

Name of the Firm/Promoter: M/s --, --, --

### DESIGN AND DETAIL OF MUSHROOM COMPOST UNIT

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

Infrastructure	No.	Length	Width	Height	Area (Sq Ft)
Composting yard	1	55	27	15	1472
Phase-I bunkers	2	26	11	11	571
Bulk chamber (inclusive of insulation)	1	24	9	13	216
Spawning area	1	23	17	13	391
Casing soil room	1	15	8	8	120
Raw material Store	1	22	15	15	324
<b>Total</b>					<b>3094</b>

### Technical details of the Bunkers

Length	26	ft	8.0	m
Breadth	11	ft	3.3	m
Capacity	0			
No of pipes	8			
No of spigots per pipe	21			
Total spigots	168			
Dia of pipe (inner)	10	cm	4	inch
dia of main i.e.header pipe	31	cm	12	inch
CMH of Fan for normal fill	600	CMH	360	CFM
Flow rate in orifice=	3.57	CMH	10	CFM
Air velocity required at orifice	40	m/s		
CMH of Fan for max. fill	900	CMH	540	CFM
Hole of orifice in spigot	5.7	mm	0.22	inch



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### Technical details of the Tunnels

Length	24	ft		
Breadth	9	ft		
<b>About Plenum</b>				
Min. Depth of plenum in front	1.42	ft		
Slope	0.41	ft		
Min. Depth of plenum in back	1.01	ft		
Normal compost input with 1.9 to 2.1 m filling	18	tons		
Normal compost output	14	tons		
<b>Fan and Duct</b>				
CFM of the Fan	2400	CFM		
Pressure of fan	10-12	cm WG		
Type of fan	Backward Curved or Backward inclined			
Min area of duct	1.22	sq ft		
Normal area of duct	1.62	sq ft		
Min. side of square duct	13	Inch		
Normal side of square duct	15	inch		
Air penetration of filter	2.50	m/s		
Side of filter for fresh air	26	inch		
Approx. area of filter	710	sq inch		
L x B (cms)	200773	cm <sup>2</sup>		
Dia of each vertical pipe in plenum floor	5	cm or	2.0	inch
Area of each pipe	19.6	cm <sup>2</sup>		
Percent free area desired in plenum	9	%		
Total free area needed	18070	cm <sup>2</sup>		
Total no. of holes in floor	920			
holes per sq m	46			
Distance between holes (square format)	14.8	cm	5.8	inch
Gap between two pipes (square format)	9.8	cm	3.8	inch
Horizontal/vertical distance between two pipes (when diagonal format is used)	20.9	cm	8.2	inch
Gap between two pipes (diagonal format)	15.9	cm	6.3	inch



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#### **COST OF PROJECT**

	<b>Items</b>	<b>Rs in lakhs</b>
1.	Land and Site Development	1.20
2.	Buildings	15.00
3.	Plant and Machinery	13.00
4.	Misc fixed asset	0.80
	<b>Grand Total</b>	<b>30.00</b>

#### **Means of finance**

<b>Items</b>	<b>Cost (Rs. In Lakhs)</b>
Total cost of the project	30.00
Term Loan	22.00
Margin Money	8.00
Working Capital	3.00

1. **Land and site development**: A piece of land measuring 0.12 acres (5060 sq ft) will be required. Land will be leveled and developed including boundary wall/barbed wire making the total cost of Rs. 1.20 lakhs. (Annexure –A)
2. **Buildings**: Design and layout of the buildings to be constructed are given in the figures enclosed and annexure –B (Rs. 15.00 lakhs)
3. **Plant and machinery**: Cost Rs. 13.00 lakhs (Annexure – C)
4. **Miscellaneous fixed assets**: Rs 0.80 lakhs (Annexure –D)

#### **Raw materials:**

Main raw materials needed in the project are wheat straw, chicken manure, urea, gypsum, wheat grains, tin cans, corrugated boxes ( Annexure –E). Annual requirement of the project are:

Raw material	One outing of one tunnel (Tons )	Annual requirement (Tons)
Wheat & paddy straw	5.40	194.4
Chicken manure	3.78	136.08
Urea	0.08	2.916
Gypsum	0.19	6.804
Wheat bran	0.38	13.608
Casing material	2.03	72.9
Spawn	0.14	4.86
Polythene bags (Number)	1400	50400

Besides above, cotton, polythene bags / sheets, chemicals for spawn production, canning, disinfectants like formaldehyde, insecticides and pesticides will be needed in low quantities. 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



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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.

