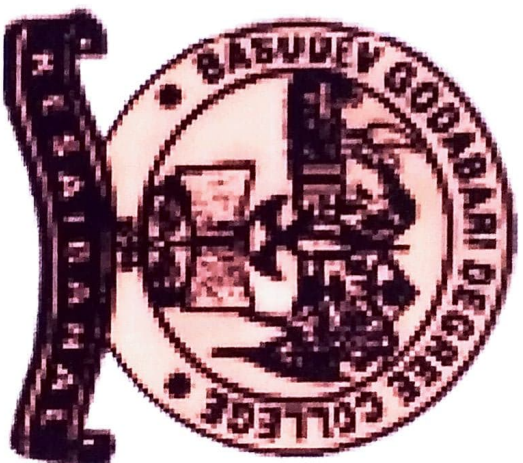


**BASUDEV GODABARI DEGREE COLLEGE ,
KESAIBAHAL**



**BLENDED LEARNING STUDY
MATERIAL**

UNIT-II

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**DEPARTMENT OF BOTANY
3rd SEMESTER BOTANY HONS.
PAPER- VI (ECONOMIC BOTANY)**

Principal
Basudev Godabari Degree College
KESAIBAHAL, SAMNAILPUR, 768228

Self-Study module Details

Class – 3rd semester (2020-2021)

Subject - Botany
Paper- VI

Paper Name – Economic Botany

Syllabus Unit-II

- i. Spices : Listing of important spices, their family and part used economic importance with special reference to fennel, saffron, clove and black pepper, Beverage: Tea, Coffee (morphology, processing and uses).
- ii. Drug-Yielding plants:- Therapeutic and habit forming drugs with special reference to cinchona, Digitalis, papaver and cannabis.
- iii. Tobacco: Tobacco (Morphology, Processing, uses health hazards)

Learning Objectives:-

After learning this unit you should be able to

1. What are spices?
2. What is the source of clove of commerce?
3. Morphology and uses of fennel, saffron, clove, black pepper, Tea and coffee plants.
4. Uses of opium plants.
5. Medicinal uses of plants.
6. Difference between alcoholic and non-alcoholic plants.
7. Various steps in processing of tea.

You can use the following video link to :

<https://youtu.be/KiOGLRvWmQ> – Pharmacognosy of fennel.
<https://youtu.be/Pb892khalzs> – Fennel
<https://youtu.be/YSVtq2VXX4c> – Beverages# Tea # Coffee
<https://youtu.be/pfRgU2wDL0w> – Cinchona- drug yielding plants.
<https://youtu.be/BdjefHJbHEO>- Digitalis- drug yielding plant.
<https://youtu.be/WpflUN3BzBY>- Papaver somniferum medical plant.
<https://youtu.be/S3i080tzkdw> – Cannabis – medical plant.
<https://youtu.be/rLoT09rtzGM> – Tobacco Plant.

You can also use the following books.

1. Economic Botany – Sing, Pandey & Jain.
2. Economic Botany – by Bhabananda Baruah (Kalyani Publisher)
3. Notes-

Plan-Unit-II

No of period to be taken.

18.01.21	10.30 to 11.30am	01	Introduction of important spices. Their family and part used, economic importance with special reference to fennel, saffron, clove and black paper.	<u>AP</u> =
25.01.21	10.30 to 11.30am	01	Introduction of Beverages. Morphology processing and uses of Tea and Coffee.	<u>AP</u> =
02.02.21	10.30 to 11.30am	01	Doubt clearing class spices and beverages.	<u>AP</u> =
03.02.21	10.30 to 11.30am	01	Introduction of Drug yielding plants. Habit forming drugs with special reference to cinchona, Digitals, Paper and Cannabis.	<u>AP</u> =
08.02.21	10.30 to 11.30am	01	Morphology, Processing, uses and health hazards of Tobacco.	<u>AP</u> =
13.02.21	10.30 to 11.30am	01	Doubt clearing class.	<u>AP</u> = 13.02.21.

" A spice is a seed, fruit, root, bark or other plant (part) substance primarily used for flavoring or colouring food"

→ Spices are distinguished from herbs, which are the leaves, flowers or stems of plants used for flavoring or as greenish.

→ Spices are some times used in medicine, religious rituals, cosmetics or perfume production.

→ Important spice yielding plant are pepper (*nigrum*), chilli (*capsicum annuum*), cardamomum, Zinger (*zingiber*) -offrenales, coriander (*coriandrum sativum* -Apiaceae) clove (*syzygium aromaticum* - myrtaceae), Nutmeg (*myristica fragans* -Hault), Turmeric (*curcuma longa*) etc

→ The Kerala state is 'spice Trade Hub'. Kerala is also referred to as the "spice garden of India".

→ Majority of the spices are occurring mostly Asia also found in Egypt, China, Greece, Rome, East India etc

→ India bears about 30% of the total world trade many spices obtained from roots of any other plant such as parmelia from P. abessinica Krasp a crustaceae lichen, occurring Anantpur & Giddaph districts of Andhra Pradesh available in market as condiment and spices.

FENNEL

Family - Apiaceae
Genus - Foeniculum
Species - vulgare
Botanical name - Foeniculum vulgare mill

→ Fennel is a flowering plant spices in the carrot family.
→ It is a hardy, perennial herb with yellow flower & feathery leaves (pinately compound) leaves with umbellate inflorescence
Fennel is also known as ancient Hindus.

Snowing region:-

This spices plant is mainly cultivated in the state of Punjab, Uttarpradesh, maharashtra & also assam.

→ It require fairly cold climate also in northern india
→ The plant best grow in loam or black sandy soil with the presence of lime.

→ Usually the sowing of seed by hands or by shallow drills.

In the plain area - October - November

Hilly area - March - April

→ The crop is harvested before the fully ripen of seed.
→ The stem also contain fruit are cut & dried in the sun
→ When the fruit are completely dry then cleaned.

