Maa Bharti P.G. College, Kota

SESSION 2021-22

SUBMITTED BY:

NAME: **Prachi Parsai**

CLASS: **M.Sc. Botany III Sem**

SUBMITTED TO: **Dr. Nivedita Sharma**

Dr. Meenakshi Sharma

SHWETA SAXENA

25.04.2024 11:19

Mutation

→ Mutations are the heritable change in DNA structure

→ There are two types of Mutation
  → Spontaneous mutation
  → Induced mutation

⇒ Spontaneous Mutations :-

→ Mutations that are result of Natural changes in DNA structures are spontaneous mutation

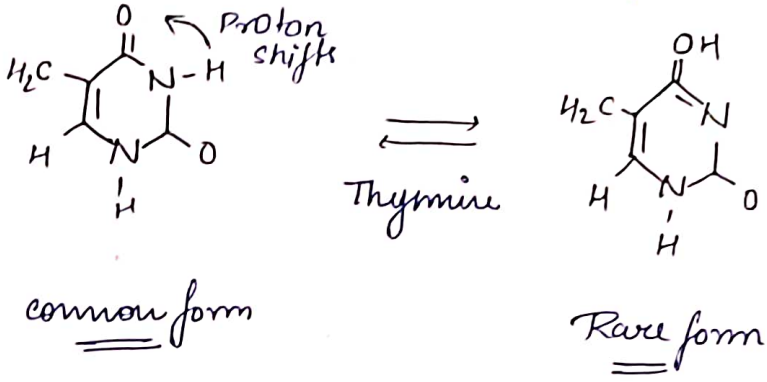
→ All types of point mutations are can occurs spontaneous during S_1, S_2 and G phase of cell cycle or by movement of transposons.

→ Rate of spontaneous mutation in eukaryotes is between 10^{-4} - 10^{-6} gene / genetic radio.

Caused mainly by :- 1) Tautomeric Shifts
2) Wobble base pairing
3) Strand Slippage
4) Unequal crossing over
5) Spontaneous chemical changes

1. Tautomeric shifts :- 1) Purine & Pyrimidine base exists in different chemical forms called tautomers.

2) Position of proton in DNA base changes.



2. Wobble base pairing :- Normal, protonated & other forms of base are able to pair because of flexibility in DNA's helical structure.

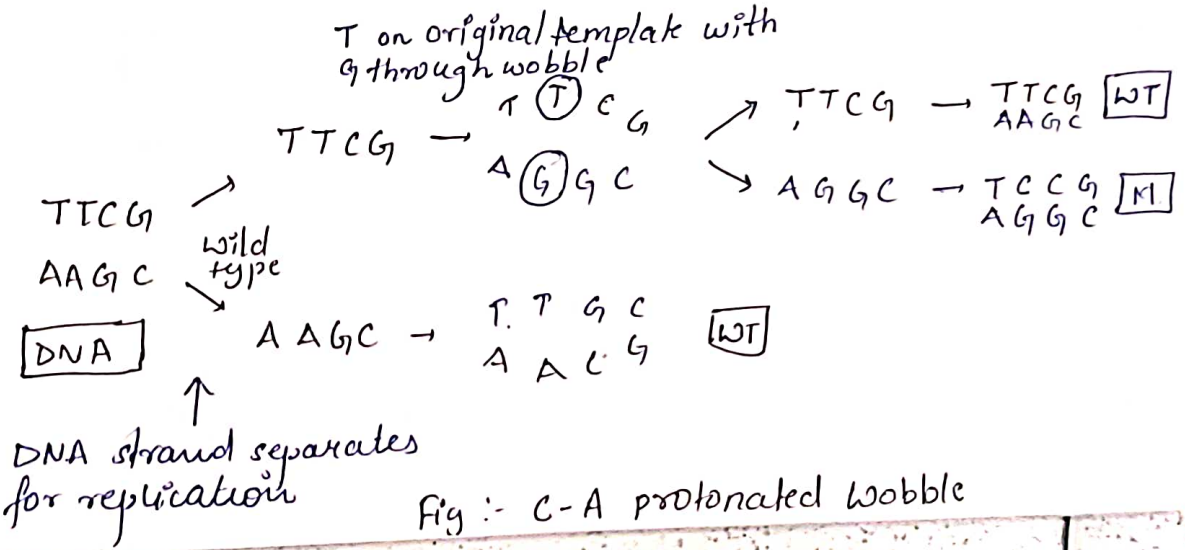


Fig :- C-A protonated wobble

3. Strand slippage : It may occures when one nucleotid strand forms a small loop

→ If the looped out nucleotide are on the newly synthesized strand, an insertion results.

CASE - I

Newly synthesised strand loops out

New strand 5' TACGTGAAAC 3'

T strand 3' ATGCCTTTTGCAA 5'

↓

one nucleotide is added. on new strand.

5' TACGTGAAACGTT 3'

3' ATGCCTTTTGCAA 5'

CASE - II

T strand loops out

new strand 5' TACGTGAAAC 3'

T. strand. 5' ATGCCTTTTGCGCC 5'

T

↓

one nucleotide is omitted from newly formed strand

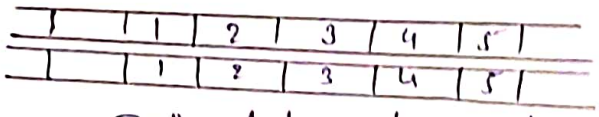
5' TACGTGAACGCGG 3'

3' ATGCCTTGCGCC 5'

4. Unequal crossing Over :- During normal crossing over the homologous sequence of 2 DNA molecule do align & crossing over produces no net changes in the number of nucleotide in either molecule.

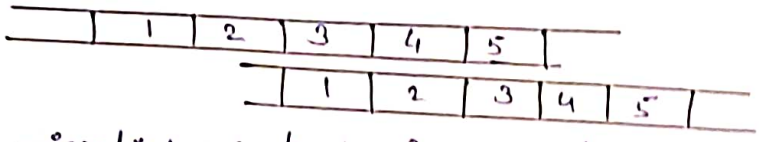
→ Misaligh pairing causes unequal crossing over which results in DNA molecules with an insertion & another with delition.

①



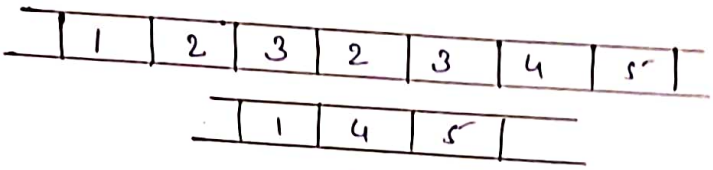
Pair of homologous chromosomes.

②



missalignment during meiosis ∴ unequal crossing over takes place.

③



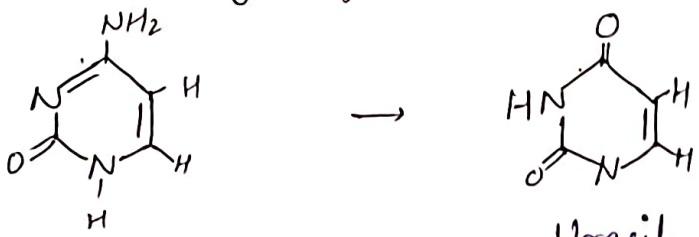
unequal crossing over.

5. Spontaneous Chemical Changes :

ⓐ Depurination : Loss of purine base from nucleotide.

ⓑ Deamination :- Loss of an amino group (NH_2) from Nucleotide.

→ May be spontaneous or Induced.



