16.43	14.98	13.66	12.47
Depreciation	2.18	1.97	1.78	1.61	1.45	1.32	1.19	1.08
Depreciated value	21.78	19.82	18.04	16.43	14.98	13.66	12.47	11.39

2.15 FINANCIAL ASSESSMENT OF THE PROJECT

Benefit Cost Ratio (BCR) and Net Present Worth (NPW)

Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year	
Capital cost (Rs. in Lakh)	29.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Recurring cost (Rs. in Lakh)	2.60	28.20	34.29	38.39	44.40	48.40	48.40	48.40	
Total cost (Rs. in Lakh)	32.20	28.20	34.29	38.39	44.40	48.40	48.40	48.40	322.71
Benefit (Rs. in Lakh)	0.00	59.40	70.20	81.00	97.20	108.00	108.00	108.00	
Total Depreciated value of all assets (Rs. in Lakh)								11.39	
Total benefits (Rs. in Lakh)	0.00	59.40	70.20	81.00	97.20	108.00	108.00	119.39	643.19
Benefit-Cost Ratio (BCR): (Highly Profitable project)	1.993								
Net Present Worth (NPW):	320.49								

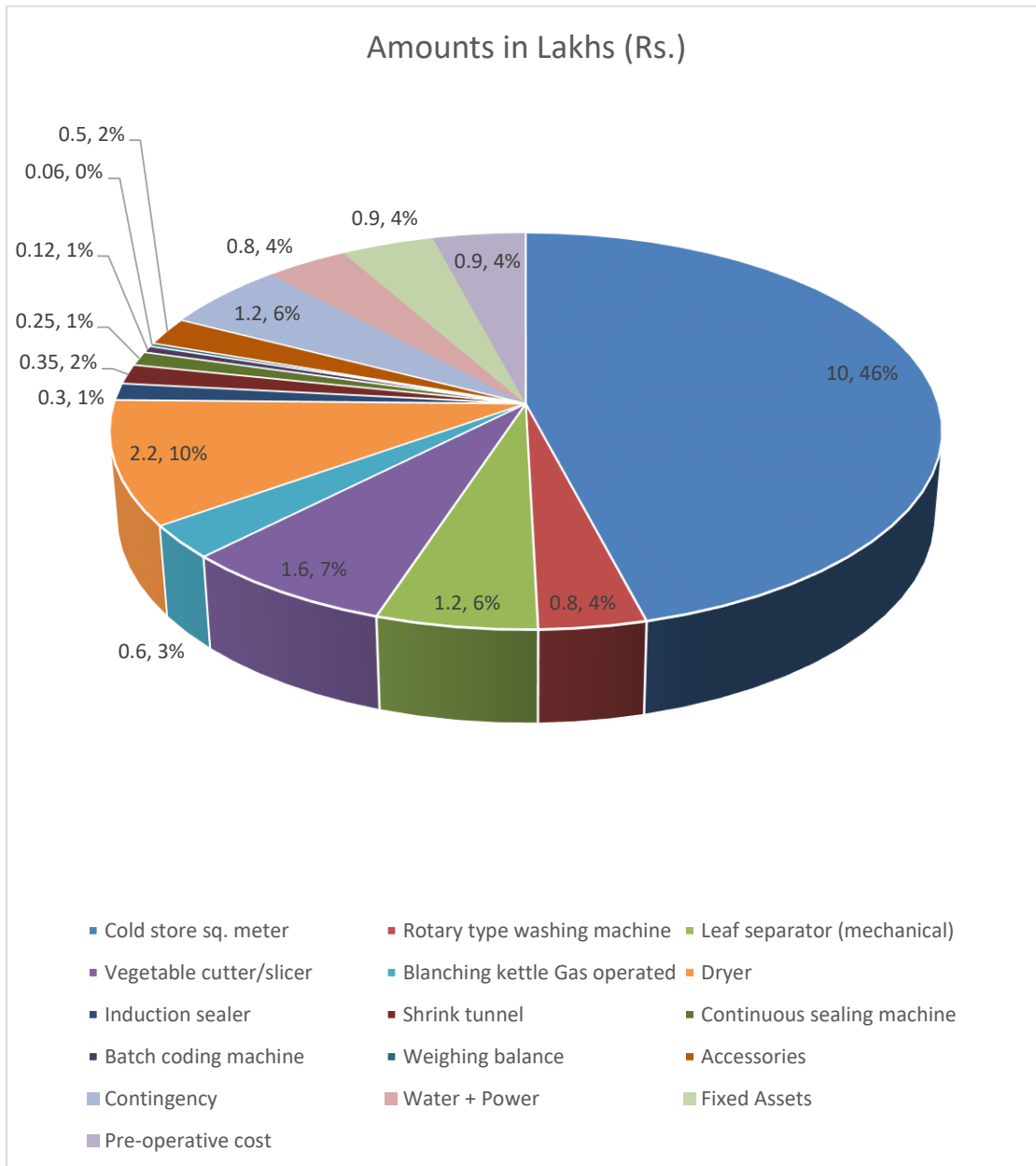
2.16 BREAK EVEN ANALYSIS

Break even analysis indicates costs-volume profit relations in the short run. This is the level at which, the firm is in no loss no profit situation.

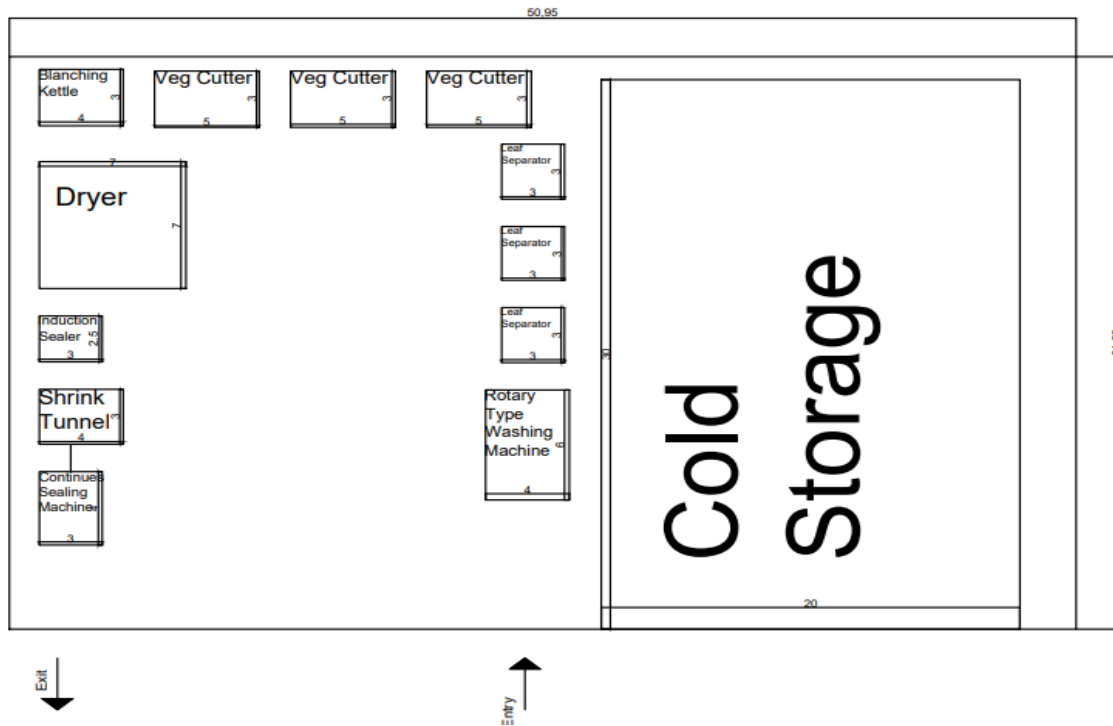
Particulars	1st Year	2nd year	3 rd year	4th year	5th year	6th year	7th year	8th year
