AS-2994

(01)

B.Sc. (Hon's) Vth Sem. Examination - 2013

Rural Technology

Introduction to Medicinal Plants

Section - 'A'

1. Choose correct answer -

(i) Latex is -
(e) Excretory food.

(ii) Alkaloids are -
(b) Nitrogenous secondary metabolites.

(iii) Digitalis is a native of -
(c) Western Europe

(iv) Katthá obtained from -
(c) Heart wood

(v) Bergapten is a :-
(b) Coumarins

(vi) Visible or detectable abnormalities arising from a disease known as :
(a) Symptom

(vii) Ingress means -
(a) entry of a Pathogen.

(viii) Corky nacrosis in the destruction of woody tissues is called "Canker".

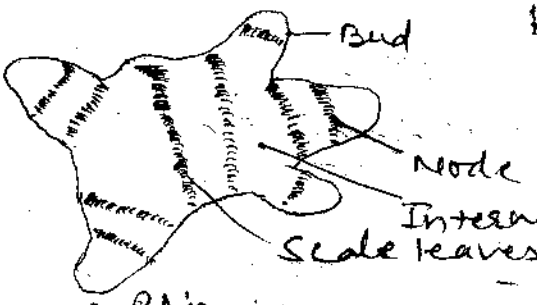
(ix) Wilt disease of Rouvolfia caused by -
(a) Fusarium oxyeporium

(x) Clinical trials comes under -
(b) Biological assay

SECTION - "B"

2. Note on -

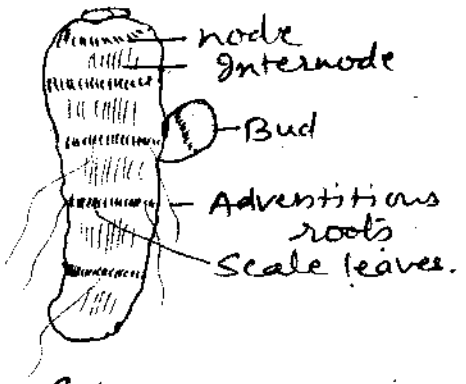
(a) Rhizome → The rhizomes grow horizontally under soil. They are thick, fleshy and characterized by presence of nodes, inter-



buds in the axil of scale leaves. Adventitious roots may also be present on lower surface of rhizomes. The rhizomes may be branched and serve as storage organ. The examples of rhizomes are ginger, dioscorea turmeric, subrub etc.

Rhizome -

(b) Corm - The corms are also underground modification of stems. Generally they are stout and grow in vertical direction. They bear bud in the axil of the scale leaves and these buds then develop further to form new plant. Adventitious roots are present at the base of the corm. The growth of corm is sympodial. The examples of corm are saffron and colchicum.



Corm.

(3) Seed :-

The seed is fertilized ovule. It represents a condensed form of life and it is a characteristic of phanerogams. Parenchymatous body of the ovule known as nucellus, contains embryo-sac surrounded by integuments (coatings). In the embryo-sac itself fertilization takes place giving rise to embryo. Thus seeds are characterized by the presence of three parts known as embryo, endosperm and seed coat. Endosperm is the nutritive tissue nourishing the embryo. Endosperm may or may not be present in the seeds. Therefore, seeds are classified as follows -

albuminous seeds.

2. Non-endospermic or exalbuminous seeds
3. Perispermic Seeds.

1. Endospermic seeds → A part of endosperm remains until the germination of seed and is partly absorbed by embryo. It shows distinct presence of endosperm, e.g. Colchicum.

2. Non-endospermic Seeds — During the development of seeds, the endosperm is fully absorbed by embryo and endosperm is not represented in the natural seeds. eg - Sunflower cotton, Soyabean

3. Periplasmic Seeds — Herein, the nucleus develops to such an extent that it forms a big storage tissue and seeds are found to contain embryo, endosperm perisperm and seed coat. eg. - pepper, cardamom

(4) Write Note on: -

(a) Storage → Different preparation may be kept for varying periods of time before they begin to lose their medicinal properties. Infusions should be made fresh each day and decoctions must be consumed within 48 hours. Store both in a refrigerator or cool place. Tinctures and other liquid preparations, such as syrups and essential oils, need to be stored in dark glass bottles in a cool environment away from sunlight, but can be kept for a number of months or years. Ointments, creams and capsules are best kept in dark glass jars, although plastic containers also acceptable.