**Power and fuel:**

Power load of Rounded Power requirement 15 KW is required at the unit including composting and cultivation of mushroom, which will be obtained from State Electricity board. Diesel generator sets of 15 KVA have been provided in the project to take care of disruptions / disturbances in the power supply. 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, Jalandhar, 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

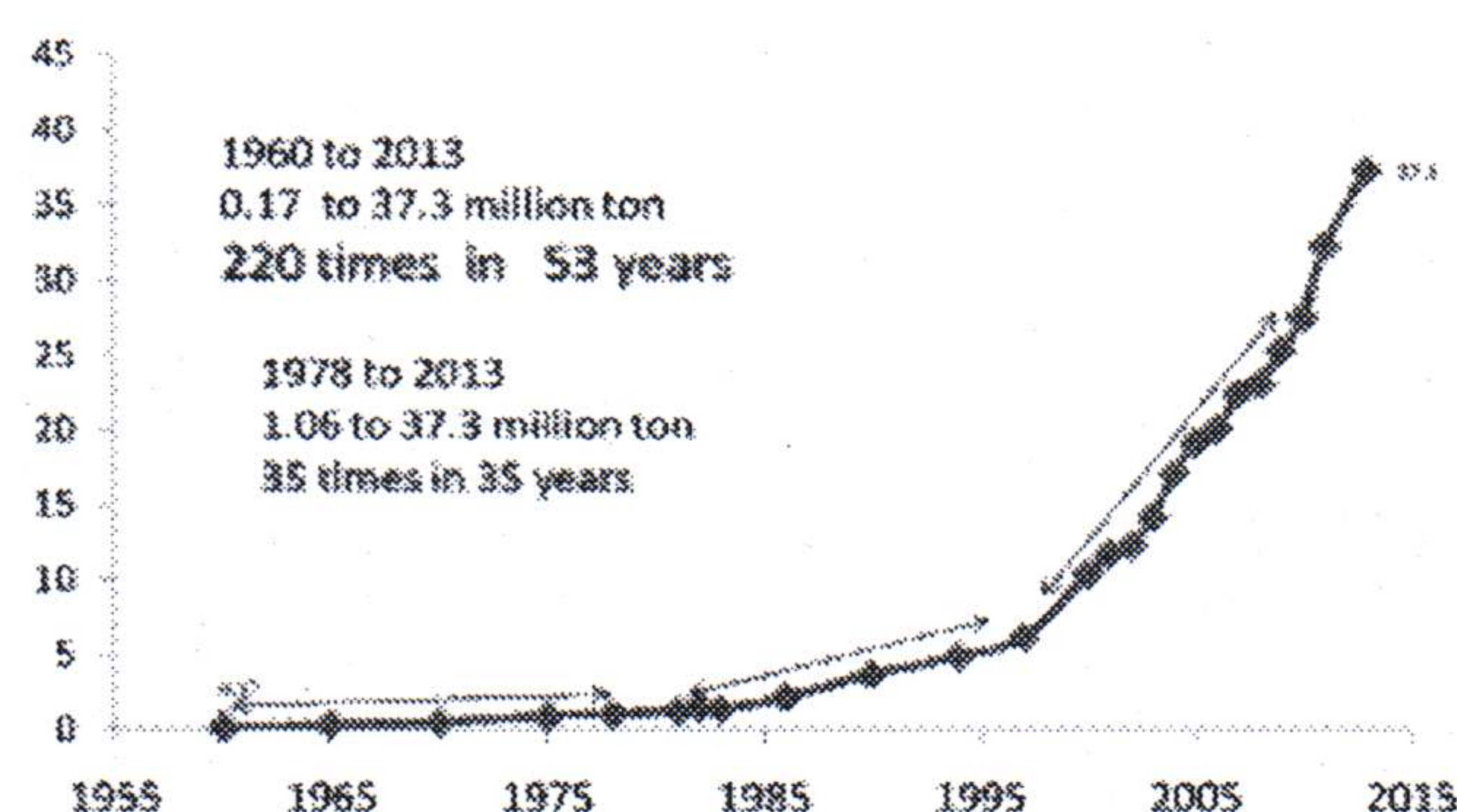


