Virtual University of Pakistan

BT403

Agricultural Biotechnology

Midterms Past Papers

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1. What is somaclonal variations? 2 marks

Ans: The genetic variations found in the in vitro cultured cells are collectively referred to as somaclonal variations.

2. How herbicides resistant crops are produced? 2 marks

Ans: How to produce herbicide resistant crops

A number of biological manipulations involved in genetic engineering are in use to develop herbicide resistance plant

• Over expression of EPSPS gene • Use of mutant EPSPS gene • Detoxification of herbicide by a foreign gene

What is germplasm preservation? 3 marks

Ans: • Germplasm is living tissue from which new plants can be grown. It can be a seed or another plant part a leaf, a piece of stem, pollen or even just a few cells that can be turned into a whole plant. • Germplasm contains the information for a species' genetic makeup, a valuable natural resource of plant diversity

4. Why synthetic seed are produced? 3 marks

Ans: • In some of the horticultural crops seeds propagation is not successful due to; • Heterozygosity of seeds particularly in cross pollinated crops • Minute seed size eg; orchids • Presence of reduced endosperm • Some seeds require mycorrhizal fungi association for germination eg: orchids • No seeds are formed

5. Write a note on protoplast culture 5 marks

Ans: Protoplast Culture

• Isolated protoplast can be cultured in an appropriate medium to reform cell wall and generate callus • Optimal culture conditions:

1. Optimal density to the culture.

2. Optimal auxin to cytokinin ratio, glucose and sucrose.

3. Maintain osmoprotectant in the medium

4. Temperature: 20-28°C pH: 5.5-5.9 0.25% Casein hydrolysate BAP and NAA

Culture of protoplasts

• Protoplasts cultured in suitable nutrient media first generate a new cell wall • The formation of a complete cell with a wall is followed by an increase in size, number of cell organelles, and induction of cell division • The first cell division may occur within 2 to 7 days of culture • Resulting in small clumps of cell, also known as micro colony, within 1 to 3 weeks

From such clumps, there are two routes to generate a complete plant (depending on the species)

1. Plants are regenerated through organogenesis from callus masses

2. The micro calli can be made to develop into somatic embryos, which are then converted into whole plant through germination

6. Write a a note on contact herbicides and selected herbicides. 5 marks

Ans: • **Contact h**erbicides: Contact is a word that means the chemical in that specific type of herbicide will kill the parts of the plant it contacts.

• For broadleaf weeds this means it will kill the above ground leafy part of the plants.

• It will not directly kill the below ground plants parts, such as roots, bulbs, tubers, or rhizomes.

• Contact herbicides are popular because they work quickly by killing the tissue in as fast as one day.

• Some herbicides will combine contact with systemic chemicals for a faster effect. • New Round Up Weed and Grass Killer has combined both for faster control.

• For **systemic** types of herbicides, the word "Systemic" means the plant absorbs through the leaves or stems and transports it internally throughout the plant. • The chemical travels with the sap so it usually doesn't have the quick "knockdown" effect. • The greatest benefit of a systemic type of herbicide is that it will kill the entire plant, roots and all. • The speed of chemical movement in the plant is largely dependent on soil and air temperature.

A chemical sprayed in early spring may take a couple weeks longer to work than the same chemical sprayed in mid-summer.

• The speed of kill is also dependent on the "mode of action" of the chemical (how the chemical works inside the plant).

7.what agriculture biotechnology give services to fuel the world? 2 marks

Ans: Fuel the world

• Using biofuels

• Improving manufacturing process efficiency

• Reducing use of and reliance on petrochemicals

8.importance of protoplast culture 3 marks

Ans: • The protoplast in culture can be regenerated into a whole plant. • Hybrids can be developed from protoplast fusion. • It is easy to perform single cell cloning with protoplasts. • Genetic transformations can be achieved through genetic engineering of protoplast DNA. • Protoplasts are excellent materials for ultra-structural studies.

• Isolation of cell organelles and chromosomes is easy from protoplasts. • Protoplasts are useful for membrane studies (transport and uptake processes). • Isolation of mutants from protoplast cultures is easy.