(6) Preservation:- Proper preservation is important factor in maintaining a high degree of quality of raw material along with storage. If these are not properly preserved they may get lost and damage by absorbing moisture, The moisture causes increase in weight and also reduces the percentage of active principles. It also favours enzymatic action and hastens microbial destruction of the material.

(5) Chemical Constituents and Medicinal Uses of Bacopa.—

Common Name - Brahmi
Botanical Name - Bacopa monnieri
Family - Scrophulariaceae

Chemical Constituent- The chemical constituents include alkaloid brahmine; its therapeutic action resembles strychnine but is less toxic. Three bases isolated, B1 oxalate, B2 oxalate, B-3 chloroplatinate and a sterol. It also contains alkaloid herpestine, plant saponins, bacoside A & B; monniera, hersaponin, betulic acid, d-mannitol, stigmasterol, β-sistosterol and stigmastanol.

Uses:→ Entire plant constitutes drug. The plant is astringent, bitter, sweet, cooling, laxative, intellect promoting, anodyne carminative, digestive, anti-inflammatory anticonvulsant, depurative, cardiotonic, bronchodilator, diuretic, emmenagogue,

It is also useful in vitiated conditions of kapha and vata, biliousness, neuralgia, inflammations, epilepsy, ulcer, dyspepsia, constipation, skin disease, leprosy, leucoderma, syphilis, elephantiasis, sterility fever and general debility.

(6) Basic Physiological functions of a healthy plant →

1. Old carpet is usually available free, but not all types are suitable. foam and rubber backings have a tendency to flake off in bits which spread and these may contain undesirable chemicals. Old natural ~~fibers~~ fibre carpets are the best as they eventually rot, so can be left in place.
2. Newspaper and cardboard are impractical on their own, as they are too prone to blow away and once wet are soon broken up or penetrated by weeds, they can be useful underneath loose mulches as they stop the soil being mixed in with the mulch and thus allow a thinner layer.
3. Plastic sheets are becoming available in rapidly increasing variety to meet different requirement, the main ones being weed suppression, moisture retention and soil warming.
4. Impermeable clear plastic (polythene) is primarily a soil warmer. As such it will also encourage weeds unless covered by a loose mulch.

(7) Harvesting methods →

Harvesting is an important ~~operation~~

reflects upon economic aspects of the crude drugs. As economic point which needs attention over here is the type of drug to be harvested and the pharmacopoeial standards of which it need to achieve.

Harvesting can be done efficiently in every respect by the skilled workers. Selectively is of advantage in that the drug other than genuine but similar in appearance can be rejected at the site of collection. It is however, a laborious job and may not be economical. In certain cases, it cannot be replaced by any mechanical means, e.g. digitalis, Senna leaves.

The underground drugs like rhizome, roots, tuber bulbs, corms etc. are harvested by mechanical devices, such as diggers or lifters. The tubers or root are thoroughly washed in water to get rid of earthy-matter.

Drugs which constitute all aerial parts are harvested by binders for economic reasons. many times, flower seeds and small fruits are harvested by a special device known as seed stripper. The technique of beating plants with bamboos is used in case of clove. The seaweeds producing agar are harvested by long handled forks.

SECTION - 'C'