Botanical Description:-

Habit - Fennel is a biennial or perennial herb with erect stem when older with hollow internode.

Root - The plant has elongated and well develop tap root system.

. The tap root is yellowish to light brown colour up to 2.5 cm in diameter

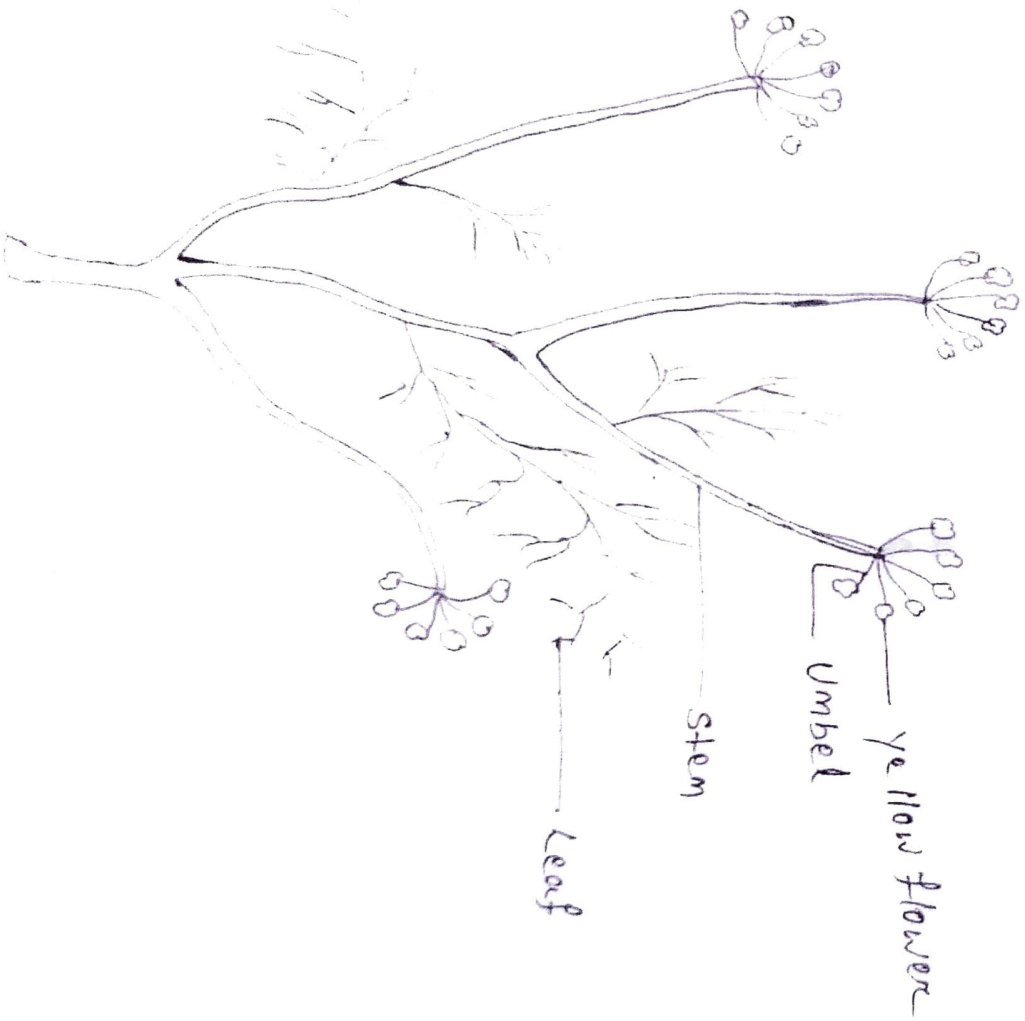
Leaf - The bright green to blue green leaves are alternate with a leaf sheath 2-15 cm

Stem - There is normally one erect, stout main stem up to 1.5-2m with the base 2-3 cm diameter. The stem is generally smooth, shiny with green to blue green colour.

Fruits - The fruits are greenish brown to yellowish brown oblong ovals about 6m

Uses

- Commonly used for flavouring curries like meat-dishes breads, rolls, sauces etc
- Useful for the treatment of chest disease kidney spleen
- Used as preparation of oil.
- Preparation of culinary, preparations, liquors confectionary etc
- It contains carbohydrate (45%), calcium (1.5%), P (0.50%), K (1.7%), Thiamine 0.41mg/100g etc



CLOVE

Family - Myrtaceae

Genus - Zygium aromaticum - Botanical name
Species - aromaticum

→ clove is the common name for a small tropical evergreen tree. Syzygium aromaticum.

→ clove is one of the most common, ancient and valuable spice yielding plants in India and all over the world.

→ It is originally tree from the main islands of the moluccas in Indonesia (the formerly known as the spice islands) in southeast.

→ This spice was first introduced by the East-India Company around 1800 AD.

Botanical Description:-

→ Evergreen tree is up to 20 m height.

→ The stem is erect & it has grey bark.

→ Leaves - until 12 cm long, oval shape.

→ Flower - Terminal, shortly peduncle & branched from the base.

• Flower is also hermaphrodite with a fleshy hypanthium which surrounded by sepals.

→ Unopened dried flower bud yield clove.

→ Generally buds are green, borne on ends, picked green and dried in the sun till the colour of the flower bud become "dark brown".

→ Cone shaped evergreen tree along with lanceolate leave in the pair.

→ clove tree is propagated by seeds

→ Occurring during August - October. The seed are germinate 4-5 week after seeding.

Growing region:-

→ clove grow well in rich loamy soil of the humid tropics and also grow in red soil.

→ In India clove is mostly grown in the hilly tract of Tamilnadu, Kerala & Karnataka

→ Tamil Nadu produced the large amount of clove in India.