Cytosine → Uracil

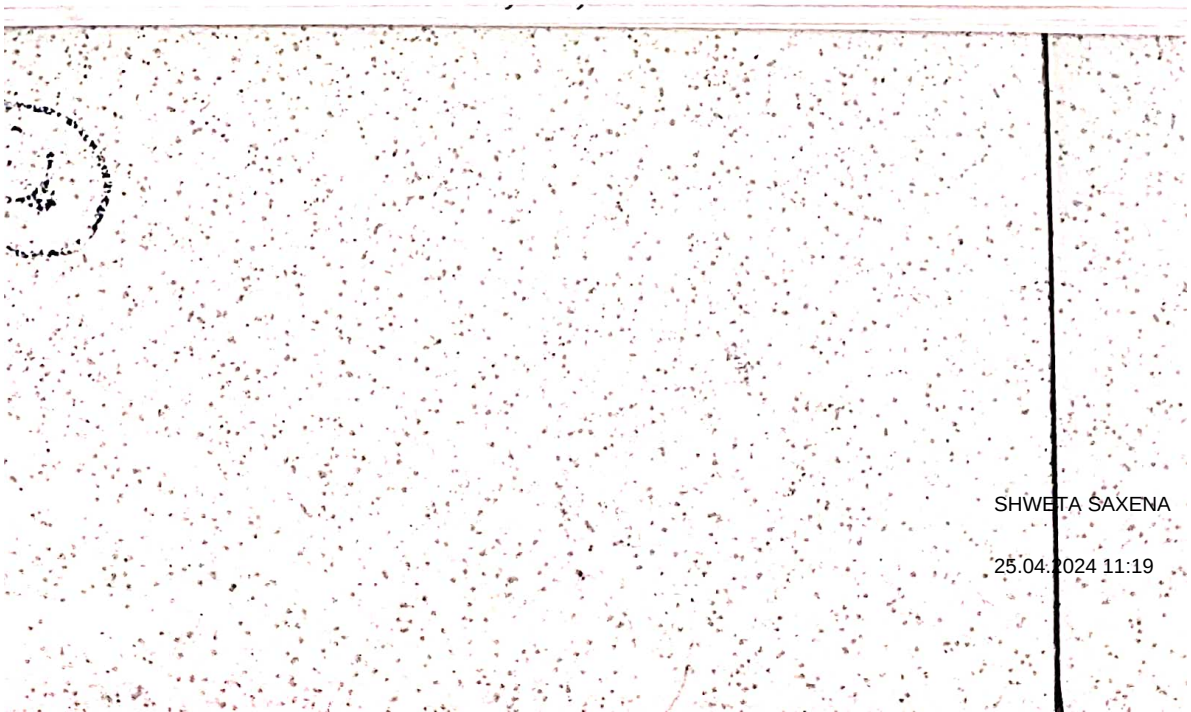
Induced mutation :- change that occurs due the environmental, chemical or radiation called Induced mutation.

→ This was discovered by Charlotte Auerbach.

Causes :- 1) Base analog
2) Alkylating agents
3) Deamination
4) Hydroxylamine.
5) Oxidative reaction
6) Intercalating agents
7) Radiations

1. Base analog :- Chemical with structure similar to that of any of the 4 standard base of DNA
   → DNA polymerase cannot distinguish this analog from standard base

   Eg :- 5-Bromouracil.



2. Alkylating agents :- Chemical that donates alkyl group.

→ This includes → methyl (CH_3) & ethyl (CH_3-CH_2) which are added to nucleotide base by some chemical

Eg :- 6 - ethylguanine pair with thymine.

3. Deamination :- Loss of amino group from nucleotide base.

4. Hydroxylamine :- It is a very specific base or modifying mutagen that adds a hydroxyl group to cytosine.

→ It converts cytosine into Hydroxylaminocytosine
→ The conversion increases the frequency of rare tautomers.
→ Hydroxylamine acts only on cytosine.

5. Oxidative reactions :- Reactive forms of oxygen damages DNA & induce mutation by bringing about chemical changes to DNA.

→ It includes → Hydrogen peroxide (H_2O_2)
→ Hydroxyl radical
→ Superoxides radical.

6. Intercalating agents :- It produces mutation by sandwiching themselves between two adjacent bases in DNA.

→ It destroys 3D structure of DNA
→ cause single nucleotide insertion or deletion.
→ This single insertion or defetion, results in frameshift mutation. may.

7. Radiations :- Ionizing radiation breaks covalent bond including those in DNA & is the leading cause of chromosome mutation.

→ IR has cumulative effects & kills cells at high doses.

Eg :- UV rays., X rays etc.

Transposons in Prokaryotes

Transposable Element : Transposable Element are region of genome that can move from one place to another.

→ Also called → Jumping genes, Mobile Elements, Junk elements, Selfish DNA.

→ Discovered by - Barbara Mc Clinbock

→ Discovered in - Corn plant (1940)
discolouration or colour variation in kernels.

→ Naming → Prokaryotes : Done in standard way
→ IS_1, IS_2, IS_3 ...
→ Tn_1, Tn_2, Tn_3 ....

→ Eukaryotes → Non standard way
→ Yeast, Drosophila, Human
↓ ↓ ↓
Ty Copia Alu.

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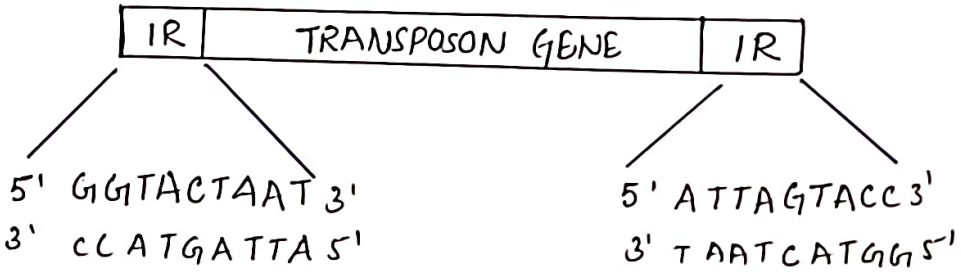
Transposable Element in Prokaryotes

It is of 3 type → 1) Insertion Sequence
2) Transposons
3) Bacteriophage Mu.

1. Insertion sequence :- 1. Simplest type of transposable element found in bacterial chromosome & plasmid.
2. Insertion sequence are shorter (750bp - 1500bp)
3. It do not codes for protein.
4. End of all known insertion sequence elements shows inverted terminal repea

Eg :- IS_1, IS_2, IS_3 .... in E. coli.



2. Transposons :- Similar to insertion sequence but it carry additional genes.

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Session 2022-23

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MICROSPOROGENESIS

MICROSPOROGENESIS--- FORMATION OF MICROSPORES/POLLEN GRAIN

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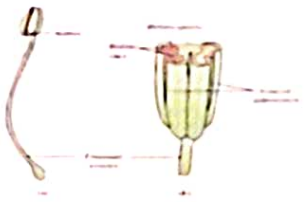
MALE REPRODUCTIVE UNIT .STAMEN

- It consists of two parts long and slender stalk called filament and bilobed structure called anther.

STRUCTURE OF ANTHER

- The anther is bilobed and each lobe consists of two microsporangia separated by septum In cross section it consists of four microsporangia which transforms into pollen sacs.



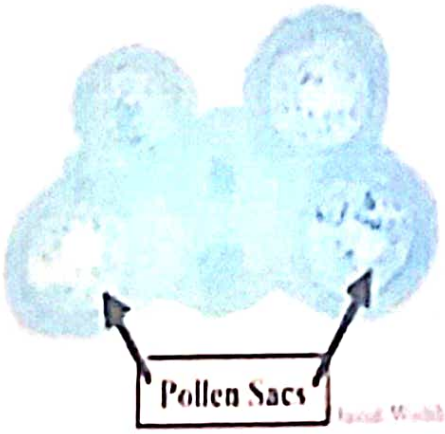
STRUCTURE OF MICROSPORANGIUM

-Microsporangium has a wall and sporogenous tissue inside.

The wall is divided into epidermis endothecium middle layer and tapetum.