(8) Future Action Plan of NMPB →

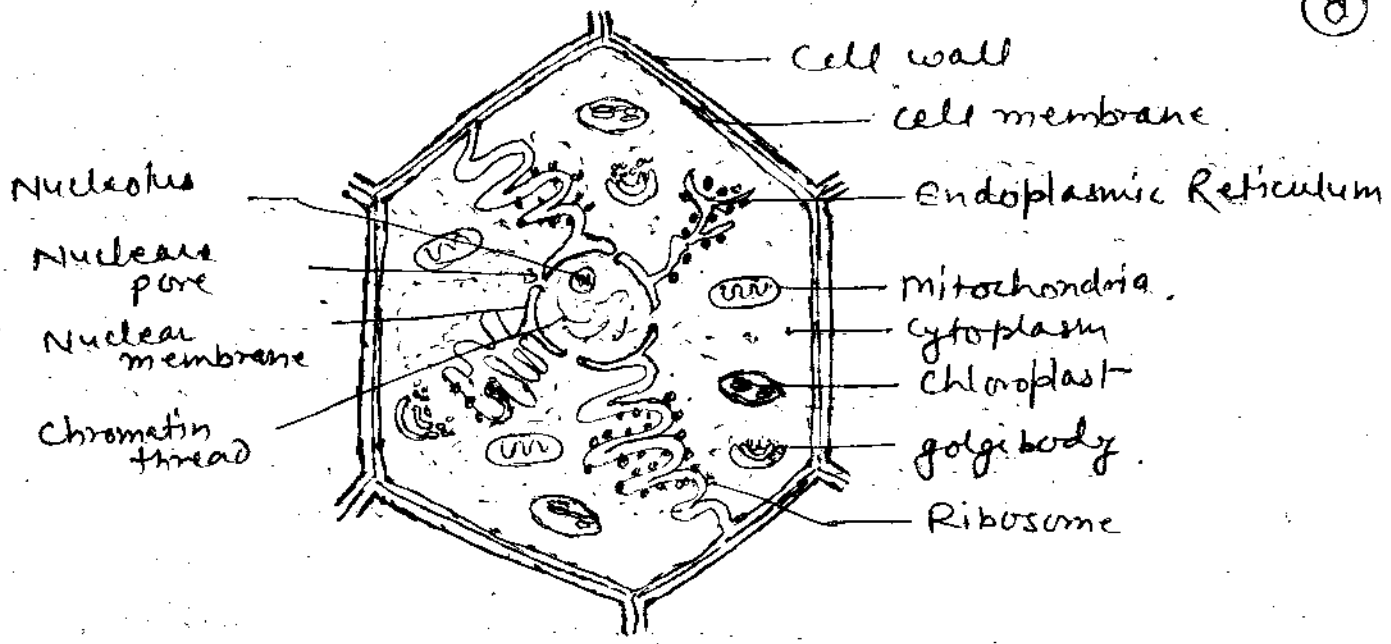
* Creation of protectorates / biosphere reserves to conserve the genetic stock of endangered species.
* Large scale cultivation of rare and endangered species used in Indian systems of medicines

through the use of appropriate technology and its tranfer to farmers fields. Transplant and tissue culture techniques should be adopted for such species which are either shy seed producers or their propagation through seeds is not easy.

* Establishment of demonstration plots for herbal drugs at Institutional level and a chain of herbal gardens in all states rich in medicinal plants followed by establishment of Herbal farms and a well stocked central herbal garden.
* As a result of thorough survey, an inventory of medicinal plants including the plants used in local folklore, has to be prepared for judicial exploitation and sustainable management of our resources both for the present and for posterity.
* Establishment of nodal agencies both at the centre and the states for coordination of cultivation, collection, extraction and utilization of the herbal resources by those involved in the vocation.
* Generation of trained and skilled manpower to handle all aspects of medicinal plants.
* Public awareness programmes, specially conservation consciousness need to be intensified among school and college students through the Introduction of topics on medicinal plants in their curicula.

(9) PLANT CELL -

In 1838 Schleiden and Schwann put forward the cell theory stating that plant or animal ultimately made up of minute cells. and



A typical plant cell

1) Cell wall → It is the outermost layer made up of cellulose. It is a protective layer and provide a definite shape to the plant cell. The cell wall is complex in its structure and usually consists of three layers, the primary wall, the intercellular substance or middle lamella and the secondary wall. The intercellular substance cements together the primary walls of two contiguous cells and the secondary wall is laid over the primary.

2) Cell membrane → All cells remain covered by a plasma membrane. The plasma membrane is quite separate and should not be confused with the cell wall. The cell membrane is double in nature and about 10 A° thick. This membrane remains connected with the nuclear membrane through the endoplasmic reticulum. The membrane has a lipoprotein composition. The protein gives wettability and flaxibility. Since protein molecules which are long and complex, can fold or unfold, the membrane can expand or contract. The lipid is bilayered and have hydrophilic head and hydrophobic tail.

3) The Nucleus → The controlling centre of the cell is nucleus. The chromosomes and genes are found within it. Nucleus is surrounded by a nuclear membrane (made up of lipid and protein). The [illegible] known as nuclear

Substance. Chromatin material (mainly DNA), RNA, Simple proteins all are suspended in nucleoplasm.

4) mitochondria → It is double layered envelope with an outer and inner membrane (unit membrane). Extending from the inner membrane into the interior of the cavity, there are present a series of folds called the cristae. The cristae may be branched tubular. Each mitochondria contains two cavities, outer and inner. The inner cavity filled with matrix. The small particles are attached inner and outer membrane known as f1 particle or Oxysomes, contains respiratory enzymes.