Uses

- clove is very aromatic and fine flavoured & impart eating quality.
- In all Indian home it is used as spice as the flavour blend well with both sweet and flavouring dishes.
- Commonly used in culinary spice.
- It is one of the ingredients of betel chewing.
- Preparation of oil by distilling clove water or steam.
- Also used pickle, curries, juices etc.
- Preparation of perfume.
- Used for special brand of cigarette for smoking.
- Used as preparation of tooth past.
- High antioxidants & can kill bacteria.



BLACK PAPER

Family - Piperaceae

Genus - Piper

Species - nigrum

Botanical name - Piper nigrum

→ Black pepper is a flowering vine in the family Piperaceae cultivated for its fruit known as a pepper corn.

→ The pepper corn is usually dried and used as a spice and seasoning

→ A mature fruit is about 5mm (0.20) in diameter and dark red, and contain single seed.

→ This is the perennial herb, usually cultivated nodes rooted. Also known as "The king of spices".

→ Black pepper is grown in many tropical region like. It grow in many tropical region like Brazil, Indonesia & India

→ Commonly known as kalimirch.

→ Kerala alone contributes to about 96% of the total production of cultivation

Botanical Description:-

→ leaves - petiolated, simple, arranged in parallel manner generally oval in shape.

→ leaves are dark green on the upper & whitish green on underside

→ flower - small dense slender spikes about 50 blossoms

→ fruit - Also known as peppercorns. Yellowish red colour in maturity. bear a single seed.

→ It is the plant of humid tropic requiring high rainfall and humidity.

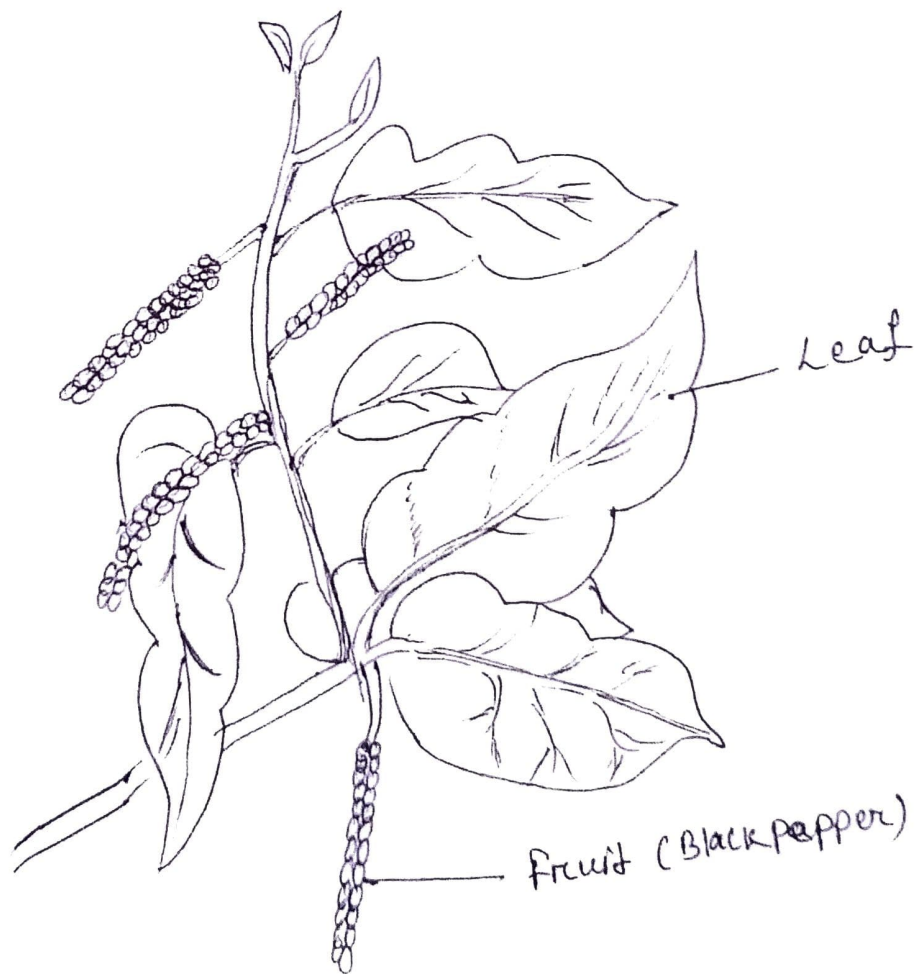
→ The hot & humid climate of sub-mountain tracts of western Ghats is ideal for its cultivation.

→ Native to present day - South India.

→ In India black paper is cultivated in Kerala, Karnataka, Tamilnadu, Maharashtra, North eastern state etc

USES

- pepper fruit are used as spice or condiment
- it is used for preparing pickles, preserving also used in cooked fruit for better taste.
- it stimulates the flow of saliva and the gastric juice has cooling effect
- Black pepper oil is used in making perfume.
- it is also used in defending against household various insect from entering vegetables.
- it is also used in medicine purpose as virus in malaria fever, aromatic stimulant in cholera, comma.
- part used as spice - dried, unopened floral buds.
- Area of cultivation - Indonesia are the largest producer



Beverage

It is an essential part of human diet due to their liquid content. Also play an important role all over the world for their stimulating and refreshing properties.

- Any potable liquid that we drink other than water.
- Generally there are of 2 types

① Alcoholic - ex - Beer, whisky (Apple, guava, grapes)

② Non-Alcoholic - ex - Tea, coffee, chocolate.

→ The non-alcoholic beverage is also known as "soft drink".

TEA

Family - Theaceae

Genus - camellia

Species - sinensis

Botanical name - camellia sinensis.