Capacity utilization (%)	Under Const.	55%	65%	75%	90%	100%	100%	100%
Production MT/Annum		33	39	45	54	60	60	60
Fixed Cost (Rs. in Lakh)								
Permanent staff salaries	4.86	4.86	4.86	4.86	4.86	4.86	4.86	4.86
Depreciation on building @ 5% per annum	0.26	0.25	0.23	0.22	0.21	0.20	0.19	0.18
Depreciation on machinery @ 10% per annum	1.80	1.62	1.46	1.31	1.18	1.06	0.96	0.86
Depreciation on other fixed assets @ 15% per annum	0.12	0.10	0.09	0.07	0.06	0.05	0.05	0.04
Interest on term loan	1.39	1.34	1.28	1.23	1.16	1.09	1.01	0.92
Insurance	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Total Fixed Cost (Rs. in Lakh)	8.72	8.46	8.22	7.99	7.77	7.56	7.36	7.16
Sales Revenue (Rs. in Lakh)	0	59.4	70.2	81	97.2	108	108	108
Variable Cost (Rs. in Lakh)								
Dehydrated fenugreek leaves(Av. Price @ Rs. 8/Kg)	0.00	16.50	19.50	22.50	27.00	30.00	30.00	30.00
Sulphur dioxide @ 150 per kg	0.00	0.09	0.11	0.12	0.15	0.16	0.16	0.16
Other ingredients @3/Kg	0.00	0.02	0.02	0.03	0.03	0.04	0.04	0.04
Packaging materials	0.00	1.98	2.34	2.70	3.24	3.60	3.60	3.60
Casual staff salaries	0.00	3.36	3.36	3.36	3.36	3.36	3.36	3.36
Utilities (Electricity, Fuel)	0.00	1.46	1.72	1.99	2.38	2.65	2.65	2.65

