

Name of the Firm/Promoter:

DESIGN AND DETAIL OF MUSHROOM UNIT

The unit has been designed as per the latest technology of mushroom growing. The following main structures are proposed.

Infrastructure	No.	Length	Width	Height	Area (Sq.Ft)
Cropping Rooms (Including Insulation)	3	25	15	12	1125
Packing Room	1	25	10	12	250
Corridor	1	55	7	9	385
Total	-	-	-	-	1760

Technical details of the AHU in the cropping rooms

Cropping Rooms		
Number of rows	1	
Air circulation in Cropping room		
Number of main duct	1	
Number of sub ducts	2	
Number of holes per sub ducts	12	
Number of racks	2	
Dimensions of racks	18x4.5 ft (LxW)	
Number of tiers	4	
CFM of AHU	920	
Pressure of Fan	5 to 7	cm WG
Air speed to be achieved	8.0	m/s
Dia of each hole to achieve airspeed 8m/s	54	mm
Air velocity required in main duct	4	m/s
Cross section of main duct	0.11	sq m
Cross section of sub duct	0.05	sq m
Dia of main duct (for 4m/s)	37.20	cm
Dia of sub duct	26.30	cm
Air pressure at which louvre should open	20.00	Pa
Max air speed at outlet	2.10	m/s
Total size of outlets (sq m)- (m3/s) / (m/s)	0.21	m2
No of outlets	2	
Area of each outlet (OPG)	0.10	m2
Width (cm) of each outlet	29	cm
Length (cm) of each outlet	35	cm
Side (if square)	32	cm

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COST OF PROJECT

1	Land Cost	Nil. (The promoter posses the own land for the plant)
2	Land and site development	0.00
3	Building	18.94
4	Plant and Machinery	10.96
5	Misc. fixed assets	0.60
	Total	30.50

Means of finance

<u>Items</u>	<u>Cost (Rs. In Lakhs)</u>
Total cost of the project	30.50
Term Loan	20.00
Márgin Money	10.50
Working Capital	3.05

1. **Land and site development** A piece of land measuring 1760.0 acres will be required. Land will be leveled and developed including boundary wall/barbed wire making the total cost of Rs. 0.00 lakhs. (Annexure –A)
2. **Buildings**: Design and layout of the buildings to be constructed are given in the figures enclosed and annexure –B (Rs. 18.94 lakhs)
3. **Plant and machinery**: Cost Rs. 10.96 lakhs (Annexure – C)
4. **Miscellaneous fixed assets**: Rs 0.60 lakhs (Annexure –D)

Raw materials:

Main raw materials needed in the project are Pasteurized Compost, Spawn, Pasteurized Casing material, Chemicals such as (formaldehyde, Carbendazim, Malathion, etc), (Annexure –E). Annual requirement of the project are:

Raw material	1 crop x 1room (Tons)	Annual requirement (Tons)
Pasteurized Compost	8.00	120.00
Spawn	0.08	1.20
Pasteurized Casing material	2.00	30.00
Chemicals		
Miscellaneous		

As.may be evident that availability of raw materials will not pose any problem, as majority of them are available in plenty in the area or nearby markets where project is to be located at reasonable rates.

Management and consultancy:

The project will be supervised personally by the promoters from the very beginning who will be trained at DMR, Chambaghat, Solan (HP) which is the apex body in the country on mushrooms. Further they will also be guided by the part time contact consultant who will be responsible to give overall guidance on all facets of commercial mushroom cultivation at all stages of crop.

Manpower:

As per annexure E, competent persons are available and shall be employed. Manual laborer at reasonable rates are available in the project area.

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Power and fuel:

Power load of Rounded Power requirement 12 KW is required at the unit including composting and cultivation of mushroom, which will be obtained from State Electricity board. Details are given in the annexure G.

Marketing:

Earlier the consumption of mushrooms was low as many were not aware of food and medicinal values of mushrooms. Mushrooms contain about 90% moisture and are a low calorie food highly suited to those with obesity. They contain about 2.5-3.5 % protein which is of very good quality, contains all the essential amino acids and is essentially rich in lysine. Mushrooms are low in fat but the fat is rich in linoleic acid (PUFA). Cholesterol, the dreaded sterol, is absent which make the choice of the dieticians for heart patients. Due to nil starch and low sugars, these are the delight of the diabetic patients. Mushrooms are highly suited to those suffering from hypertension, hyperacidity and constipation. These are especially rich in vitamin B complex. and vitamin B12 also. Besides, mushrooms have many medicinal properties like anti cancer, hypocholesterolemic and hypolipidemic effects. Justifiably mushrooms are called the "ultimate health food", the nutraceuticals.