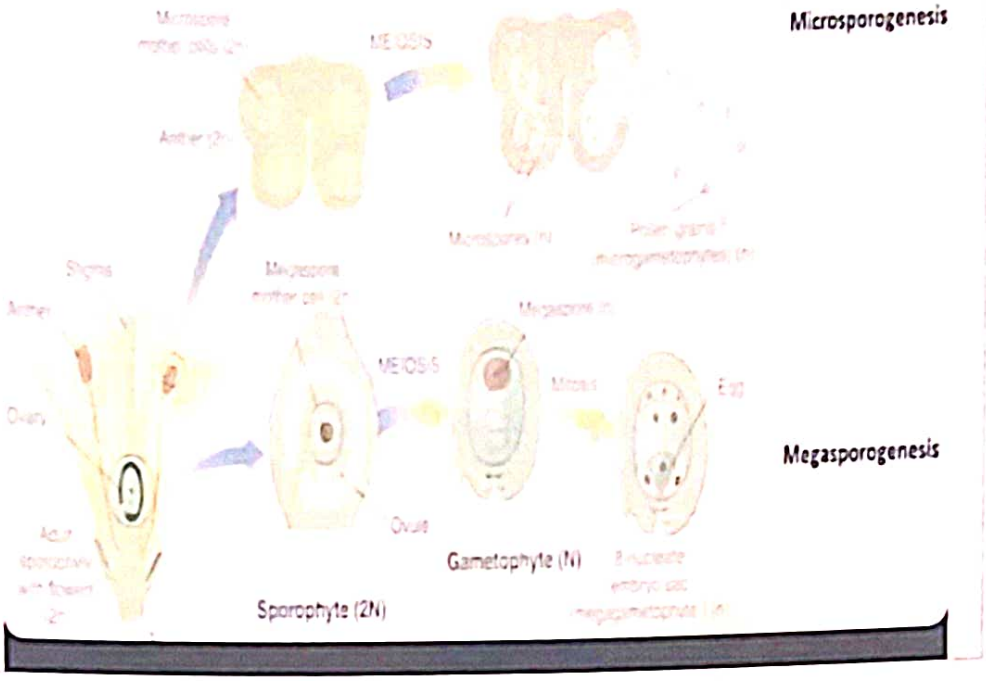
The outer three layer is protective in nature and tapetum provides nourishment to the developing pollen grain.

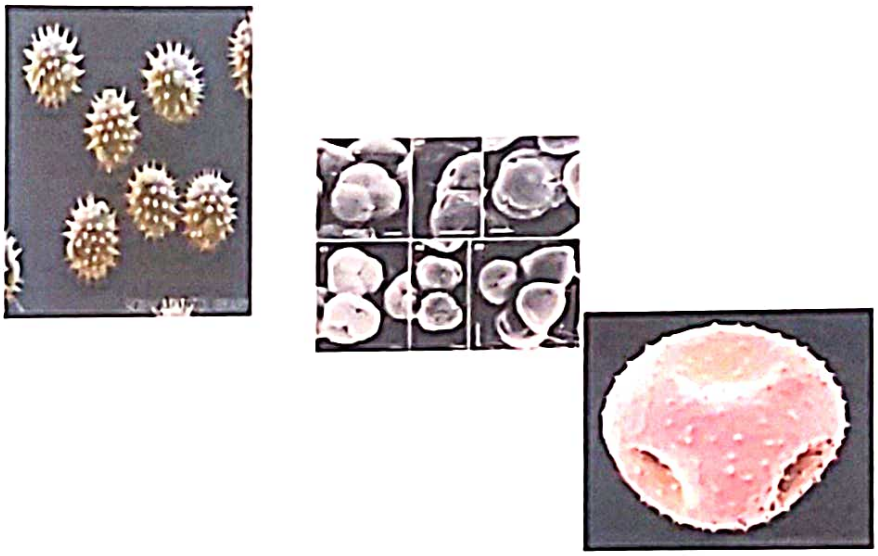
The inner portion of the cell is filled with sporogenous cells.



MICROSPOROGENESIS

- The process of formation of microspore from PMC through meiosis is called microsporogenesis.
- The sporogenous cells divide meiotically to form microspore tetrads.In this process haploid microspore are formed.
- It occurs inside the microsporangia or pollen sac of anther.
- The four microspore formed from MMCare arranged in tetrad and are functional.
- The microspore gives rise to male gametophyte.


Microsporogenesis
Megasporogenesis
MEIOSIS
MEIOSIS
Mitosis
Stigma
Anther
Ovary
Ovule
Gametophyte (N)
Sporophyte (2N)



POLLEN GRAIN

- Pollen grain represent male gametophyte.
- They possess two layered wall.
- The outer wall is called exine and inner wall is called intine.
- The exine is composed of sporopollenin.
- The intine is composed of cellulose and pectin.

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Maa Bharti P.G. College

University of Kota (Kota)

Session: 2022-23

M.Sc. Botany

Semester- II (CBCS REPORT)

Topic: Mushroom

submitted by:

Harish Verma

MSc. (Botany)

Semester II

submitted to:

Dr. Nivedita Sharma

Dr. Meenakshi Sharma

Name		Year	
Subject	Mushroom (BOTANY)	Class	
School		Roll No.	

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Sr. No.	Name of the Experiment	Page No.	Date	Remarks
7.	Sources for technology.			

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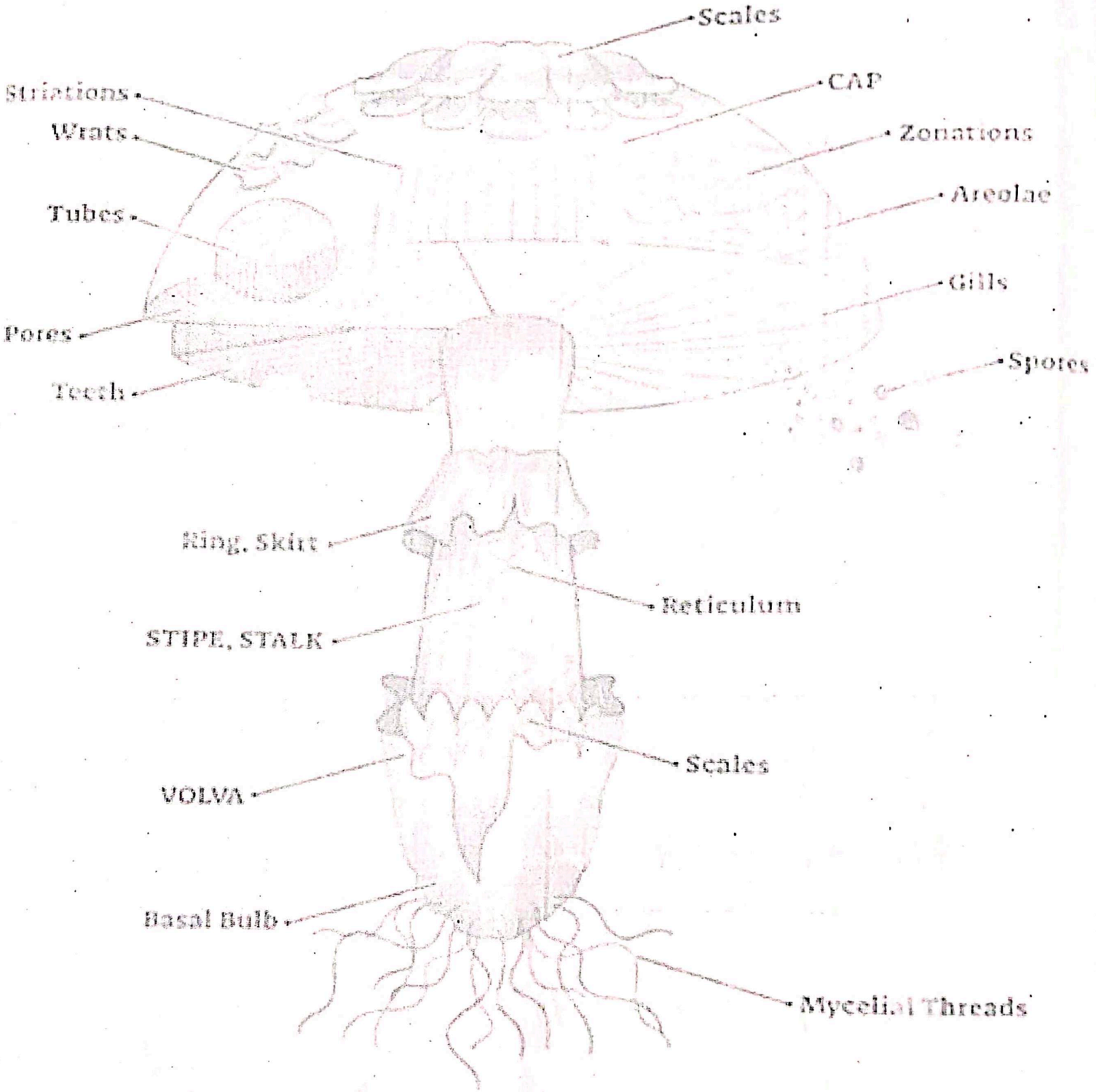

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Venture has a promising scope to meet the food shortages without undue pressure on land.

