APSC ADO Sample Paper

Q1 The CRI stage of irrigation in wheat was given by_____
(a) J.C. Bose
(b) M.S. Swaminathan
(c) B.L. Bhardwaj
(d) Norman Borlaug

Q2. Deficiency symptoms of calcium on plants are first noticed at:
(a) Roots
(b) Stems
(c) Leaves
(d) Terminal buds

Q3. Decomposition of organic matter in submerged soil is carried out by_____
(a) Fungi
(b) Algae
(c) Bacteria
(d) Insects

Q4. Soybean is a _____ type of plant:
(a) C4 & Long day
(b) C3 & Short day
(c) C4 & Short day
(d) C3 & Long day

Q5. Which portion of sugarcane stalk should normally be used for sett purpose?
(a) Bottom one-third to half portion
(b) Bottom one-fourth portion
(c) Top one-third to half portion
(d) Entire cane

Q6. The line joining equal points of cloud cover is known as_____
(a) Isobar
(b) Isohyet
(c) Isotherm
(d) Isoneph

Q7. The type of weather forecast that is beneficial for agriculture is:
(a) Short-range
(b) Long-range
(c) Medium-range
(d) Immediate

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Q8. The crop commonly used for green manuring in India is:
(a) Alfalfa
(b) Sunhemp
(c) Clover
(d) Soybean

Q9. The burning quality of tobacco decreases due to the presence of:
(a) Sulphate
(b) Nitrate
(c) Chloride
(d) Phosphate

Q10. When a plant selected for resistance to a specific herbicide is also resistant to other herbicides within a similar chemical group, it is known as:
(a) Multiple resistance
(b) Cross resistance
(c) Target-site resistance
(d) Non-target-site resistance

Q11. The agent that helps to antagonize the phytotoxicity of specific herbicides to specific plants is:_____
(a) Adjuvants
(b) Safeners
(c) Antidotes
(d) Surfactants

Q12. The device used to measure percolation and leaching losses from a column of soil under controlled conditions is_____
(a) Tensiometer
(b) Lysimeter
(c) Hygrometer
(d) Pycnometer

Q13. Minor irrigation project has command area of:
(a) < 500 ha
(b) < 1000 ha
(c) < 1500 ha
(d) < 2000 ha

Q14. Injury caused to the plants due to low temperature is known as:
(a) Frostbite
(b) Freezing injury
(c) Frost injury
(d) Chilling injury

Q15. The gibberellin is first isolated from:
(a) Aspergillus niger
(b) Penicillium chrysogenum
(c) Gibberella fujikuroi fungus
(d) Rhizopus stolonifer

Q16. Biocontrol agent Bacillus thuringiensis is used for lepidopterous pest in:
(a) Rice
(b) Wheat
(c) Cotton
(d) Maize

Q17. The system of cropping where one crop hands over the land to the next crop in a quick succession is known as:
(a) Mixed cropping
(b) Intercropping
(c) Relay cropping
(d) Crop rotation

Q18. The mechanical operation on a farm is called_____
(a) Farm transformation
(b) Farm mechanization
(c) Farm Utilization
(d) None of the above

Q19. The safe limit of irrigation water for Residual Sodium Carbonate (RSC) is:
(a) < 0.5 me/l
(b) < 1.25 me/l
(c) < 2.0 me/l
(d) < 2.5 me/l

Q20. Absolute water requirement is also known as:
(a) Transpiration
(b) Evaporation
(c) Consumptive use of water
(d) Field capacity

Q21. Which of the following program was launched in India to introduce reform in public sector Extension System in Late 90s?
(a) NARS
(b) Green Revolution
(c) T&V
(d) ATMA

Q22. An automated method of surface irrigation is:
(a) Drip irrigation
(b) Sprinkler irrigation
(c) Cab legation
(d) Subsurface irrigation

Q23. The trench formed by an implement in the soil during the field operation is known as:
(a) Ridge
(b) Furrow
(c) Terrace
(d) Ditch

Q24. Application of fertilizer nutrient through irrigation water is known as:
(a) Hydroponics
(b) Fertigation
(c) Aeroponics
(d) Inundation

Q25. Trichogramma chilonis parasitoid is used for the control of:
(a) Bollworm of cotton
(b) Whitefly
(c) Aphid
(d) Thrips

Q26. The capillary water retained in the soil at a tension of:
(a) 0.1 to 0.2 ATM
(b) 0.3 to 31 ATM
(c) 1 to 5 ATM
(d) 10 to 20 ATM