The demand for mushrooms, domestic as well as international is rising at a phenomenal speed. The present world production of mushrooms is about 28 million tons and China remains the main producer and exporter of mushrooms. India is roughly producing around 1,29,000 tons of mushrooms annually of which 85% is of button mushroom. Agro Dutch Foods Lalru, Punjab boasts the single largest producer and exporter of mushrooms in India. Besides this very big unit there are many other small white button mushroom units in HP, Punjab, Maharashtra and Gujarat cultivating this mushroom all the year round and are running successfully. These units are located in Phagwara, Jullandhar, Bhatinda, Banga, Bannore etc. In west Bengal, only a few units of button mushroom are operating producing a meager quantity of mushroom of about 700 tons per annum. However, the demand of mushrooms in the state is quite high and the mushroom is being supplied to the state mainly from Maharashtra. The prevailing retail rates of mushroom in the state range between Rs 150 to Rs 250/kg.

Leading producers of mushrooms are European, American and East Asian countries. The so called G-6 (USA, Germany, France UK, Italy and Canada) are major consumers of mushrooms. China is the leading producer and exporter of the mushrooms to the American, European and Asian countries. China's mushroom production is on seasonal basis employing temporary structures. Mushroom cultivation is not organized on scientific footings in China. In China cultivation is dominated by small scale farmers and they have competitive advantage due to lower production costs. The Chinese Edible Fungi Association estimated that about 95% of mushroom production was grown by small-scale households in the early 1990s. Even in the year 2011, 2012 and 2013 Chinese domestic output by small-scale farmers accounted for 96.15%, 94.63% and 93.49% of the production. Due to its special demand for climate, mushroom cultivation was geographically concentrated in a few places, particularly in the warm humid South and, thus, so is the culture of mushroom consumption. Although most mushrooms are grown seasonally, modernization of mushroom industry is taking place. Technology and equipment from Japan and Korea are spreading rapidly in China, and it is believed that modern farming of *Agaricus bisporus* will be the trend for the next 5-10 years. At present China is leader in the total production and tops the world in growing straw mushrooms, tuckahoe, shiitake, agaric, wood ear, black fungus, white jelly fungus, enoki mushroom, oyster mushroom, King trumpet mushroom and hedgehog fungus. The expanding domestic demand in recent years took a larger share of the market and made China itself the chief mushroom consumption market. More consumers are substituting meat products with mushrooms. In 1980s over 80% of mushroom production in China was exported. In the early 2000s, over 80% of China's mushroom production was consumed domestically and less than 20% was exported. Currently, mushroom export accounts for less than 5% of China's total domestic production. Considering that China is the major producer of specialty mushroom which are consumed more in East