Mushroom farming today is being practiced in more than 100 contries and its production is increasing at an annual rate of 6-7%.

present world production of mushrooms is being 3.5 million tones per years. FAO Stat and is over 25 million tonnes as per claims of Chainese Association of edible fungi. The wide variation in world production data is FAO Stat and CAEF is party due to the fact in FAO state, mushrooms means button mushroom, along with the boletes. morels and tubur, whereas CAEF data Covers all type of mushrooms. and mushroom Cultivation has become China's Sixth largest industry.

presently, three geograplical regions - Europe, Americat and East Asia contribute to about 96% of world mushroom production.

India produces about 600 million tonnes of agricultural waste per annum and a major part of it is left out to decompose naturally or burnt in situ.

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This can effectively be utilized to produce highly nutritive food such as mushrooms and spent mushrooms substrate can be converted into Organic vermi-Compost.
Mushrooms are grown seasonally as well as in state-of-art environment controlled Cropping rooms all the year round in the Commercial units.

That is availability of raw materials and labour make mushrooms growing economically profitable in India. Moreover, scope for intense diversityfication by Cultivation of other edible mushrooms like Oyster, Shittake, milky and medical mushrooms are Addible additional Opportunities for indian growers.

In spite of predominantly tropical and subtropical Climates in india.

In the mushroom scenario of the country which should be promoted in a big way, both with the producers and consumers.
We take the shelter of no demand to justify almost negligible diversification in the mushroom production in India.
The other flesky fungus of Ascomycating known as morchella produces spores inside a sac like structure.

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CHAPTER – 2 ÷ BACKGROUND

1. Origin :- Mushrooms are the plant of immortality - Thats what ancient Egytians believed according to the heiroglyphics of 460 BC. The delicious flavour of mushrooms intrigued the pharohs of Egypt.

The chinease were the first to artificially Cultivate the tropical and subtropical mushrooms about thousand year back.
But real Commercial venturies started when Europeans started Cultivation of button mushroom in cave during 16th and 17th Centuries.

In the last 19th centuries, mushroom production Made its way across the Atlantic to the US where Curious home gardners in the East tried there luck at growing the new and unknown crop.

Mushroom cultivation in India is of recent origin and it was in the 1961 when ICAR funded a Scheme on button mushroomm cultivation technology at Solan which led to the establishment of a UNDP project with FAO experts.

The pioneering research work of the HPKUV at their Agriculture College Campus at Chambaghat.

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National Centre for mushrooms Resarch & training was establizing in 1983 at the same place under the aegis of ICAR that was later renamed as National Resarch Centre in 1997 and upgraded to directorates of mushroom resarch in December 2008

The people of a developing contry like India, the two main issues are the quality food and unemployment beside the environmental issues and these issues can be popularizing mushroom cultivation amongst the rural masses and the young genration.

2. Botanical Description :-

Mushrooms are primitive Organisms known as fungi. The Organism lack chlorophyll which synthesize food in higher plants in presence of sunlight. They do not process this green colour substance so they cannot prepare ther own food. They grow saprophytically on dead Organic matters or living organisms. Mushrooms are fruit bodies or reproductive structure emanating from the mycelium, which under natural condition lie buried in the soil or in the substrate where condition are favourable for their growth.

advantage over manure spawn as it could be mixed easily and provided many inoculum

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Recently Chang & miles (1989) has defined mushrooms as, a micro fungus with a distinctive fruiting body which can be either epigeous or hypogenous and large enough to be seen by naked eye and to be picked by hand.

Mushrooms belong to class fungi of the plant kingdom. They are often defined as plants without chlorophyll, that lack differentiation into stem, leaves, flower and have distinct fruiting, which may be above or below the soil. Mussrooms is derived from mousseron (French), a term that includes edible & poisonous mushrooms.

The vegetative mycelium is composed of many times inner-woven separate hyphae. The reproductive phase is initiated by the formation of small knob like swellings at different points of interwoven mycelial strands. These swelling increase in size and break through the surface of the substratum as small balls constituting the button stage. A matured basidiocarp is whitish in colour and consists of thick short stipe with an example annulus. The stipe supports the pileus which appears as a hat like expansion. On the underside the pileus, a number of radiating gills or lamella are present which are pink when young but purple-brown when mature.

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3. Seed (Spawn production) :-

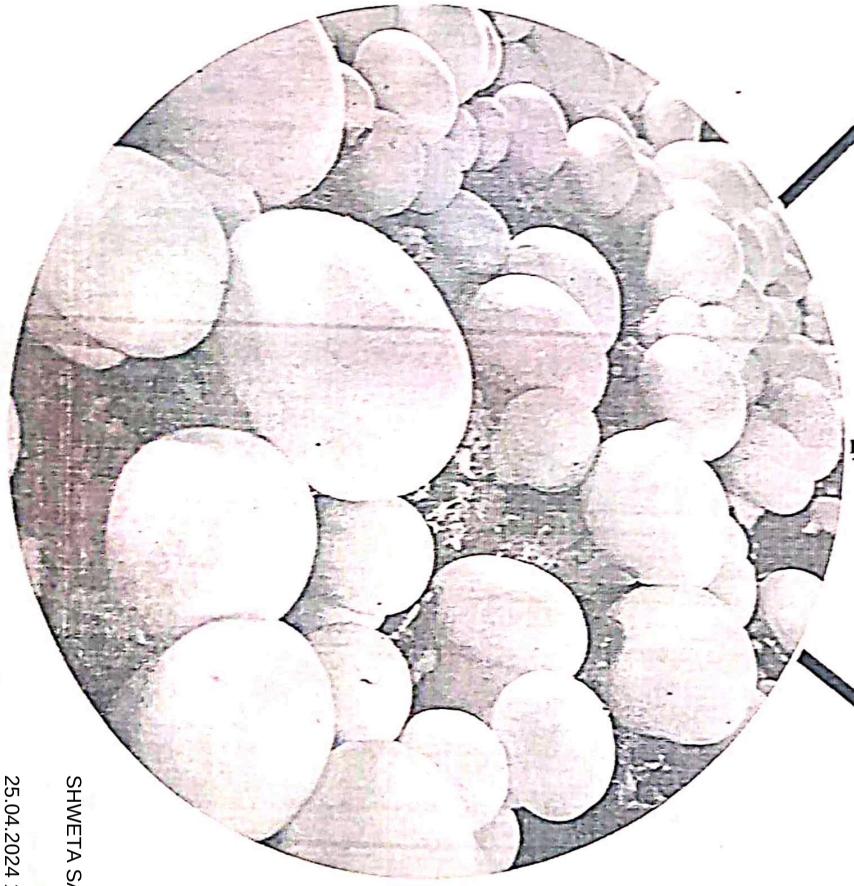
Spawn i.e seed required for growing mushroom, is the vegitative mycellium from a selected mushrooms cultured on a on a Convenient medium like wheat, pearl millet, Sorghum grains. etc. In Simple words Spawn is grains covered with mushrooms mycelium. It essentially involves preparation of pure culture of mushrooms from tissue / spores, evaluted of Selected Cultures for yield, quality and other desirable traits, maintenance of selected Cultures on suitable agar medium. followed by Culturing On Sterlized grains and further multiplication on grains, from 1652 to 1894 A.D. Spawn was gathered from the wild rather than made and was referred as Natural or virgin Spawn and flakes Spawn, mill - track Spawn.