Repair & maintenance	0.00	0.70	0.80	0.90	0.90	0.90	0.90	0.90
Miscellaneous expenses	0.50	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Interest on working capital @ 12%	0.00	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Total Variable Cost (Rs. in Lakh)	0.50	27.06	30.80	34.55	40.01	43.66	43.66	43.66
Break Even Point (BEP)								
as % of sale	-	12.00	10.00	8.00	8.00	7.00	7.00	6.00
Break Even Point (BEP) in terms of sales value (Rs. in Lakhs)	-	7.13	7.02	6.48	7.78	7.56	7.56	6.48

2.17 PIE CHART FOR BETTER UNDERSTANDING OF EXPENSES OF EACH HEAD:



2.18 TYPICAL DEHYDRATED FENUGREEK LEAVES MANUFACTURING UNIT LAYOUT



2.19 MACHINERY SUPPLIERS

There are many machinery suppliers available within India for vegetables based beverage processing machineries and equipment. Some of the suppliers are:

1. Bajaj Process pack Limited, Noida, India 0
2. Shriyan Enterprises. Mumbai, India

3. LIMITATIONS OF MODEL DPR & GUIDELINES FOR ENTREPRENEURS

3.1 LIMITATIONS OF THE DPR

- i. This DPR has provided only the basic standard components and methodology to be adopted by an entrepreneur while submitting a proposal under the Formalization of Micro Food Processing Enterprises Scheme of MoFPI.
- ii. This DPR is made to provide general methodological structure not for specific entrepreneur/crops/location. Therefore, information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of business, background of proposed project, location, raw material base/contract sourcing, entrepreneur's own SWOT analysis, market research, rationale of the project for specific location, community advantage/benefit, employment generation etc are not given in detail.
- iii. The present DPR is based on certain assumptions on cost, prices, interest, capacity utilization, output recovery rate and so on. However, these assumptions in reality may vary across places, markets and situations; thus the resultant calculations will also change accordingly.

3.2 GUIDELINES FOR THE ENTREPRENEURS

- i. The success of any prospective food processing project depends on how closer the assumptions made in the initial stage are with the reality of the targeted market/place/situation. Therefore, the entrepreneurs must do its homework as realistic as possible on the assumed parameters.
- ii. This model DPR must be made more comprehensive by the entrepreneur by including information on the entrepreneur, forms and structure (proprietorship/partnership/cooperative/ FPC/joint stock company) of entrepreneur's business, project location, raw material costing base/contract sourcing, detailed market research, comprehensive dehydrated product mix based on demand, rationale of the project for specific location, community advantage/benefit from the project, employment generation, production/availability of the raw materials/crops in the targeted area/clusters and many more relevant aspects for acceptance and approval of the competent authority.

- iii. The entrepreneur must be efficient in managing the strategic, financial, operational, material and marketing aspects of a business. In spite of the assumed parameter being closely realistic, a project may become unsustainable if the entrepreneur does not possess the required efficiency in managing different aspects of the business and respond effectively in changing situations.
- iv. The machineries should be purchased after thorough market research and satisfactory demonstration.
- v. The entrepreneur must ensure uninterrupted quality raw materials' supply and maintain optimum inventory levels for smooth operations management.
- vi. The entrepreneur must possess a strategic look to steer the business in upward trajectory.
- vii. The entrepreneur must maintain optimum (not more or less) inventory, current assets. Selecting optimum source of finance, not too high debt-equity ratio, proper capital budgeting and judicious utilization of surplus profit for expansion is must.
- viii. The entrepreneur must explore prospective markets through extensive research, find innovative marketing strategy, and maintain quality, adjust product mix to demand.
- ix. The entrepreneur must provide required documents on land, financial transaction, balance sheet, further project analysis as required by the competent authority for approval.
- x. The entrepreneur must be hopeful and remain positive in attitude while all situations.



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