- The Tea is prepared from the dried leaves of C. sinensis
- Primary origin - Lower Tibetan mountain central Asia.
- Secondary origin - Southern part of Assam
- Growing region - China, Japan, India, Bangladesh, Sumatra, Sri Lanka.
- In India it is widely cultivated in Assam, Tamilnadu, Kerala, West Bengal.

Morphology:-

- The plant is evergreen small tree but it is grown under cultivation as a shrub
- Usually the plant is about up to 7-9 meters
- The leaves have a leathery petiole with entire margin arranged in alternate manner
- The matured leaves are generally bright green colour and also contain oil glands.
- The flowers are axillary, white colour, may be single or in cluster
- The fruit are capsule type containing 1-3 seeds in each cell

Cultivation

- Shrub, usually the tea plant can be grown in nursery bed by the seed sowing.
- The nursery bed can be manured to the growth seedling up to 6-9 month old
- The plant can be propagated by either seedling or by seed
- Land preparation - Removal of forest completely drains are made along with the contour of hilly slope for soil erosion as well as water logging of the low-lying areas
- Method of planting seed.
- Holes can be dug at 3ft - 5ft terraced or flat land also mixed organic manure with soil & shade is very essential for cultivation.
- Weeding - The unwanted plants that grow in betⁿ crop are called weeds. The process of removal of such unwanted plants is called weeding.
- Pruning method.
- Pruning is the process by which the planter selectively removes parts of a plant like the branches root or bud.
- Thus Tea pruning is a horticultural practice which the planters widely used to keep the plants in ideal shape. Basically there are 2 types of pruning of tea leaves.
 - 1st pruning done by - 5 year old
 - and pruning done by - Annually or Bimually

Processing

- Plucking is very important process. It depends on the age of the leaves of the tea plant.
- The young leaves contain more than tannin than the older leaves.
- The flavour and quality of the tea depends on soil climate, age of the leaf, time of plucking and method of preparation
- After plucking the leaves are first exposed to the sun or heated in shallow trays until they become soft

Here
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to

After this process they are rolled by hand or machine finally the leaves are changed their shape now the curled and twisted leaves are completely dried in the sun followed by current of hot air

→ The final product is the green tea having an even texture and flavour.

There are commonly four kind of tea

(a) Black tea

(b) Green tea

(c) oolong tea

(d) lappet tea

uses

→ The tea contain 82-88% moisture and rest are solid residue

→ It contains 2-5% theanine (alkaloid), 13-18% tannin and small amount of volatile oil caffine

→ Used as infatigue condition

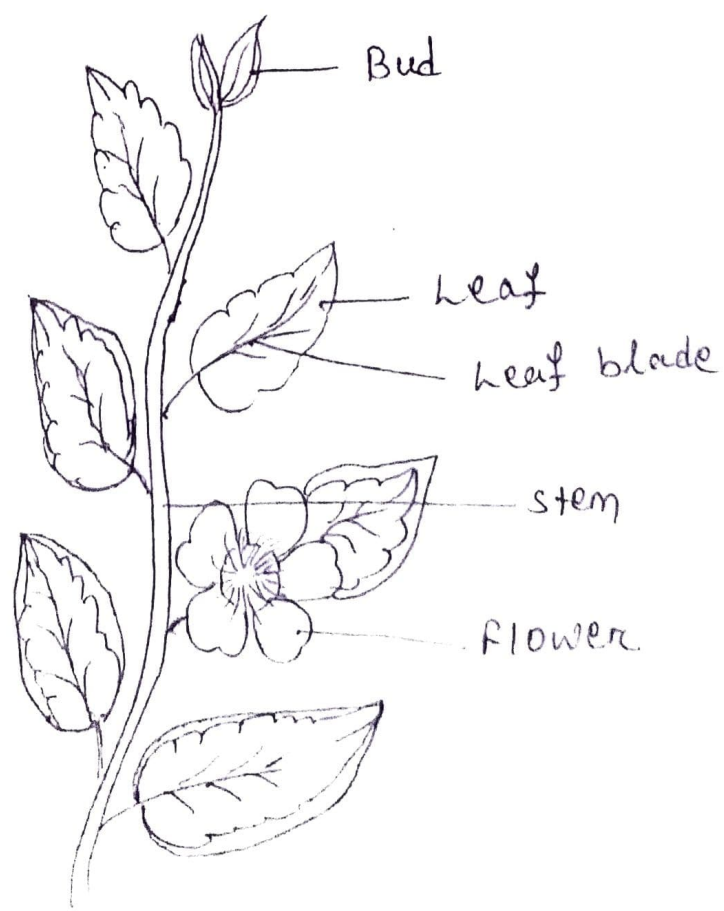
→ Used as nervous stimulating beverage

→ It is also used as medicine against malaria

fever diuretic condition

→ Tea is harmful to the digestion to excess drinking.

→ protect heart health, weight loss, Relieve insect bite pain



COFFEE

Family - Rubiaceae

Genus - Coffee

Species - Arabica

Robusta

Liberica

Morphology

→ The plant is shrub or a small tree reaching a height of 13.30 feet.

→ The leaves are opposite, smooth, dark green in colour

→ The flowers are axillary white fragrant

→ The fruit called berry and contain 1-2 seeded. The unripe seed is green in colour and the ripe-ning seed is yellow or red in colour.

- "Coffee Arabica" - Arabian coffee - about 90% of the world supply.

→ occasionally fruit is called as "cherries" and the fruit is also known as "pea berry".

Climate:

→ Tropical plant requires moist climate rainfall about 50 inches & in betn 75-120 inches is suitable for its growth

→ There are out of 15 kinds of arabian coffee high esteemed ex-mocha coffee.