In the beginning of 20th century pure mycelial Culture were made and used for making masure Spawn on sterlized horse manure or Compost manure.

The process of macking grain spawn was first introduced by the Pennsylvania State University in 1932. Grain Spawn had an advantage over manure spawn as it could be mixed easily and provided many inoculum

points. The grain spawn was further perfected by Stoller in 1962.

Today most of the traditional Spawn laboratories world over are using wheat, rye and millet grains as substrate for spawn production and are following the standard technique of mother spawn from pure culture mycelium grown on synthetic mycelium.



Nutritional value

- Carbohydrate and Fiber
- Protein and amino acid
- Fat content
- Mineral content
- Vitamins
- Sugars

Medicinal value

- Antioxidant
- Anticancer
- Anti-diabetic
- Anti-obesity
- Antimicrobial
- Anti-inflammatory

Cosmetic value

- Creams
- Lotions

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CHAPTER-3 : NUTRITIVE VALUE OF MUSHROOM

Mushrooms are a rich source of nutrients, particularly proteins and vitamins such as vitamin B, C and D. The Content of the anti-pellagra vitamin, niacin is Comparable to its levels found in pork of beef. which are the richest known sources of this vitamin. Mushroom cultivation is the major fermentation industry, which involves the bio-Conversion of cellulose wastes into edible biomass.

Meeting the food demand for the increasing population from the limited land resource is a big challenge for our indian democracy in this vulnerable climate change era. In addition to this, wide Spread malnutrition and associated diseases are more common among the economically poor population.

Non green revolution otherwise reffered as mushroom farming is one among the apt ways to meet this challanges because mushrooms grows on wastes without requiring additional land besides its exceptional nutritional and medical properties.

According to an estimate, yield of mushrooms per unit area, such as or in terms of protein is 100-1000 times more than conventional agriculture like production of paddy, wheat, pulses and

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Carbohydrates:
Mushrooms are good source of minerals. They are rich in phosphate, phosphorus, potassium and iron but are low in sodium. About one third of the total iron in mushrooms is in the available form.

They are particularly rich in Niacin (B1), Riboflavin (B_2), niacin, biotin, ascorbic acid, Vitamin K and vitamin E.

In addition to these, some other interesting features in the nutritional quantities of Mushrooms are
(i) lack of starch
(ii) low fat content (iii) low calorie value
(iv) presence of a variety of sugar and their derivatives and.
(v) high fiber content

Hence, they are said to be the "delight of diabetics".

The nutritional value of mushrooms is affected by numerous factors such as species, stage of development and environmental conditions.

Mushrooms are rich in protein, dietary fiber

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Vitamins and minerals. The digestible carbohydrate profile of mushroom includes staches, pentose, hexoses, disaccharides, amino sugars, sugars alcohols and sugar acids.

The total carbohydrate content in mushrooms varied from 26-82% on dry weight basis in different mushrooms.
The crude fiber composition of the mushroom consists of partially digestible poly-polysaccharide and chitin.

(A) Nutritive value of Oyster Mushroom :-

fiber = 48.60 g
protein = 19.20 g
fat = 6.32 g
Energy = 412 K cal.

(B) medical values :-

Specific biochemicals compounds in mushrooms are responsible for improving human health in many ways. These bioactive compounds include polysaccharides, tri-tarpinoids, low molecular weight proteins, glycoproteins and immunodulating compounds.

Hense mushrooms have been shown to promote immune functions: boost health; lower the risk of cancer; inhibit tumor growth;

help balancing blood sugar; ward off viruses, bacteria, and fungi; reduce inflammation; and support the body's detoxification machanism. Increasing recognition of mushrooms in complementing Conventional medicinal is also well known for fighting many diseases.

① Good for heart :-

The edible mushrooms have little fat with higher proportion of unsaturated fatty acids and absence of cholestrol and Consequently it is the relevant choice for heart patients and treating Cardiovascular disease. Minimal sodium with rich potassium in mushroom enhances salt ~~bala~~ balance and maintaing blood Circulation in human being. mushrooms are suitable for people suffering from high blood pressure.

② low calorie food :-

The dibetic patients choose mushrooms ~~an~~ as an ideal food due to its low calorific value, no starch, little fat and sugars. The lean proteins present in mushrooms help to burn cholestrol in the body. Thus it is most preferable food for people striving to shed their extra weight.

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(3) Prevents Cancer :-

Compound restricting tumor activities are found in some mushrooms but only limited no. have undergone clinical trials.
All from of edible mushrooms, and white button mushrooms in particular, can prevent prostate and breast cancer. fresh mushrooms are capable of arresting the action of 5-alpha-reductase and aromatase, chemicals responsible for growth of Cancerous tumors.

Lentinula edodes, trametesversicolor, Agaricus bisporus and others. Salenium in the from of seleo proteins found in mushrooms has anticancer properties.
⇒ According to the international Copper Association, the mushroom's high copper lavels help to reduce colon cancer besides osteoporosis.

(4) Regulates digestive system :-

The fermentable fiber as well as oligosaccharides from mushrooms acts as a prebiotics in intestine and therefore they anchor useful bacteria in the Colon. This dietary fiber assists the digram digetion process and healthy functioning of bowel system.

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CHAPTER – 4 :- MARKET ANALYSIS AND STRATEGY

1. production & market status :-

large scale white botton mushroom production is centered in Europe, North america and S.E. Asia. The national annual production of mushrooms is estimated to be around 50,000 tones with 85 percent of this production being of button mushrooms.

2. Demand and supply pattern :-

white botton mushrooms are grown all over the coorld and accounts for 35-45% of the total mushroom production.

In India, large units with production capacities between 2000 – 3000 tones/annum have been set up mainly as export oriented units in the southern, western and northern region

India exports the highest quantity of the mushroom produced in the contry to USA. Netharlends and china account for 60% of the export of mushrooms.

Germany is the largest importer and france and UK are large producess as well as consumers.

⇒ World production of mushrooms up to 2014

Countries	1997	2007	2014
China	1450000	4060000	7626791
US	3,66,810	3,59,630	432100
Netherlands	2,40,000	2,40,000	310000
polands	1,07207	1,40,000	254224
Spain	81,304	1,31,974	149854
france	1,73,000	1,62450	108540
Italy	57,646	85,911	600114
Ireland	57,800	81,000	69600
Canada	68,020	73,260	102526
UK	1,07,359	71,500	94857
Japan	74,782	67,000	65,811
Germany	60,000	55,000	59923
Indoneshia	19,000	48,247	37410
India	9,000	37,000	28000
Australia	35,485	42,739	60023
Korea	13,181	28,764	27,130
Iran	12,601	28,000	80,239
Hungry	13,559	21,637	22,603
Viebnam	12269	18,636	22,000
Denmark	8,766	11,000	10026
Thailand	9,000	8802	1000
Israel	1260	9500	10,000
Southafrica	7406	10,320	17,299

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Countries	1997	2007	2014
New zeland	7500	8500	607.
Switzerland	7,239	7,440	8,155
Total world = Production	3101498	5990976	10378163

⇒ Imparter Countries of mushroom

Importers of botton mushrooms
Germany
U.S.A.
France
Belgium
Swedon
Norway
U.K.