Q27. The critical stage for irrigation in pulses is:
(a) Seedling stage
(b) Vegetative stage
(c) Per-flowering
(d) Maturity stage

Q28. The relationship between soil moisture tension and absolute moisture content in the range from field capacity to wilting point is represented by:
(a) Evapotranspiration curve
(b) Moisture release curve/soil moisture characteristics curve
(c) Water retention curve
(d) Infiltration curve

Q29. The complementary interaction between component crops both in space and time is known as:
(a) Synergy
(b) Annidation
(c) Cooperation
(d) Symbiosis

Q30. 2,4-D, Atrazine, PMA, Phosphon D, and Potassium metabisulphate are types of antitranspirants that cause:
(a) Leaf abscission
(b) Stomatal closure
(c) Root elongation
(d) Cell expansion

Q31. Which of the following is mutant variety of mango?
(a) Rosica
(b) Rumani
(c) Ratna
(d) Sindhu

Q32. The "Principle of diminishing returns" explains:
(a) Product-Product relationship
(b) Factor-Product relationship
(c) Factor-Factor relationship
(d) Input-Input relationship

Q33. Annual rainfall of 750-1150 mm, a growing period of 75-120 days, and less frequent crop failure are characteristics of:
(a) Rainfed farming
(b) Irrigated farming
(c) Dryland farming
(d) Wetland farming

Q34. An example of autoecious rust is:
(a) Stem rust of wheat
(b) Bajra rust
(c) Apple rust
(d) Linseed rust

Q35. The type of farming that aims at a balanced supply of plant nutrients from both chemical and organic sources is known as:
(a) Conventional farming
(b) Organic farming
(c) Integrated farming
(d) Precision farming

Q36. The type of agro-forestry system in which trees are planted with food crops which serve as a nursery for the young tree seedlings is known as:
(a) Shifting cultivation
(b) Taungya cultivation
(c) Alley cropping
(d) Silvopasture

Q37. Crops can be grown year-round and provide more income per unit area under:
(a) Open field cultivation
(b) Rainfed farming
(c) Protected cultivation
(d) Agroforestry

Q38. The three characteristics of extension are -
(a) Teaching- Informal- Flexible
(b) Teaching - Formal- Voluntary
(c) Teaching- Curriculum based- Compulsory
(d) Teaching- Cooperation- Formal

Q39. What is a common method of processing coffee beans?
(a) Sun drying
(b) Steam peeling
(c) Fermentation
(d) Blanching

Q40. What type of credit is advanced for periods more than 5 years against mortgage of immovable property for undertaking development works?
(a) Short-term credit
(b) Medium-term credit
(c) Long-term credit
(d) None of the above

Q41. The breed evolved by crossing of Murrah and Surti breed of buffalo is:
(a) Nili Ravi
(b) Jafarabadi
(c) Mahsana
(d) Nagpuri

Q42. In which year was the Seed Act passed in India?
(a) 1956
(b) 1966
(c) 1976
(d) 1986

Q43. Which of the following is required for a long term sustainable agricultural extension system?
(a) World bank funding
(b) Plot projects
(c) Donor funding
(d) Public funding

Q44. Diamondback moth is a pest of:
(a) Cotton
(b) Cabbage
(c) Rice
(d) Soybean

Q45. The adopter category characterized by respectability, localite, more opinion leadership, less dogmatism, and high empathy is known as_____
(a) Innovators
(b) Early adopters
(c) Early majority
(d) Late majority

Q46. Frozen semen is being stored at:
(a) -169°C
(b) -171°C
(c) -196°C
(d) -206°C

Q47. What is the most common method for sweet orange propagation?
(a) T-budding or Patch budding
(b) Grafting
(c) Cutting
(d) Seed sowing

Q48. Mohair is obtained from which animal?
(a) Merino
(b) Angora goats
(c) Nagori
(d) Mehsana

Q49. What is the three-line system of breeding in crops known as?
(a) Single-line system
(b) Double-line system
(c) Three-line system
(d) CGMS (Cytoplasmic Genetic Male Sterility) system

Q50. Ranikhet is a _____ disease?
(a) Viral
(b) Bacterial
(c) Fungal
(d) Nematodal

Q51. In which year was the Food Safety and Standards Authority of India (FSSAI) established?
(a) 2005
(b) 2007
(c) 2008
(d) 2011

Q52. Majority of the plant viruses have a genome of:
(a) ssRNA
(b) dsRNA
(c) ssDNA
(d) dsDNA

Q53. The yellow color of onion is due to_____
(a) Carotene
(b) Anthocyanin
(c) Quercetin
(d) Chlorophyll