9.importance of plastid transformation 5marks

Ans:

10.why mature embryo need to culture 2 makrs

Ans: • Mature embryos are isolated from ripe seeds and cultured in vitro. Mature embryo cultures are carried out in the following conditions

conditions

1. When the embryos remain dormant for long periods.

2. Low survival of embryos in vivo.

3. To avoid inhibition in the seed for germination.

4. For converting sterile seeds to viable seedlings

11.how herbicide reistence plant is produced 3 marks

12. competent cells 22 marks

Ans: • Competent Cells are more likely to incorporate foreign DNA if their cell walls are altered so that DNA can pass through more easily. • Such cells are said to be competent

13.why lettuce favored over tobacco ? 3marks

Ans: • Most of the plant is leaf tissue and this tissue contains the greatest number of plastids per cell • Unlike tobacco, lettuce has no toxic alkaloids that need to be removed - low purification and downstream processing costs • Lettuce is a relevant human foodstuff that can be consumed without cooking

14. post mitotic stage of anther? 3 marks

Ans: • Early bi-cellular stage of pollen development is most suitable for culture in Atropa belladonna and Nicotiana sp. etc. • Mature anthers are usually unsuitable for culture, but in Brassica oleracea mature anthers are the proper stage for

anther culture. • Anthers of proper stage are chosen by selecting flower buds of definite length under fixed environmental conditions.

15. Primary benefits of pesticides.

Ans: Controlling pests and plant disease vectors • Improved crop/livestock yields • Improved crop/livestock quality • Invasive species controlled

16. short term effect of pesticides 5 marks

Ans: • Short-term pesticide poisoning or acute toxicity from pesticides is usually the result of a single and brief exposure to a pesticide.

• This kind of poisoning can happen due to exposure via the skin, inhalation, through the eyes, or orally.

• Symptoms of acute toxicity can become apparent instantly or take as long as 48 hours

17. name basic techniques of tissue culture? 5 mars

Ans: Culture vessels

• Cultures can be grown in various kinds of vessels such as petri plates, test tubes, “Magenta boxes,” bottles, and flasks

Culture medium

• The important media used for all purpose experiment are Murashige and Skoog medium (MS medium) • The culture medium is closed with cotton plug/ or aluminium foil sheet. • The pH of the medium is adjusted to 5.8 (acidic range).

Composition of culture medium

• Nutrient Medium • Medium depends upon the type of plant tissue or cell used for culture • Generally nutrient consist of • inorganic salts (both micro & macro elements) a carbon source (usually sucrose) • Vitamins (eg. nicotinic acid,

thiamine, pyridoxine • Amino acids (eg. arginine) • Growth regulators (eg. auxins) • An optimum pH (5.7) is also vary important

Sterilization

• Sterilization Methods Used in Tissue Culture Laboratory

• All the materials, e.g., vessels, instruments, medium, plant material, etc., used in culture work must be freed from microbes

Sterilization techniques

• sterilization is achieved by one of the following approaches: • dry heat treatment • flame sterilization • autoclaving • filter sterilization • wiping with 70% ethanol • surface sterilization.

Inoculation

• Transfer of explant (root, stem, leaf, etc.) on to a culture medium is called inoculation. • The inoculation is carried out under aseptic condition for which an apparatus called laminar air flow chamber is used. • Flamed and cooled forceps are used for transfer of plant materials to different culture media kept in glasswares.

Incubation

• The culture medium with the inoculum is incubated at 26 - 28oC with the light intensity at 2000 to 4000 lux (unit of intensity of light) and allowing photoperiod of 16 hour of light and 8 hours of darkness.

Induction of callus

• Due to activity of auxins and cytokinins, the explant is induced to form callus. • The callus is an unorganized mass of undifferentiated tissue. • The mechanism of

callus formation is that auxin induce cell elongation and cytokinin induces cell division as a result of which masses of cells are formed.

Morphogenesis

• Formation of new organs from the callus under the influence of auxin and cytokinin is called morphogenesis. • Roots and shoots are differentiated from the callus. • Such embryos are called somatic embryos result in the formation of young plantlet.