expanding domestic demand in recent years took a larger share of the market and made China itself the chief mushroom consumption market. More consumers are substituting meat products with mushrooms. In 1980s over 80% of mushroom production in China was exported. In the early 2000s, over 80% of China's 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 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 under taken 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.

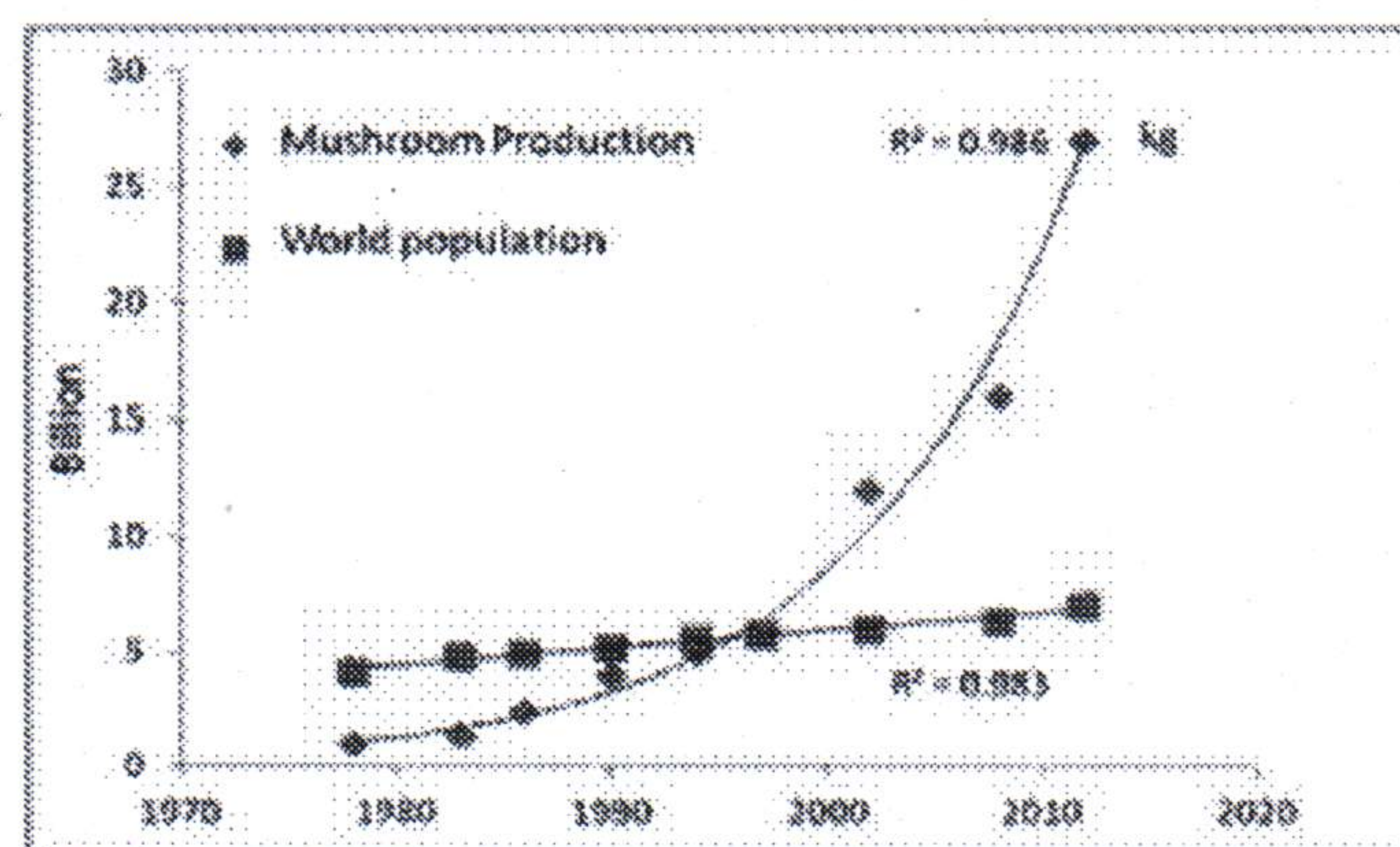
### MUSHROOM PRODUCTION IN CHINA AND WORLD (Unit 1000 tons)