- Congo coffee - (Coffea robusta)

→ most uses plant with thick leaves

→ Native to Congo region of Africa

→ It have lower quality than the (Arabian coffee)

- Liberian coffee

→ This is the large species of genus coffee height about 40ft

→ It is used chiefly for flavour & aroma

→ Growing region - Central & South America, Africa & middle east & South Asia

→ In India the coffee is cultivated in Karnataka, Tamil Nadu, Kerala, Andhra Pradesh, Telangana

Plantation of coffee

- The coffee plant is directly developed from seed. The seedlings are transplanted at 6ft interval.
- The *C. arabica* are cultivated (plantation) by washed method
- In this process the outer mucilaginous covered is removed by pulping and washing with water
- During these method the coffee beans from the coffee berries are released.
- Coffee is made for the market by either drying or by wet method
- The machines are used for clean off dried & pulp each bean is encased in a soft parchment covering
- The parchment covering is removed by mechanical method or pounding in mortar
- The "coffee beans" are graded and they are packed in bag for shipments

Uses

- The coffee contain 1-2% caffeine, 34% cellulose 8% chlorogenic acid, 10-13% volatile oil, 17% sugar, 14% protein etc
- The stimulating affect of coffee is due to the present of alkaloid caffeine
- In jockey the coffee are mixed with sugar. eaten
- The water product of pulp are used as fertilizer & fuel.
- It help could live longer
- Develop strong heart quality.
- Genetic material strong.
- Lower risk of diabetes
- protect our liver
- Lower risk of cancer

Drug yielding plants

Pharmacology - It is the branch of science which deals with drugs or drugs yielding plant
ex - Ginseng, Cascara, Digitalis, Hemp, Atropa, Ithone ^{Stromantem}

CINCHONA

Family - Rubiaceae

Genus - Cinchona

Species - officinales

- Native - South America having 40 species of trees & shrub
- Cinchona plant was discovered in Peru 1739 by Lacodamine
The termed cinchona was given by Carlous Linneous.
- In India it is distributed in meghalaya (K-JHills), Nilgiris, Sikkim, South India also madhypradesh
- Popularly known as "counless bark" on Jesuits bark
It is also known as "peruvianak bark".
- Some species of cinchona *C. calisaya* Wedd, *C. ledgeriana*, *moens* ex Treman, *C. officinalis*, *C. robusta*, *C. succinubra*, *C. cordifolia* etc

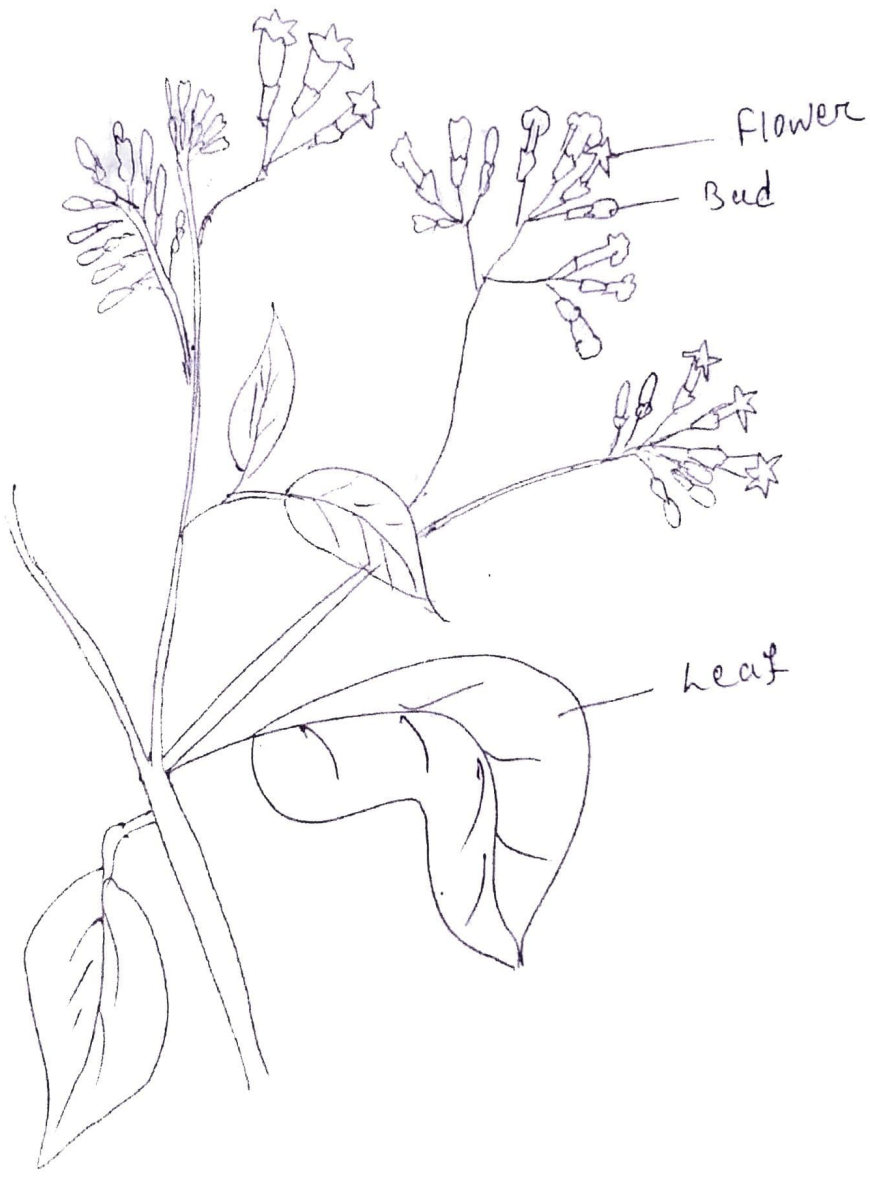
Morphology

- The plant is larger evergreen trees & attain a height of 150 feet
- Stem - covered with thick bark, various colour, light colour, pale brown, dark brown.
- leaves - green colour arranged in opposite mannure
- flower - yellow pink colour, borne at terminal peduncle
- The Cinchona propagated by seed, They may be grafting and cutting.
- The plant growing in atitudes ranging from 762-2050 meter
- The cinchona prefore cold mountain spore with the rainfall of 270cm

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The quinine is prepared from cinchona most cure for malaria

- Quinine is very bitter, white, granular substance; very valuable tonic & antiseptic.
- cinchona is use for promoting realising of digestive juice & treating bloating and other stomach problem.
- In food cinchona use as bitter flavour in tonic and alcoholic beverage
- cinchona is also used eye lotion
- Also used in cold, leg cramps, influenza, siniflue etc



Digitalis

Family - plantaginaceae

Genus - Digitalis

Species - purpurea

Botanical name - Digitalis purpurea

Family - P.
Genus - D.
Species - P.