Types of morphogenesis

• Organogenesis • Embryogenesis

Organogenesis

• Formation of new organs such as shoot and root is known as organogenesis. • The development of shoot from the callus is called caulogenesis and formation of root is called rhizogenesis respectively.

Embryogenesis

• Formation of embryos (ie. bipolar structure having shoot and root) from the callus is called embryogenesis. • These embryos arise from somatic callus tissue and are called somatic embryos or embryoids or somaclonal embryos.

Hardening

• Exposing the plantlets to the natural environment in a stepwise manner is known as hardening. • Finally the plantlets are gradually transferred to the soil.

18. somoclonal variations and germinal variations?

Ans: • Somaclonal variation is the variation seen in plants that have been produced by plant tissue culture. Chromosomal rearrangements are an important source of this variation • Gametoclonal variation has been defined as the variation among plants regenerated from gametic cells in culture

19. write a note on contact herbicides and selected herbicides?

20. how herbicide resistance crops ate produces

Long
21.What are the importance of biotechnology Vecine

Ans: Vaccines

• Biotechnology-derived vaccines are used in livestock and humans.

• They may be cheaper, better and/or safer than traditional vaccines.

• They are also stable at room temperature, and do not need refrigerated storage

• Biotechnology-derived vaccines are used in livestock and humans. • Cheaper • better • safer than traditional vaccines • stable at room temperature • do not need refrigerated storage

22. How chloroplast is transmit write any 2 procedure

Ans: Biolistic Transfer:

• Biolystic is one of the efficient approaches for plastid transformation. • Effective penetration and high transfer frequency are some of the plus points of biolystic method. • There are number of bacteria and viruses are known to infect chloroplast.

• It's envelop is made up of double membrane and actually considered that chloroplast transformation was considered to be virtually impossible. • However, invention of biolistic gene gun technology paved the pathway of direct delivery of target gene into the living cell.

• It is fortunate that DNA is deposited in a chloroplast and successfully integrated into the chloroplast genome.

PEG Mediated Transformation:

• Polyethylene glycol is widely used in transformation work. Despite its efficiency, PEG mediated transformation is far behind than the biolistic approach. • Foreign DNA is taken by protoplast in presence of PEG and transported by unknown

process from cytoplasm into the chloroplast and finally integrated into the genome

Short

23. What are the application that resistance the herbicide

24. Write sever 6 pastisdes effect

25. How explant transfer to culture plate

Ans: Establishment of the explant in a culture medium

• The medium sustains the plant cells and encourages cell division.

• It can be solid or liquid

26. Protoplast culture

Total question 26
20 Mcqs:
1.A germplasm is a collection of genetic resources for an organism.
2.64% of total soya crop
3.Frdrc grfth exprmnt date---- 1928
4.Morphological marker ---- are those traits that are scored visually, or morphological markers are those genetic markers whose inheritance can be followed with the naked eye
5.Herbicide type systematic type
6.In which the culture can be prepared…ans all above
7.Drought is …..Stomata closure.
8.Anthers or pollens can be cultured on a suitable medium containing sucrose (usually 2%),
9. Surface sterilize with 0.01% Tween-20 for 15 min
10. The process of growing an entire plant from a single cell or group of cells. Regeneration
11. Transposable elements (TEs), also known as "jumping genes" or transposons,
12. particles of gold or tungsten
13.Photosynthesis is carried out in presence if which plastid….chloroplast
14.What is not the effect of mild pesticide?
15. growth is change in ……size
16 …. Is used to kill the mite and insects eggs.

Baqi mcqs yad ni
2 marks question
What is germplasm preservation?
What are the contact and types of herbicides?
3 marks question:
What are herbicides?

Ans: A herbicide is a chemical substance used to control or manipulate undesirable vegetation, especially weeds.

• Herbicides are extensively used in gardening, farming, and landscape turf management.

• Herbicides tend to have wide-ranging effects on non-target species (other than those the pesticide is meant to control or kill).
What are environmental effects of pesticides?
5marks question

Ans: Environmental effects

• Widespread use of pesticides in agriculture has experts worried due to their longterm environmental damage.