Q54. The Warna project was started in which state?
(a) Gujarat
(b) Maharashtra
(c) Karnataka
(d) Madhya Pradesh

Q55. Rice tungro disease is caused by:
(a) A mixture of spherical and flexuous viruses
(b) A bacilliform virus alone
(c) A mixture of bacilliform and flexuous viruses
(d) A mixture of spherical and bacilliform viruses

Q56. Visual aid for transfer of technology includes:
(a) Audio teleconference
(b) E-mail
(c) Cultural programme
(d) All of these

Q57. Mango fruits are a good source of which vitamin?
(a) Vitamin C
(b) Vitamin D
(c) Vitamin A
(d) Vitamin E

Q58. Gumboro is a disease of which animal?
(a) Chicken
(b) Cow
(c) Goat
(d) Sheep

Q59. _____is the quantity of the produce which can be made available to thenon-farm population of the country.
(a) Marketable surplus
(b) Marketed surplus
(c) Both a and b
(d) None of the above

Q60. Which country is the largest producer of okra in the world?
(a) Nigeria
(b) India
(c) Brazil
(d) United States

Q61. Which of the following major blood sugars is found in insects?
(a) Glucose
(b) Fructose
(c) Trehalose
(d) None of the above

Q62. Which pre-emergence herbicide is commonly used in sorghum?
(a) Atrazine
(b) Alachlor
(c) Glyphosate
(d) Paraquat

Q63. ICRISAT is located at?
(a) Hyderabad
(b) New Delhi
(c) Kolkata
(d) Mumbai

Q64. Which one of the following is not a variety of garlic?
(a) Agrifound White
(b) Agrifound Parvati
(c) Agrifound Light Red
(d) Yamuna Safed

Q65. Which of the following is the longest phase in mitosis?
(a) Anaphase
(b) Metaphase
(c) Prophase
(d) Telophase

Q66. Rice tungro virus is transmitted by which of the following vectors?
(a) Aphid
(b) Leafhopper
(c) Whitefly
(d) Mite

Q67. Which crop is known as the king of fodder crops?
(a) Alfalfa
(b) Berseem
(c) Ryegrass
(d) Timothy

Q68. _____ is the apex body in India for research and education pertaining to Agriculture?
(a) Agricultural Support and Services Project
(b) Indian Council of Agricultural Research
(c) State Agricultural Universities
(d) Department of Agricultural Extensions

Q69. The value of elasticity of demand in perfectly inelastic demand is?
(a) One
(b) Less than unity
(c) Infinity
(d) Zero

Q70. The pest which attacks both in field and storage of pulses is:
(a) Pulse beetle
(b) Gram pod borer
(c) Red gram pod fly
(d) Pod borer

Q71. Which kind of seed has the highest genetic purity?
(a) Truthful Labelled Seed
(b) Foundation Seed
(c) Certified Seed
(d) Breeder Seed

Q72. What is the typical duration of a short-term loan in agriculture?
(a) 1-3 months
(b) 3-6 months
(c) 6-18 months
(d) 18-24 months

Q73. What is the ratio of male to female flowers in cucurbit vegetables?
(a) 1:1
(b) 2:1
(c) 3:1
(d) 9:1

Q74. NABARD stand for_____
(a) National Agricultural Bank and Rural Development
(b) National Bank for Agriculture and Rural Development
(c) National Agribusiness and Rural Development
(d) National Association for Bank and Rural Development

Q75. What is the recommended spacing for planting guava trees?
(a) 4.5M × 4.5M
(b) 5.5M × 5.5M
(c) 7.5M × 7.5M
(d) 6.7M × 6.7M

Q76. When was the Kisan Call Centre established?
(a) January 1, 2000
(b) January 15, 2003
(c) January 21, 2004
(d) January 30, 2005

Q77. Who recommends the Minimum Support Price (MSP) for agricultural products in India?
(a) Ministry of Agriculture
(b) NABARD
(c) CACP
(d) FCI

Q78. ***Pectinophora gossypiella*** **is a pest of:**
(a) Cumin
(b) Brinjal
(c) Cotton
(d) Spinach

Q79. **The measure of the degree of randomness or choice is_____**
(a) Variability
(b) Entropy
(c) Probability
(d) Uncertainty

Q80. **Aflatoxins are produced by:**
(a) *Alternaria burnsii*
(b) *Fusarium graminearum*
(c) *Cladosporium spp.*
(d) *Aspergillus flavus*

Q81. **The Indian Journal of Extension Education is published by_____**
(a) ICAR
(b) IARI, New Delhi
(c) UGC
(d) None of the above