- popularly known as "Foxglove" which are biennial herb
- Leaves are rosette like. The flowers are pendent purple or yellow coloured
- Drug is obtained from the dried leaves of *D. purpurea*
- The species *D. lantana* (woolly foxglove)
- It is cultivated as central Europe, England, Argentina, United State.

Uses

- used for the treatment of circulatory disorder
- used for myocardial stimulant for the treatment of heart failure
- used to help blood supply to kidney and blood circulation
- Removes any renal obstruction
- over dose is harmful to the body is heart beat, nausea, diarrhoea, abdominal pain etc.



Papaver

Family - Papaveraceae

Genus - Papaver

Species - somniferum

Botanical name - P. somniferum

→ Papaver is cultivated for popular drug "opium" it is also cultivated in Uttar Pradesh, Punjab, Rajasthan, Madhya Pradesh etc.

→ Opium is obtained when un-ripened nodules are cut

Morphology

→ The plant is erect, annual, exstipulate, large ovate and are arranged in alternate manner. up to 2-4 feet

→ The flowers are large, terminal, showy they may be white, pink or red in colour.

→ The inflorescence is terminal and solitary cyme

→ The fruit is globular, pale green, capsule developed from a multicarpellary ovary

→ The seeds are small minute, blue, black or yellow in colour, it contains a minute embryo in an oily endosperm.

→ The buds are always drooping but the flowers have upright stalk

→ Poppy capsule have pores in their neck for dispersal of seed, The dehiscence is of porous type.

Used

→ The crude opium containing 35 alkaloids the important alkaloids are morphine, codeine, nicotine, thebaine, papaverine.

→ The morphine is a powerful analgesic (sleeping), sedatives to relieve & cause sleep

→ The morphine is also used in the cough medicine, diarrhoea, vomiting and reduce blood pressure and bleeding.

→ Codeine is used as analgesic respiratory sedatives it is used as the pain of cancer