• Some pesticides can stick around for years, posing a very real threat to the ecological system and hence human health.

• Excessive and careless use of pesticides can contaminate water sources and soil, make fruits and vegetables less nutritious, and reduce biodiversity.

• Some pesticides have also been linked to the dramatic reduction in the number of bees across the world, posing a huge threat to agriculture and food security, given that bees pollinate more than 70% of all crops
Benefits of agri biotechnology?

Ans: Benefits of Biotechnology

• HEAL THE WORLD

• FUEL THE WORLD

• FEED THE WORLD

Heal the world

• Creating more precise tools for disease detection

• Reducing rates of infectious disease

Fuel the world

• Using biofuels

• Improving manufacturing process efficiency

• Reducing use of and reliance on petrochemicals

Feed the world

• Generating higher crop yields

• Using biotech crops

• Improving food and crop oil content

Why we need herbicides?

Ans: • Weeds are unwanted & useless plants that grow along with the crop plants . • Weeds compete with the crops for light & nutrients, besides harboring various pathogens . • So it is estimated that the worlds crop yield is reduced by 10 – 15 % due to the presence of weeds. • To tackle the problem of weeds , modern agriculture has developed a wide range of weed killers (herbicides).

• Herbicides are broad spectrum as they can kill wide range of weeds.

Bt403

How Establishment of explant is done in the tissue culture technique?2 marks

Define plant strss?2 mark

How can herbisides resistant in the crops?3 mark

Why herbicides used?5

mark
What are the benefits of agriculture biotechnology?5 mark

bt403 today 12pm

Competent cells 2

Primary importance of pesticides 2

Characteristics of synthetic seeds. 3

Ans: • High volume. Large scale propagation method • Maintains genetic uniformity of plants • Direct delivery of propagules to the field, thus eliminating transplants • Lower cost per plantlet • Rapid multiplication of plants

Limitation of PEG 3

Ans: 1. The DNA is susceptible for degradation and rearrangement. 2. Random integration of foreign DNA into genome may result in undesirable traits. 3. Regeneration of plants from transformed protoplasts is a difficult task.

Why biotechnological vaccines are important? 5

Write the methods of chloroplast transformation. 5

BT403 (Agricultural Biotechnology)
26 Q (40 marks)
20 Mcqs
4 short Q (2 and 3 marks)

1. What are somaclonal variations? (2 marks)

2. How pesticides effect the kids more as compared to adults? (2 marks)

Ans• Children are especially susceptible to harmful effects of pesticides.

• They can easily become exposed to pesticides (via inhalation or skin contact) in schools, daycare, playgrounds, hospitals, and any other public areas, no matter how careful you are

3. How viruses sepread from plant to plant? (3 marks)

Ans: Viruses can be spread from plant to plant by several means. Some of these would include transmission from the parent plant to an offspring through the genetic structure of the plants. • Other ways in which viruses can be transmitted

are through vegetative propagation, grafting and budding, seed transmission and mechanical spread by insects and man.
4. How synthetic seeds are produced? (3 marks)

Abs:
Long Q (5 marks)

1. What are short term pesticides effect? Enlist them? (5 marks)

2. Plastid transformation? Explain it (5 marks)

Factor of herbicides?

Ans: • Because weeds contain a tremendous amount of genetic variation that allows them to survive under a variety of environmental conditions the development of a resistant species is brought about through selection pressure imposed by the continuous use of an herbicide.

• Factors that can lead to or accelerate the development of herbicide resistance include

• weed characteristics • Herbicide characteristics • and cultural practices.

Benefit of agriculture?

Reasons of using herbicides?

Culture protoplast?

Microinjection

Ans: • where the DNA is directly injected into plant protoplasts or cells (specifically into the nucleus or cytoplasm) using fine tipped (0.5 - 1.0 micrometerdiameter) glass needle or micropipette. • This method of gene transfer is used to introduce DNA into large cells such as oocytes, eggs, and the cells of early embryo.