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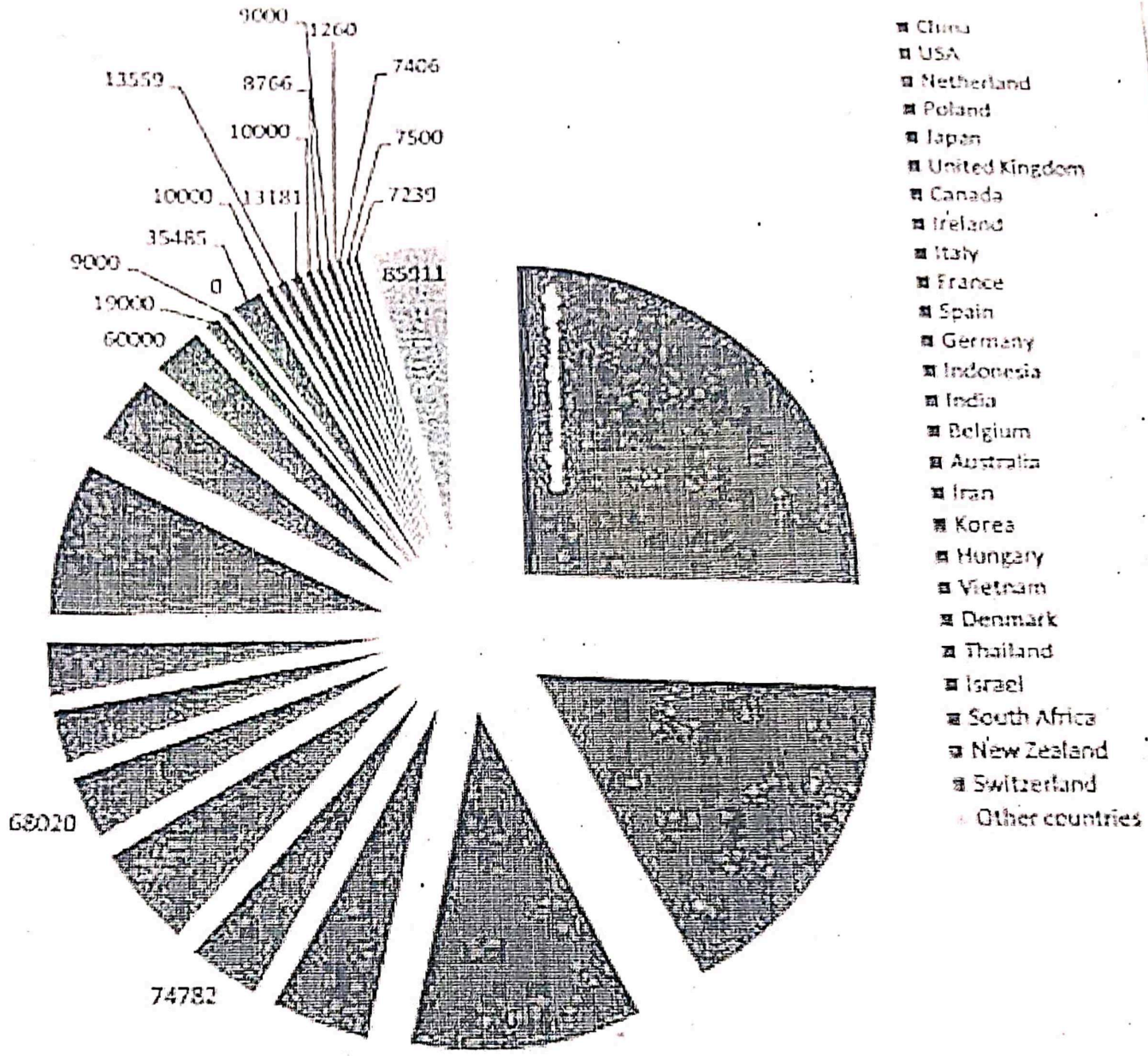
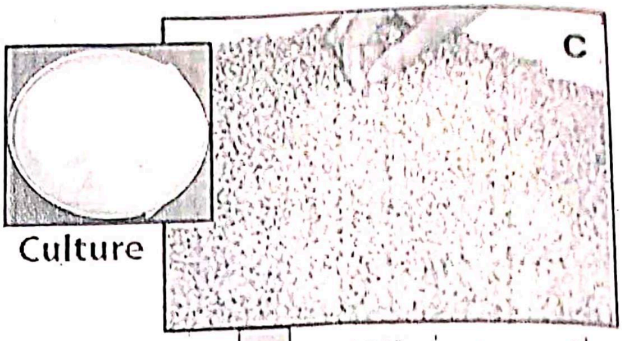
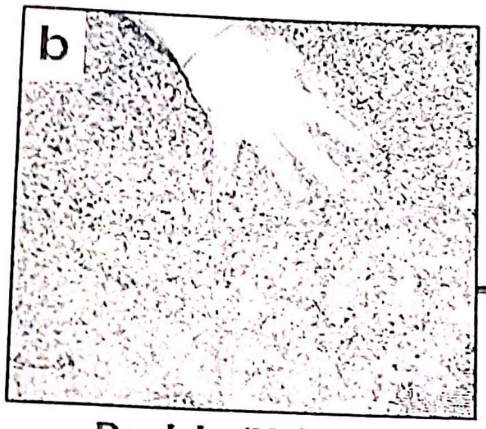


Chart: 1: World Production of Mushroom (Metric Tonnes)

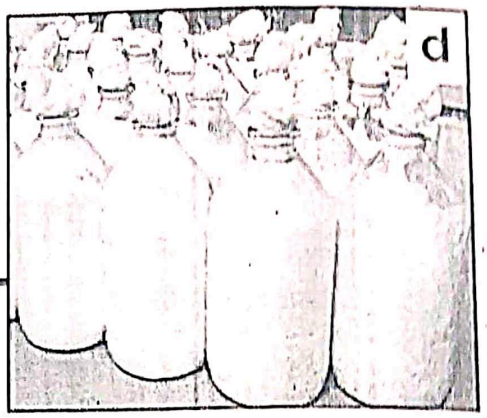
Stubble burning of Paddy/Wheat



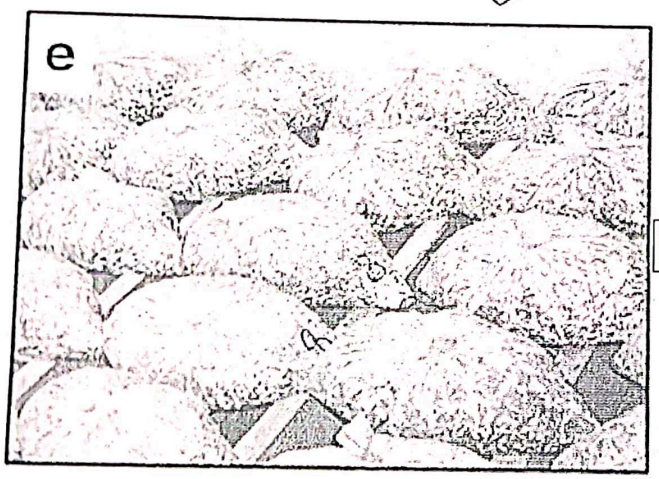
Wheat grain



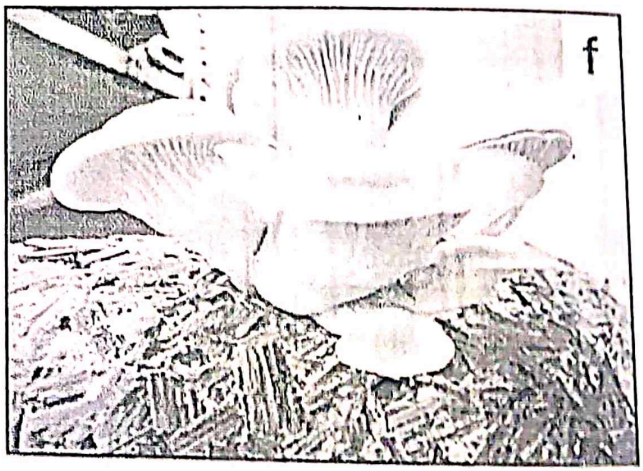
Paddy/Wheat straw



Mushroom Spawn



Mushroom cultivation / bagging



Growing Oyster mushroom on paddy/wheat straw

g Use in green synthesis approach for synthesis of Au-Pt Nanoparticles

CHAPTER – 5 :- PRODUCTION TECHNOLOGY

The cultivation of oyster mushroom or pleurotus spp is relatively simple and can be a homestead project. The agro-climate conditions in out country especially in the north indian states are conductive for mushroom cultivation when the temprature is 15-30.C and relative humidity is 70-80 %. The production decreases during peak periods of winter.