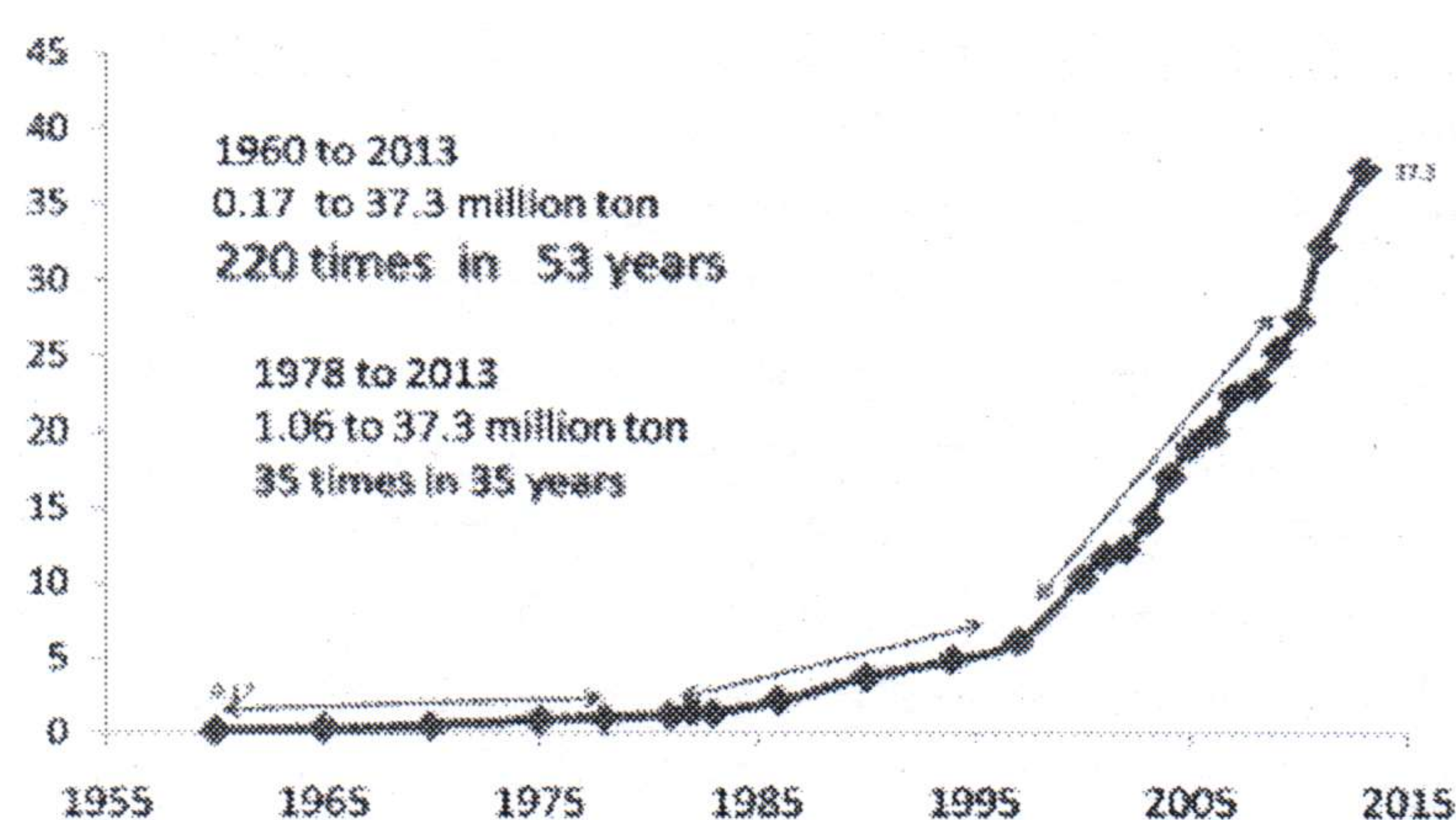
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Asia, major export destinations from China are Japan, Thailand, South Korea and Malaysia and also Hong Kong and Singapore.

It is the right time that India, with its relatively cheap labour and raw materials, which had made Chinese mushrooms competitive, should enter the billion dollar mushroom market. But as indicated above our annual production is very low because mushrooms are being grown by small farmers seasonally during the winters only and the venture is being taken up by a very few players as a modern technical industry. Now with adoption of latest technology of mushroom production under controlled environmental conditions, it is possible to grow high quality mushrooms throughout the year to meet the domestic and international demand. The promoters have undertaken the market surveys and made inquiries regarding the demand for mushrooms. Besides the big demand in the countries mentioned above there is a fast developing mushroom market in the gulf countries. Domestic market is also expanding at phenomenal rate, which is reflected in the increase in the production. Our per capita of mushrooms consumption is the lowest in the world which is 40-50 g against the 3 kg in the developed countries. This poor consumption is mainly due to non-availability of mushrooms in most part of the country for most of the year. The global mushroom production in last 5 decades (FAO STAT) and in India in last 3 decades is as below.