Q82. **What does nutritional degradation in the post-harvest period involve?**
(a) Diminishment of essential nutrients
(b) Increase in moisture content
(c) Improvement in packaging methods
(d) Reduction in transportation time

Q83. **During seed germination, its stored food is mobilised by:**
(a) Auxin
(b) Ethylene
(c) Gibberellin
(d) ABA

Q84. **The word "Agronomy" is derived from which language?**
(a) Latin
(b) Sanskrit
(c) Greek
(d) English

Q85. Pureline variety is mostly:
(a) Homozygous and homogeneous
(b) Homozygous and heterogeneous
(c) Heterozygous and homogeneous
(d) Heterozygous and heterogeneous

Q86. An individual having both male and female reproductive organs is known as?
(a) Dioecious
(b) Hermaphrodite
(c) Unisexual
(d) Bisexual

Q87. Which farming practice involves growing two or more crops sequentially on the same land within a single growing season?
(a) Relay cropping
(b) Intercropping
(c) Multiple cropping
(d) Monoculture

Q88. In alkali soils, which fertilizer should be used instead of urea?
(a) Ammonium nitrate
(b) Calcium nitrate
(c) CAN (Calcium Ammonium Nitrate)
(d) DAP (Di-Ammonium Phosphate)

Q89. What is the significance of the biuret content in urea for foliar application?
(a) It should be less than 1.5% for safe use.
(b) It should be more than 2% for effectiveness.
(c) It does not affect foliar application.
(d) It enhances the nitrogen availability.

Q90. What is the process of crossing two plants or lines of dissimilar genotypes known as?
(a) Mutation
(b) Polyploidy
(c) Hybridization
(d) Selection

Q91. Which irrigation method is typically worked in arid regions where water is scarce?
(a) Surface Irrigation
(b) Drip Irrigation
(c) Sprinkler Irrigation
(d) Basin Irrigation

Q92. Headquarters of the National Seed Corporation is located in:
(a) New Delhi
(b) Mumbai
(c) Bangalore
(d) Kolkata

Q93. Urea contains:
(a) 40% N
(b) 46% N
(c) 50% N
(d) 52% N

Q94. The seed viability test is also known as:
(a) T-test
(b) Z-test
(c) Germination test
(d) TZ-test

Q95. The most abundant mineral nutrient in plants is:
(a) Nitrogen
(b) Phosphorus
(c) Potassium (K)
(d) Calcium

Q96. According to the modern concepts, the major function of inter – row tillage is:
(a) Moisture conservation through soil mulching
(b) Improved soil aeration
(c) Improved soil granulation
(d) Moisture conservation through weed destruction

Q97. Maturity of stamens and pistils at different time is called as?
(a) Cleistogamy
(b) Dioecy
(c) Dichogamy
(d) Dicliny

Q98. Who is known as the father of plant breeding?
(a) Gregor Mendel
(b) Norman Borlaug
(c) Charles Darwin
(d) Luther Burbank

Q99. Which of the following is correct with respect to Muriate of Potash (MOP)?
(a) Pink in color
(b) Readily soluble in water
(c) Neutral fertilizer
(d) All of these

Q100. The use of computers to operate machinery is primarily adopted in which type of farming?
(a) Organic farming
(b) Subsistence farming
(c) Precision farming
(d) Mixed farming