5) Golgi body — Camillio Golgi (1898), an Italian neurologist, first discovered these organelles. It is quite variable in somatic cells of plants and animals. Made up of sacs, vacuoles and Vesicles. Involved in the storage and possible modification of lipids.

6) Endoplasmic Reticulum - This is highly ordered arrangement of the membranes constitute a cellular background. ~~called~~ ER is a complex finely divided vacuolar system extending from the nucleus throughout the cytoplasm to the margins of cell.

7) Ribosomes - 1955 Palade discovered ribosomes. They are the intercellular sites of proteins synthesis. They are present in all cells. Ribosomes are made up of proteins and ribosomal RNA.

8) Chloroplast → It is present only in plant cell and contain 'Chlorophyll's' which is a photosynthetic pigment. It is a membranous structure. The membranes are semipermeable and comprises of two seperate layers. It is organised internally into series of lamellar areas (Grana) and non lamellar areas (stroma).

(10) Value addition techniques

In order to make use of its latent medicinal qualities, a plant must be treated and modified in such a way that its specific curative substances can be enacted.

1) Decoction — It is the method normally used for those medicinal herbs whose active principles are difficult to extract because they are contained in woody parts of the plant, or which require prolonged heating in order to pass into solution. Sometimes extraction by decoction involves boiling the whole plant or a part of it in water and allowing to macerate for a further period before filtering.

2) Extraction — Extraction is much more suitable method for obtaining the active principles when the parts of the plant being used are soft and fragile, such as leaves bud or flowers.

3) Maceration — This method is used for medicinal plants whose active principles are soluble in cold water for several hours during, which time all the principles that do not need heat to release them. (i.e. that are not thermolabile) will be released into the solution.

4) Dehumidifying - An effective but expensive way to dry herbs is to use a dehumidifier, which literally sucks out of the plant. The dehumidifier should be placed in a more or less sealed small room in which the herbs are hung in loose bunches or placed on mesh trays.

5) Freeze-Drying — Freeze-drying retains colour and flavour but is more suited to culinary than to medicinal herbs. Whole sprigs of [illegible] such as parsley (Petroselinum crispum) or

Sage (Salvia officinalis), can be frozen in plastic freezer bags. There is no need to defrost before use as the leaves crumble easily when still frozen.

(11) Types of Necrosis –

1) Rot – This type of necrosis is not localized and parenchyma, collenchyma and pith tissues all are infected. Depending upon the organ of plant attacked, colour and condition of tissues various types of rots have been described. On the basis of plant organ involved, the different rots have been called as root rot, fort rot, collar rot, neck rot, bud rot and fruit rot. On the basis of colour white, red, black and brown rots have been recognized. On the basis of firmness of tissues, soft rots, dry rots and wet rots have been designated.

2) Canker – It is the corky necrosis and result in the destruction of woody tissues and is deep seated. Cankerous growth occurs due to the hypertrophy of cambium tissues. Cankers are usually slow rots but can also spread rapidly. eg. Cankers of Mango, Citrus etc.

3) Blights – These are characterized by very rapid and extensive necrosis of the whole plant or plant part. On the basis of infected plant parts, names like leaf blight, twig blight shoot blight have described.

4) Spots → The necrosis may be local. Spots may develop on leaf, stem and fruit. The locally water soaked or swollen (blotch) or chlorotic or killed tissues get coloured. In many diseases the leaf spots are very characteristics

5) Damping off → Seedling of various crops suffer from this type of necrosis. Tissue in the basal portion of the stem or in the crown region are attacked. Infected tissues become too weak to support the stand to plants which ultimately topple down.

6) Wilts - In wilts, vascular tissues may be affected. Pathogenic wilts incited by fungi and bacteria are well. In cabbage yellows, the vascular tissues become from yellow to dark brown.

7) Scab - Necrosis is usually superficial and restricted mainly to the epidermal region. The scab may be induced by living or non-living agencies.

8) Hypoplasia - It is the underdevelopment of tissues due to subnormal multiplication of cells. This causes reduction in size of the whole plant or plant parts or reduction in chlorophyll may occur. Hypoplasia can be expressed in the forms of stunting, smelling of leaves or colour change.