① Climate and other conditions :-

~~Pleuto~~ pleurotus spp. is one of the choice edible mushrooms which can be cultivated in the tropics. It has gained importance only in the last decade and is now being cultivated in many countries in the subtropical and temprate zones.

Different species of pleurotus are suited for growing within a temprature range of 15 – 30°C. P. sajor-caju can tolerate tempratures upto 28-30°C. althought it fruits faster and produces larger mushrooms at 25°C during the ~~Cott Cotton~~ cooler months of the year or in the highlands of the tropics. This is the species now popularly grown in the tropical southest Asian contries, including India.

② Substrate :-

Mushrooms are growing well on different lig. types of lignocellulosic material, converting them to digestible and protein rich substances suitable for animal feeds.

Pleurotus spp. may be produced in the tropics on a mixture of sawdust and rice bran, rice straw and rice bran, saw dust and ipil-ipil leaves and other combinations of tropical wastes.

Other wastes such as corncobs, cotton waste, sugarcane bagasse and leaves, corn leaves, grasses, rich results and water hyacinth leaves are also good substrates for growing this mushroom.

The substrates used in each region and depend upon the availability of agricultural wastes.

③ Preparation of substrate - Sterlization

In addition, nutrients in the compost are broken down by sterlization into forms more favourable for the growth and development of competing micro organisms. Thus, substrate are sterlized are easily contaminated unless

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Spawned under very aseptic conditions as in ~~india~~ media and spawn preparation steaming at 100°C is more acceptable because the cost of is lower and substrates thus steamed are less susceptible to contamination. The substrate is steamed for 2-3 hours depending on the volume and the size of the bags when using a lower temprature as in the case of room or bulk pasteurization, the substrates, whether in bulk or already packed in bags, are steamed for last 6-8 hours.

Inoculation / Spawning :-

Spawning is carried out aseptically, preferably using the same transfer chamber or the same inoculation room as is used in spawn preparation. Grain or sawdust spawn is commonly used to inoculation the substrate in bags. With grain spawn, the bottle is shaken to sprate the seeds colonized with the white mycelium.

For sawdust spawn, the spawn is broken up with an aseptic needle. A piece of the spawn may than be transferred, using a long flat sponed needle especially designed to scoop the spawn. One bottle of grain or sawdust spawn in a 500 ml dextrose bottle is subficient to inoculate 40 to 50 bags.

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Incubation :-

The Spawned ~~Content~~ Compost bags are kept in a dark room untill the mycelium has fully penetrated to the bottom of the substrate appears white, due to the growth of the mycelium. The bags are kept for an additional week before they are opened to cheak that the mycelium is mature enough to fruit. Most strains of the mushrooms from primordia after 3 to 4 weeks of mycelial growth. The bags are opened, to initiate fruiting, inside a mushroom house.

Fruiting :-

The Size of the mushroom house will depend on the number of bags prepared at any one time. The house may be built of nipa, sawali wood or concreate.

~~Frit~~

Fruiting requires an appropriate temprature range ventilation, light moisture and humidity. To provide moisture, daily watering of the substrate is required but excessive watering should be avoided. If the temprature inside the house rises to more than 30°c, a light water mist should be used to lower the temprature and hasten fruiting. Doors and windows may also be opened, especially

Approximately 3 to 4 days after opening the bags, mushroom primordia will begin to form and mature mushrooms would be ready for harvesting in the following 2 to 3 days. If the onset of fruiting is likely to be delayed.

To harvest the mushrooms, they are to be grasped by the stalk and gently twisted and pulled. A knife should not be used. If kept in a refrigerator or in a cool place, the mushrooms can remain fresh for up to 3 to 6 days.

After harvesting from the top end of the bag, the other end may be opened to allow fruiting. The two ends are sometimes opened and allowed to fruit to at the same time. After harvesting from the end portions, slits may be made on the central portion of the bag so that more mushrooms can develop. When a sawdust substrate is used, the harvested surface may be scraped lightly to expose a new surface for fruiting. As long as the substrate appears white, mushrooms will continue to from under adequate environmental conditions. When it appears colourless and soft, it is time to remove the bags from the hous

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Yield :-

Yield ranges from about 100-200% of the dry weight of the substrate and depends on the substrate combination as well as the way in which the substrate has been managed during the fruiting season. The richer the combination and the whiter and denser the mycelium, the greter will be the mushroom yield. To increae yield, the most common supplement used is urea or organic fertilizers dissolved in water. Using a plastic mist sprayer, the solution is sprayed on the surface immediately before fruiting.

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CHAPTER-6 :- POST HARVEST MANAGEMENT

① Storage :-

(A) Short-term-storage :-

Fresh mushrooms are packed in perforated polythene bags which are directly sent to the local market situated nearby. freshly harvested mushrooms can be stored at low temprature (0-5°C) for 1-2 weeks without loss in quality in case it is to be sent to the distant markets.

(B) long term storage :-

Dried mushrooms with 2-4% moisture can be stored for 3-4 months in sealed pouches without any change in ~~state~~ taste. The dried produce can be rehydrated in luke warm water (~~40-5~~ 40-50°C) within 20-30 minutes giving 80-90% of original weight.

② Packing and transportation :-

Fresh mushrooms are packed in perforated polythene bags. poly pouches Containing crushed ice and overwrapped in paper are put in trayes which are then covered with ~~him~~ thin polythene sheet with subbiecient perforation for proper aeration. The pre-packed

pouches. can be transported by roadways in trucks, bushes depending upon the quantity to be transported.

Marketing :-

Domestic marketing does not pose a problem at present because only small quantities are being traded. As production develops, marketing promotions measures will need to be undertaken to bolster the demand. Export potential exists and needs to be taken advantage of by organising Cooperatives of producers linked to Commercial units for processing fresh mushroom into dehydrated powder for export.

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CHAPTER-4 :- SOURCES FOR TECHNOLOGY

Sprout Consultancy services, Pune, India.

Mr. Anil Wanarse patil →

Mr. Anil is a post graduate in agri. business and plantation management from Indian Institute of plantation management, Banglore. He has great interest in mushroom cultivation and is specialized in setting up mushroom plants and growing mushroom.

Mr. Anil is presently acting as Mushroom Consultant in the field of mushrooms. Also he is director for Sprout Naturals, Pune, which Company functioning in the Aagriculture supply chain domain. He has been the master brain behind the drafting of mushroom project to be estabelized by the Company. He has also undergone many training programs on mushrooms production technology from recognised institute like, Agriculture College pune and DMR Solan, Himachal pradesh. He is having almost 2 year of experience in setting mushroom farms on commercial scale

In all over India he ~~st~~ Setup various plants for button mushroom, Oyster mushroom and other medicinal mushroom for commercial

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production of ranging capacity of 1000 kg. to 5000 kg on per day. basis production.

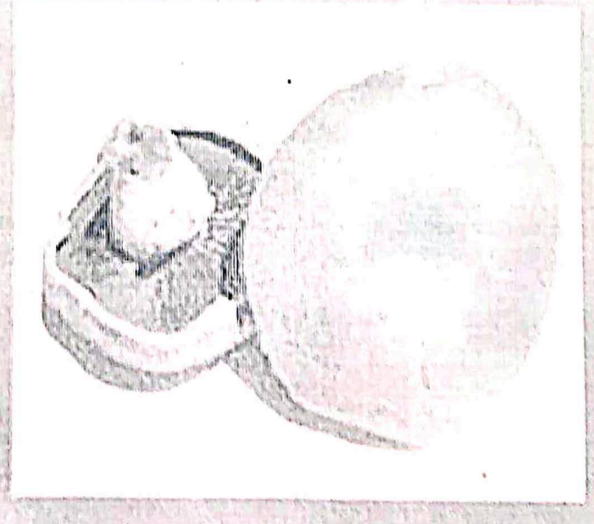
Mr. Raju jadhav :-

Mr. Jadhav is graduate in B.Com and started his journey with mushroom field as Asst. Manager from 1985 to 1999 with Himraj Mushrooms In chakan pune.