CANNABIS

Family - Cannabaceae

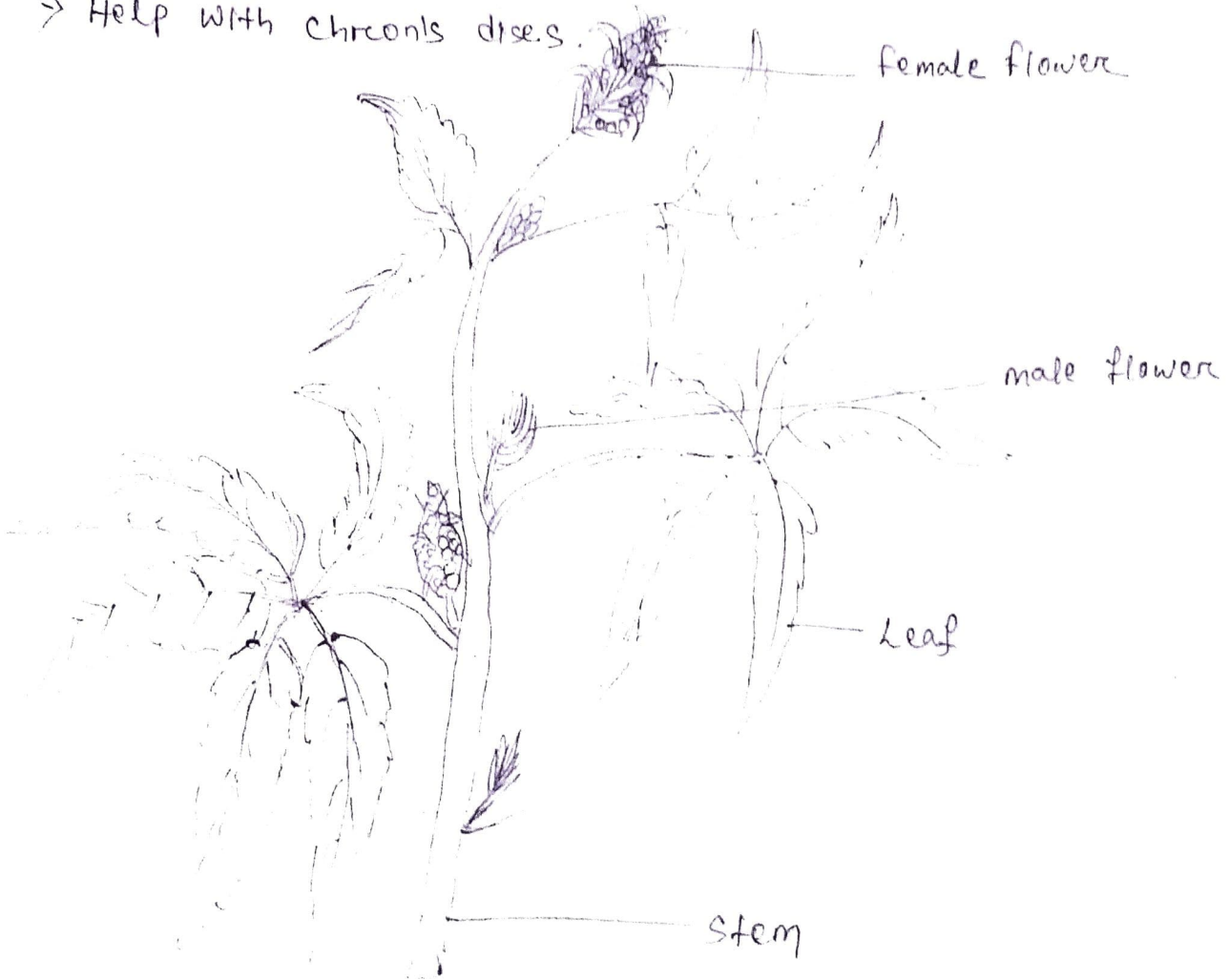
Genus - Cannabis

Species - Cannabis sativa

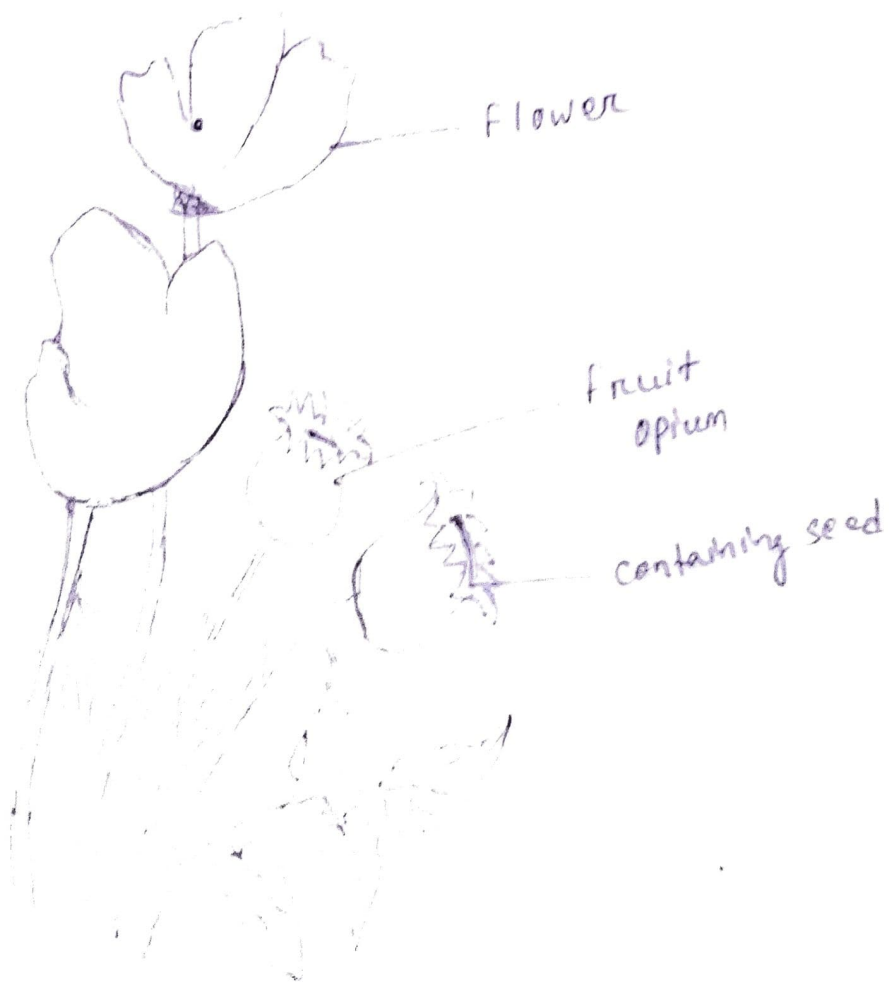
- In India it is cultivated in, Assam, West Bengal, Maharashtra, Madhya Pradesh, Tamil Nadu, Odisha
- Commonly known as "Ganja" Hindi - "Bhang"
- In India also known as "Hemp" cultivated a drug plant.
- The leaves and flower (female) flowering branch are used for narcotic stimulant.
- Ganja is made from dried flowering tops, glandular hairs which exuded resins duct used for smoking.

Uses

- Slow & stop cancer cells for spreading.
- prevent Alzheimer's
- Relieve Arthritis
- Help with chronic diseases.



- The opium checks excessive parasympathetic and contracts the pupils of eye
- A fatty oil called poppy oil is used in sweet paste.
- The latex obtained from the immature fruit is employed to induce sleep relief pain
- The seed of opium poppy are consumed many way mostly used for cooking stuffed (paranthas)
- In India there are 3 type of opium cultivated in Bihar
 - Bihar (patana opium)
 - Utter pradesh (Benares opium)
 - Madhy pradesh & Rajasthan - (malwa opium)
- Overdoses of opium is powerfull poison
- widely cultivated in, India, Turkey, Afganistan, china etc
- In India, widely cultivated in madhypradesh, utterpradesh, Rajasthan, Tamilnadu, Punjab.



Tobacco

Family - Solanaceae

Genus - Nicotiana

Species - tobacco, rustic

Botanical name - Nicotiana glauca

- Native to West Indians, south & central America.
- Origin - Mexico also grow some part of North America
- The major produces countries are China, India, Brazil, Turkey, Zimbabwe, Malawi
- In India cultivated in Andhra Pradesh, Karnataka, Gujarat, Uttar Pradesh, Tamil Nadu, Bihar, West Bengal etc

Morphology:

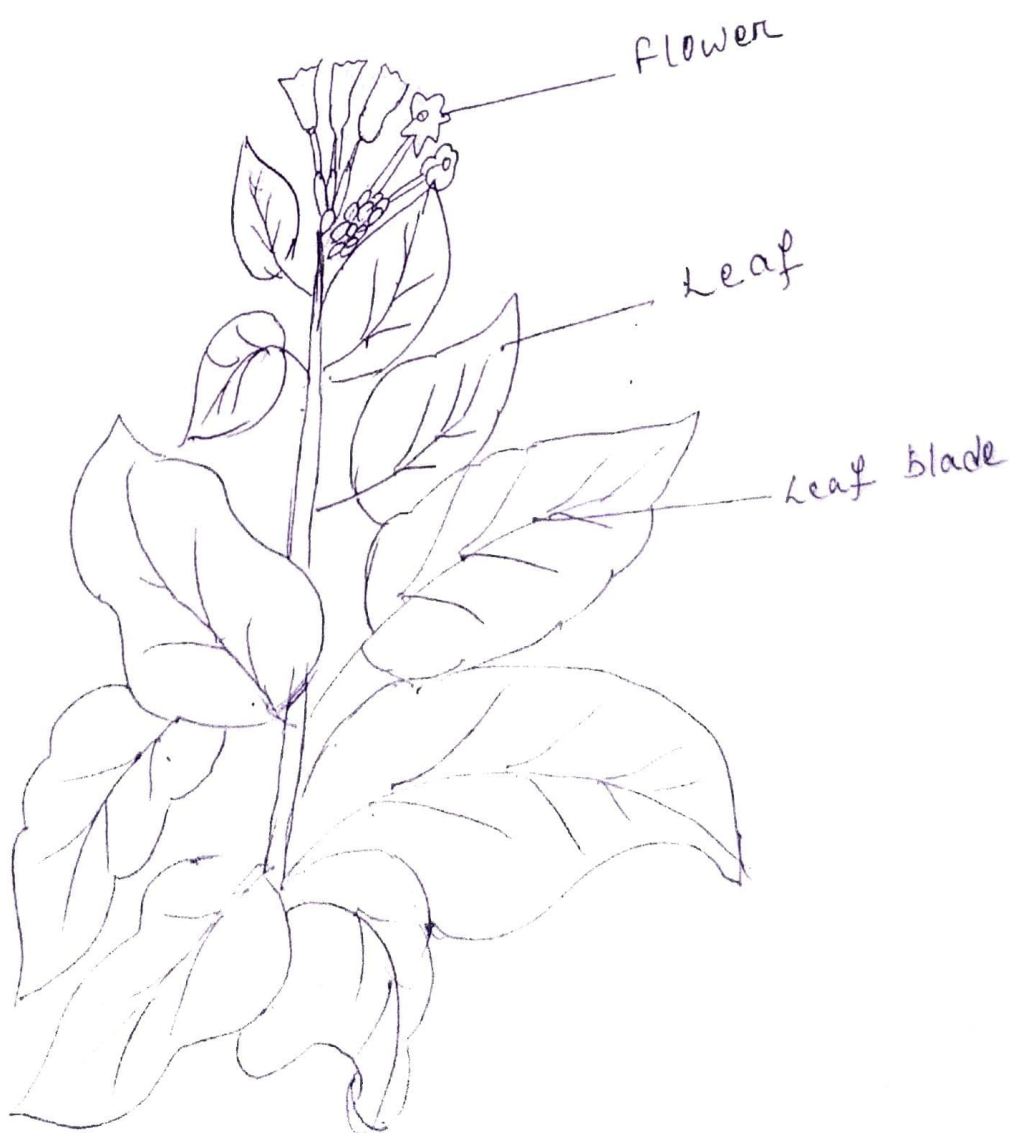
- The tobacco is a small herbaceous annual plant about 3-6 feet.
- It has well developed strong tap root system.
- The stem is unbranched and bears large, oval sessile leaves.
- The leaves and stem are covered with glandular hairs containing rastonos fluid sticky to touch.
- The inflorescence is terminal raceme of white or pink flower
- The fruit is a capsule and many seeded

Cultivation

- usually tobacco plant are planted in seed beds. The seedlings are transplanted when they are about 4-6 feet
- The sandy loams, rich humus, potash are essential for the growth of this plant. after & before planting.
- The terminal bud should be removed for strengthening of leaf.
- The colour of leaf are changed during fully ripe. The leaves are harvested by the pruning method.

Used

- The alkaloid present in the leaf. The chief alkaloids are Nicotine, anacronicotine
- The nicotine can be used as raw material for the preparation of vitamin nicotinic acid.
- It is used for smoking and for chewing
- It is also used in curing certain skin diseases
- The leaves of the tobacco plants are used to stimulate the mental and physical activity.
- The tobacco seed posses no nicotine. The refined for tobacco seed oil can be used as substituent for ground nut oil, in oil paints and varnish industry.
- The seeds are used as fodder material for cattle and horses.
- The tobacco is always used in cigarette industry
- product - cola, Betel, coca, opium, peyote, cappi - etc



Economic Botany paper - vi

NO-1

- 1- Scientific name of fennel _____ 1X10-10
- 2- An alkaloid "piperine" present in _____ fruit.
- 3- Non-alcoholic beverage are also called _____
- 4- _____ popularly known Arabian coffee.
- 5- The fruit of coffee plant is known as _____
- 6- The Quinine is only the drug obtained from _____ plant.
- 7- The drug "Opium" is obtained, from _____ plant.
- 8- Digitalis obtained from, the _____ of D. purpurea
- 9- The most important alkaloid present in Rauwolfia is _____
- 10- Tobacco is extensively used for smoking & and _____ purpose.

NO-2 short note

3X5-15

- 1- morphology and uses of fennel.
- 2- medicinal importance of Quinine.
- 3- uses of opium
- 4- morphology & uses of Tobacco
- 5- uses of Tea

NO-3 Long question

- 1- morphology and uses of Tea
- 2- morphology and type of coffee.
- 3- Briefly describe the Papaver plant.
- 4- Briefly describe the ~~papaver~~ the drug yielding plant cinchona.
- 5- Briefly describe the morphology & uses of clove.