Global Mushroom Production (1960-2014)



Chinese Association of Edible Fungi, Chang 2006, ISMS 2012

### World population vs mushroom production in last four decades



16 times increase in mushroom consumption  
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	277
2022	308

Most of the big units are producing their own compost for the production of button mushroom but the small, marginal and seasonal units are still producing compost by long method and facing problems of diseases and pests leading to low levels of production. The establishment of pasteurized compost unit will help the small and marginal farmers to come up with mushroom cultivation. Viewing the demand for the pasteurized compost for button mushroom, we don't see any marketing problem.

#### 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 16<sup>th</sup> and 17<sup>th</sup> 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 B<sub>12</sub>.

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 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.

As the demand of mushroom is increasing day by day in our country, more and more small and marginal farmers are being attracted towards this lucrative venture. This will create more demand of pasteurized compost and casing in the country as all the growers will not be able to establish growing and composting unit both. Thus, establishment of compost unit will be a highly profitable venture viewing the present scenario and future demand.

#### **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 of 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**

Most of the big units are producing their own compost for the production of button mushroom but the small, marginal and seasonal units are still producing compost by long method and facing problems of diseases and pests leading to low levels of production. The establishment of pasteurized compost unit will help the small and marginal farmers to come up with mushroom cultivation. Once planned for a compost



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unit, you must contact the small and marginal growers of nearby area so as to establish business linkages for sale of spawn compost along with pasteurized casing soil.

### **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. 1 bulk tunnel of 14.00 tons compost handling capacity
2. 3 outings will be taken in a month
3. Annual production = 14.00 tons x 3 outings x 12 Months x 1 tunnel = 504 tons  
**Accepted = 500 tons**
4. Rate of interest on term loan 11.00% and on working capital 11.00%
5. Depreciation: 5.00% on buildings, 10.00% on machinery and miscellaneous fixed assets.

### **SALES PROJECTIONS**

Installed capacity	500 TPA
Sales	500 TPA
Sale of 500 Tons fresh @Rs 11000.00/ton	<b>55.00 Lakh</b>

### **ANNEXURE –A**

#### **LAND AND SITE DEVELOPMENT**

**A total of 0.12 acre (5060 sq ft) land will be required to host this project**

	<b>Item</b>	<b>Cost (Rs in Lakhs)</b>
1	0.12 acre of land (Cost not included in project)	-
2	Land leveling and site development	1.20
	<b>Total</b>	<b>1.20</b>

### **ANNEXURE –B**

#### **BUILDINGS**

<b>Infrastructure</b>	<b>Area (Sq Ft)</b>	<b>Unit Cost (Rs)</b>	<b>Total cost (Rs in Lakhs)</b>
Composting yard	1472	300.00	4.40
Phase-I bunkers	571	700.00	4.00
Bulk chamber (inclusive of insulation)	216	1200.00	2.59
Spawning area	391	500.00	1.96
Casing soil room	120	900.00	1.08
Raw material Store	324	300.00	0.97
<b>Total</b>	<b>3094</b>		<b>15.00</b>



### चेकलिस्ट

1. भू-स्वामित्र प्रमाणपत्र /अद्यतन भू राजस्व रसीद (न्यूनतम 3000 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 कम्पोस्ट के लिए आवश्यक मशीन का कोटेशन
6. मशरूम कम्पोस्ट का प्रशिक्षण प्रमाण पत्र (न्यूनतम तीन दिवसीय)