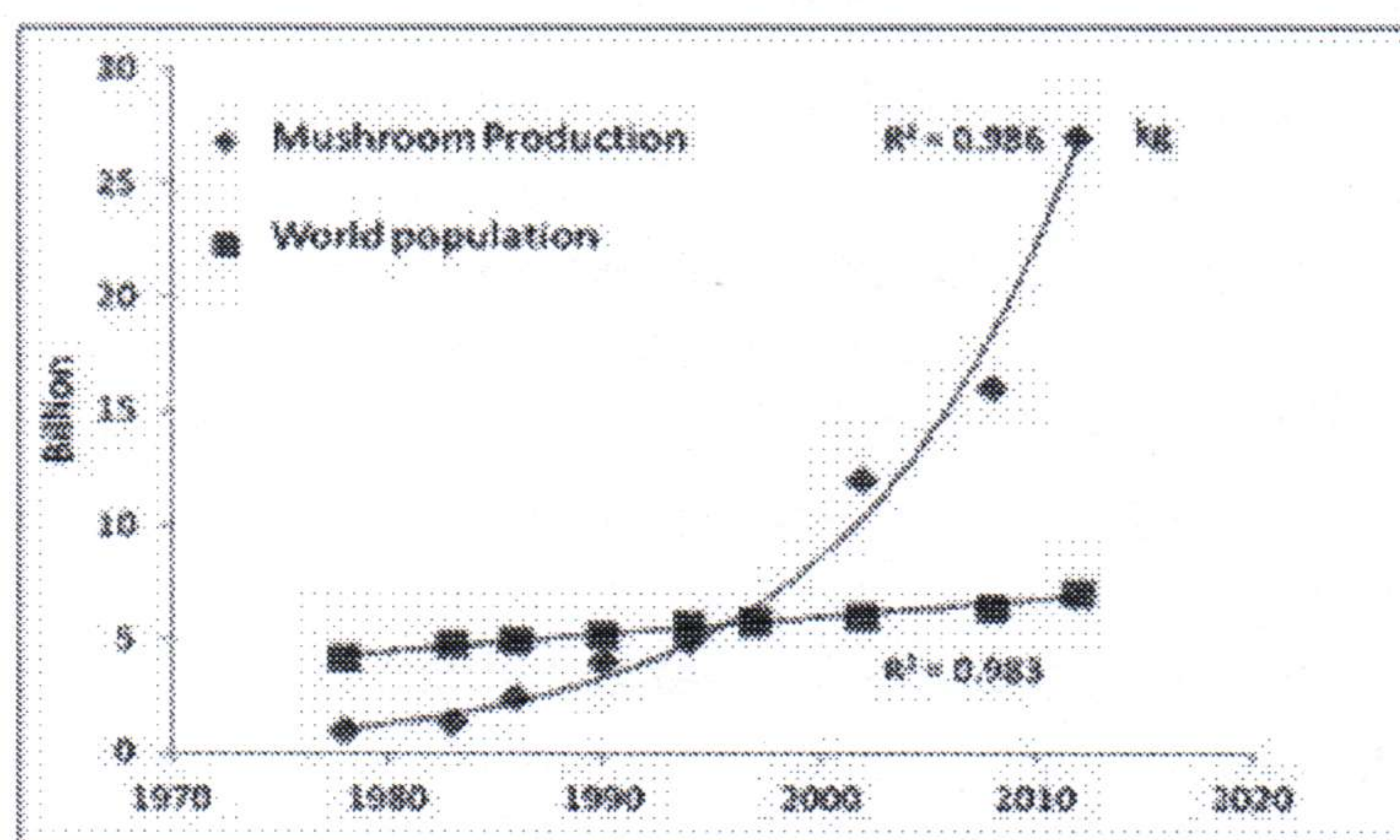
MUSHROOM PRODUCTION IN CHINA AND WORLD (Unit 1000 tons)

Global Mushroom Production (1960-2014)



Chinese Association of Edible Fungi, Chang 2006, ISMS 2012

World population vs mushroom production in last four decades



Growth in world mushroom production (all cultivated mushrooms) vis-à-vis world human population

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MUSHROOMS PRODUCTION IN INDIA

Year	Production ('000 tons)
1980	3
1985	5
1990	8
1992	15
1995	30
2000	70
2007	100
2016	129
2018	181
2019	201
2020	242
2021	280
2022	315

Brief note on the product, their possible uses and possible competition

Mushrooms have been devoured as food by mankind since time immemorial after collecting from the forests. Though Chinese were the first to do the artificial cultivation of the tropical and subtropical mushrooms about thousand years ago real commercial ventures started when Europeans started cultivation of button mushroom in green houses and caves during 16th and 17th century. The success to isolate pure culture through tissues and spores was the turning point in the process of commercial mushroom production in world. Mushrooms are now getting significant importance due to their nutritive and medicinal values and income generating venture in about 100 countries. At present, world mushroom production is estimated to be around 7 million tons/annum and is increasing @ 7% per annum. In developed countries, particularly in Europe and America mushroom farming is a Hitech industry. The Dutch, Irish and Italian technologies in button mushroom production are worth noticing. These countries, in spite of high wages, could succeed due to large scale production units with 10,000-20,000 tons production/annum. These units are highly mechanized and with computer controlled environmental system. Besides, there are decentralized activities viz, compost producing units, spawn producing units and the processing units. This has resulted in higher productivity with consistency. In recent years, in spite of these factors, cost of mushroom production in these countries and in USA has gone up resulting into stagnation of mushroom production which has opened opportunities for the third world countries to capitalize due to widening gap between demand and supply. It is estimated that in 2006 the demand supply gap was 2,73,971 MT.

Mushrooms are known to have all essential components of a balance food. Besides being rich in highly digestible lysine rich proteins, vitamins and minerals, mushrooms lack fats and are low in carbohydrate (Low calorie food). They are rich in folic acid, phosphorus, potassium, calcium, copper, iron, selenium and vitamin B-complex. In place of starch, mushroom contains sorbitol and linolenic acid (a poly-unsaturated fatty acid). They are excellent source of thiamine, riboflavin, niacin, pantothenic acid, biotin, folic acid and vitamin B₁₂.