He worked then for Karjat fresh mushrooms in mumbai, Maharastra from 2001 to June 2005.

He also worked as mushroom expert in Navin fresh mushrooms from pune ~~to~~ and still providing consulting to farm as senior Mushroom Consultant for Sprout Consultancy ~~Ser~~ Services. This total journey is of almost 25 to 30 years only in case of button mushrooms cultivation technology showing efforts and great Commitment in the field of mushrooms. Mr. jadhav. In this journey had set up of about 10 button mushrooms plants and all of them are today in very good running conditions giving 100% efficiency in case of production ~~of~~ and quality. Now he is associated with Sprout Consltancy Services. pune as senior consultant for mushroom cultivation.

- By far the most common mushroom: *Agaricus bisporus*,
- White (Agaricus bisporus)
- Crimini (Agaricus bisporus)
- Portobello (Agaricus bisporus)
- Oyster (Pleurotus ostreatus)
- Shitake (Lentinus edodes)



Portobello (4-6 inch crimini)

Shiitake mushroom benefits

CHAPTER 10 :- ECONOMICS OF THE PROJECT

The demand for Oyster Mushroom is increasing Rapidly in international markets and a big gap exists between Supply and demand. There is need to take advantage of this situation by encouraging its production which is a highly viable venture as through out below for Kiran agro park, bhilai Chattisgarh company putting hands in commercial Cultivation of agriculture crops in the Country. Company movements in to large scale productions Of oyster mushroom would give fast returns to ~~to~~ them and will contribute in the wealth of nation.

Maa Bharti P.G. College, Kota

Department of Botany

Bachelor of Science (B. Sc.) Part-III

Economic Botany File

Session: 2021-22

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WHEAT

Botanical name – Triticum Aestivum
Hindi name – Gehoon, Kanak
Family – Gramineae or poaceae

Comments :—

(1) Wheat is an annual herb with 0.6 – 1.5 m high culum's

(2) The inflorescence is a terminal spike made of 15-20 spikelets. The grain is a dry one seeded indehisfen fruit called caryopsis.

(3) Wheat flour is used for breads, cake, biscuits and other confiction dry products.

(4) Wheat is grown in variety of climates but grow mostly in worm M.p. region of world.

(5) Some imp. wheat variety - Kalyan Sona, Sharbati Hira etc.

Wheat

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RICE

Botanical name :— Oryza Sativa
Hindi Name :— Chawal, Dhan.
Family :— Graminea or Poaceae.

Comments :—

(1) Plant is a large annual grass. The inflorescence is a terminal panicle its branches ending into a grain covered by a husk.

(2) Half the world's population use this cereal as a staple food.

(3) Plant grow in hot, most tropics. The area should be flooded with water during early stages. Clay to Lomme soil are more suitable for paddy cultivation

(4) In India rice a grown at diff. region like U.P. W.B etc.

(5) High yielding varieties are Jannum Groya, Sabarmati etc.

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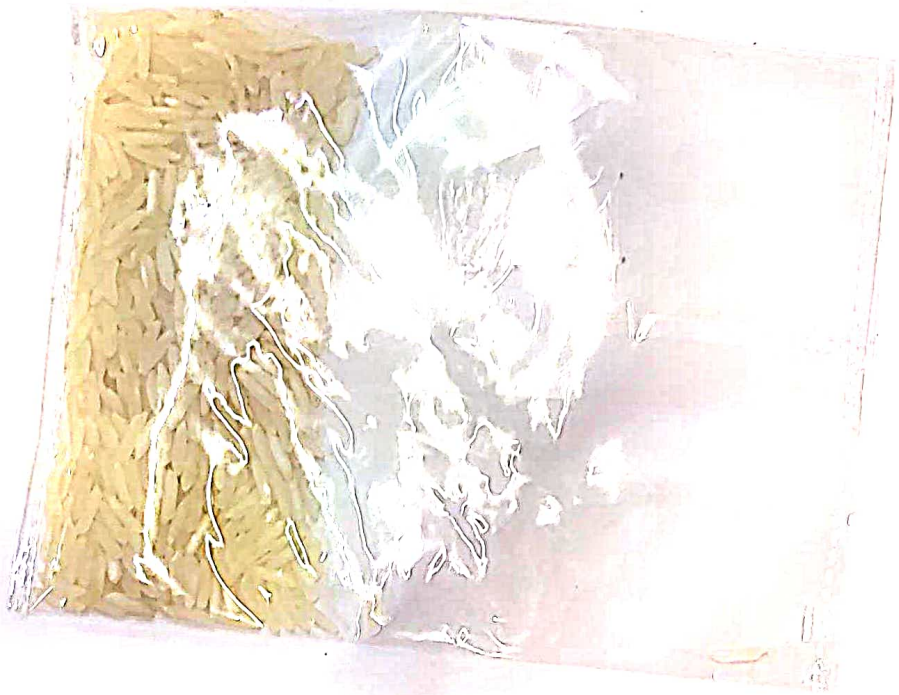

Rice

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MAIZE

Botanical name – Zea mays
Hindi name – Makka Bhutta
Family – Graminae or poaceae

Comments :–

(1) Edible part is caryopis which is a fruit called grain. The plant of maize is annual grass. The plant posses both made & female flowers on the same plant

(2) The grain is caryopis with two types of grain (i) hard yellow (ii) soft flowry and white

(3) Maize is a sub tropical crop grown in alluvial & Loame soil

(4) Maize is used on food source for live stocks, flou is used in prep. ration of corn bread. Others. incl. flakes, starch oil etc.

(5) Some imp. varieties incu. Ganga, Oceanic, Kanchan, Sweta etc.

maize

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Suger CANE

Botanical Name :- Saccharum officinarum
Hindi Name :- Ganna
Family :- Gravineae or Poocege.

Comments :-

(1) Part of plant used as stem for sugar extraction.

(2) Perennial grass 8-12 fett tall is supported by still roots

(3) Grows best in warm humid tropical to wland it req. hot & climate with high rain fall

(4) The juice extracted from stem by expression is Crystallised to warm facture sugar.

(5) Chief sugarcane prod. countries are Beari, Incha Chinab etc.

(6) Indian varieties include Co - 1148, Co. 802 etc.

Sugarcane

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Groundnut

Botanical name — Arachis hypogea
Hindi Name — Moongphali
Family — papilionaceae

Comments :—

(1) Part of plant use are seed from which oil is extracted.

(2) Groundnut plant is a low annual growing herb. The sessile flowered are born in axil of leaves The fruits is indehiscent. Contented pod with 1-3 or mar e seeds.

(3) Groundnut grows in tropical and subtropical regions.

(4) Seeds are on important source of veg. non drying oil. oil contain fatty acid such as oleic acid palvitic acid etc.

(5) Rich in phosphorus & vitamin - major groundnut producing countries are India. China west Africa etc. In India A.P. Gujarat Raj etc.

Groundnut

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Mustard

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MUSTARD

Botanical name – Brussica Competeris
Hindi name – Sarson
Family – Cruciferae or Brassicafence.

Comments :–

(1) Part of plant used as seed. For extraction. Mustard plant are erect and branched annual herb small pale yellow. coloured flowers.

(2) Mustard is grown as rabe crop. other pure or mixed with legumes.

(3) The seed soil are used as Condiments in preparation of pikles & for flowering and vegetable.

(4) India is first in both with regard to arreage preduction

(5) Chiefly grown in Biher, W.B., U.P. & M.P, Orisa.

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