Mushrooms are used extensively in cooking, in many cuisines (notably Chinese, European, and Japanese). The most popular amongst edible mushrooms is the white button mushroom the *Agaricus bisporus* though some individuals do not tolerate it well. Several varieties of *A. bisporus* are grown commercially, including whites, crimini, and portabello. Other cultivated species are also now available at many grocers include shiitake, maitake, oyster, enoki etc.

Edible mushrooms show wide variation in protein content. Even varietal and strainal variation in protein contents has been reported. However, their value as good source of protein is never disputed. They are considered as a potential substitute of muscle protein on account of their (i) high digestibility (Digestibility coefficient around 89%), (ii) good amino acid content and (iii) about 1000 times higher production of mushroom protein per unit area. As mushrooms are grown on agricultural waste, hence the

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cost of production of mushroom protein is also lower than muscle protein. According to an estimate 35000 kg (dry weight) of mushroom protein can be produced from an acre of land during one year. Mushroom protein is not only cheaper but is almost as nutritious as muscle protein. It also contains most of the essential amino acid in sufficient quantity and can prove a good supplement to those cereal diets which lack in some essential amino acids.

In India, per capita consumption is the lowest in the world which is 50-70 g against the 3 kg in the developed countries and 20-22 kg in China. This poor consumption is mainly due to non-availability of mushrooms in most part of the country for most of the year. Thus there is no competition for the product as such in India.

Special Feature of the product (Price, quality) compared to competitive products

There is no competition in the product in respect of price and quality as the supply of the product is limited and there is a huge demand of the product in the market for the want its nutritional quality and flavor.

Assessment of likely competition in future

With urbanization and increased production of agro-waste along with increased food production, there will be need to radically change the way we look at agriculture. High-tech agriculture including mushroom production is going to gain importance in coming decades. Mushroom production in the world has increased rapidly in the last few decades and the trend is likely to pickup in our country as well. Thus, there is no competition in the product is visible in near future as the supply of the product is limited and there is a huge demand of the product in the market for the want its nutritional quality and flavor.

Export possibilities and Export commitments

Now with adoption of latest technology of mushroom production under controlled environmental conditions, it is possible to grow high quality mushrooms throughout the year to meet the domestic and international demand. Besides, the big demand in the European, American countries, there is a fast developing mushroom market in the gulf countries also. Thus the product has a huge export potential. Domestic market is also expanding at phenomenal rate, which is reflected in the increase in the production. As the consumption of mushroom in India is still at minimal level due to non-availability/less availability of the product, we intend to tap the domestic market and there is no commitment for export in this project.

List of principal customers and selling arrangement/agreement

The product is in huge demand in the super markets besides the regular domestic vegetable markets, hence there is no such agreement or selling arrangement has been made. If required we can make agreements with the super markets for the same.

PROFITABILITY PROJECTIONS:

As would be evident from the annexure H, the project is highly profitable, economically viable and bankable.

ASSUMPTINS FOR PRODUCTION AND PROFITABILITY

1. 3 cropping rooms of 7.00 tons compost handling capacity
2. 5 crops taken as per standard Dutch plan using cultivation of advanced hybrids which gives 18-22 kg mushrooms / 100 kg compost in 60 days duration.
3. Yield of mushrooms 20 kg / 100 kg compost (though yields of 20 -25 kg are achievable)
4. Annual production = 7.00 tons x 3 rooms x 5 crops x 0.20 ton = 21 tons

Accepted = 20 tons
(At 20% conversion)
5. Rate of interest on term loan 10.50 % and on working capital 11%
6. Depreciation: 5 % on buildings, 10 % on machinery and miscellaneous fixed assets.

चेकलिस्ट

1. भू-स्वामित्र प्रमाणपत्र /अद्यतन भू राजस्व रसीद (न्यूनतम 2000 वर्ग फीट)
2. बैंक द्वारा ऋण देने की सहमती या बैंक ऋण स्वीकृति प्रपत्र
3. डी पी आर- अनुमानित परियोजना लागत का पूर्ण विवरण (चार्टर्ड अकाउंटेंट द्वारा हस्ताक्षरित)
4. सभी सिविल निर्माण का लेआउट प्लान और नक्शा (चार्टर्ड इंजीनियर द्वारा हस्ताक्षरित)
5. मशरूम उत्पादन के लिए आवश्यक मशीन का कोटेशन
6. मशरूम उत्पादन का प्रशिक्षण प्रमाण पत्र (न्यूनतम तीन दिवसीय)