Solutions

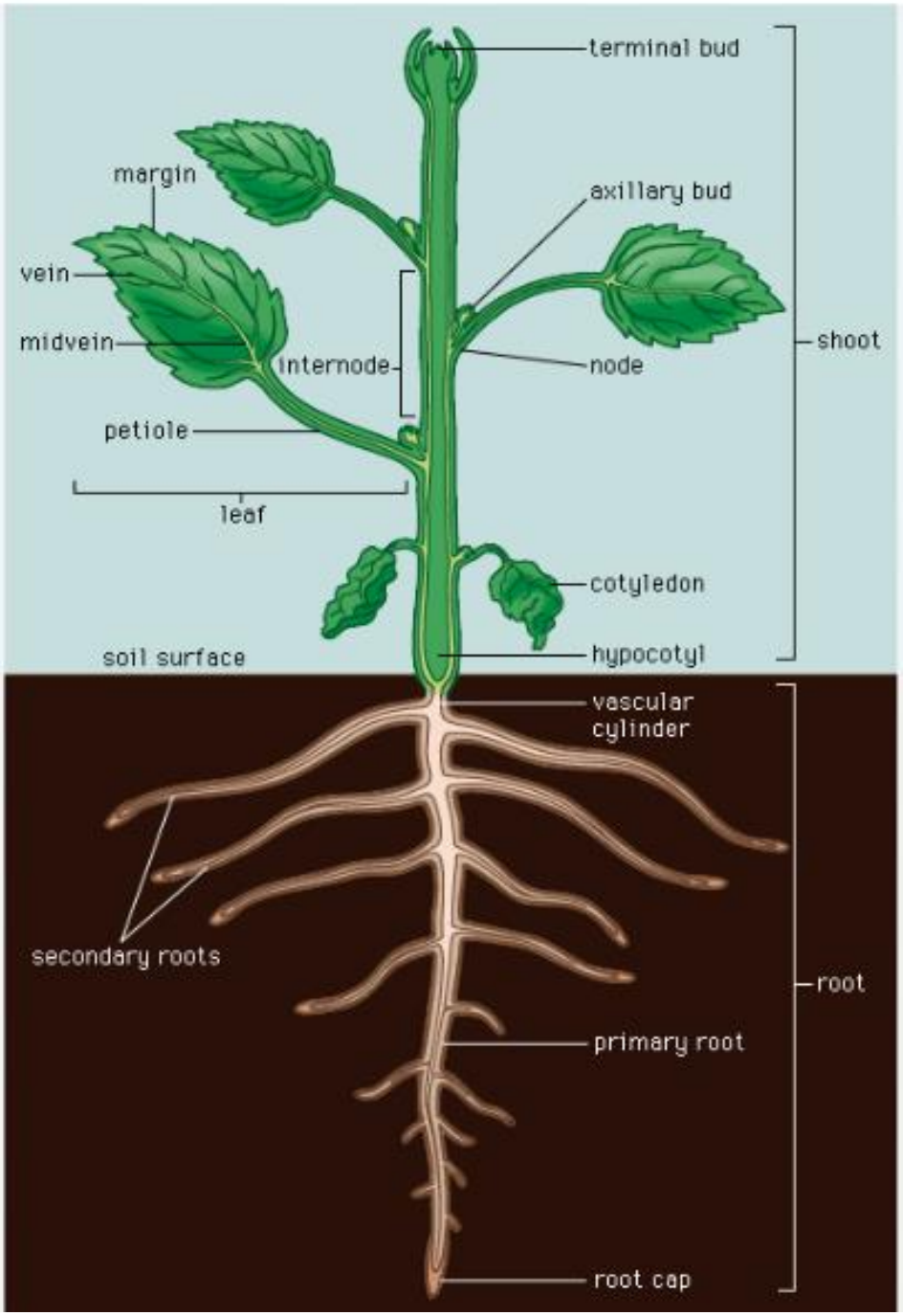
S1. Ans.(c)
Sol. The correct answer is: (C) B.L. Bhardwaj
The **CRI stage (Crown Root Initiation)** is the **most critical stage for irrigation** in wheat.
This stage generally occurs **20–25 days after sowing**, and irrigation at this point ensures proper root development.
The importance of this stage and its irrigation schedule was **identified and established by B.L. Bhardwaj**, a renowned Indian agronomist.
Information Booster:
- Missing irrigation at CRI stage can lead to **reduced tillering and poor yield**.
- Wheat requires about **4–6 irrigations** depending on soil and climatic conditions, but CRI is the **most crucial**.

Knowledge Booster :
- **J.C. Bose**: A pioneering Indian scientist in plant physiology and radio communication.
- **M.S. Swaminathan**: Known as the **father of the Green Revolution in India**, contributed to **high-yielding wheat varieties.**
- **Norman Borlaug**: An American agronomist and **father of the Green Revolution**, introduced **semi-dwarf wheat varieties.**

S2. Ans.(d)
Sol. The correct answer is: (D) Terminal buds
- **Calcium (Ca)** is a **relatively immobile nutrient** in plants, which means it cannot easily move from older tissues to newer ones.
- Therefore, **deficiency symptoms appear first in the actively growing regions**, such as **terminal buds** and **young leaves**.
- These symptoms may include **death of growing points**, **chlorosis**, and **deformed new growth**.

Information Booster:

- Calcium is essential for:
  - **Cell wall formation**
  - **Cell division and elongation**
  - **Root and shoot development**
- Its deficiency may also lead to:
  - **Blossom-end rot in tomato**
  - **Tip burn in cabbage and lettuce**
  - **Poor root growth**



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S3. Ans.(c)

Sol. The correct answer is: C) Bacteria

Explanation:

In submerged (**anaerobic or low-oxygen**) soils, the decomposition of organic matter is primarily carried out by anaerobic bacteria.

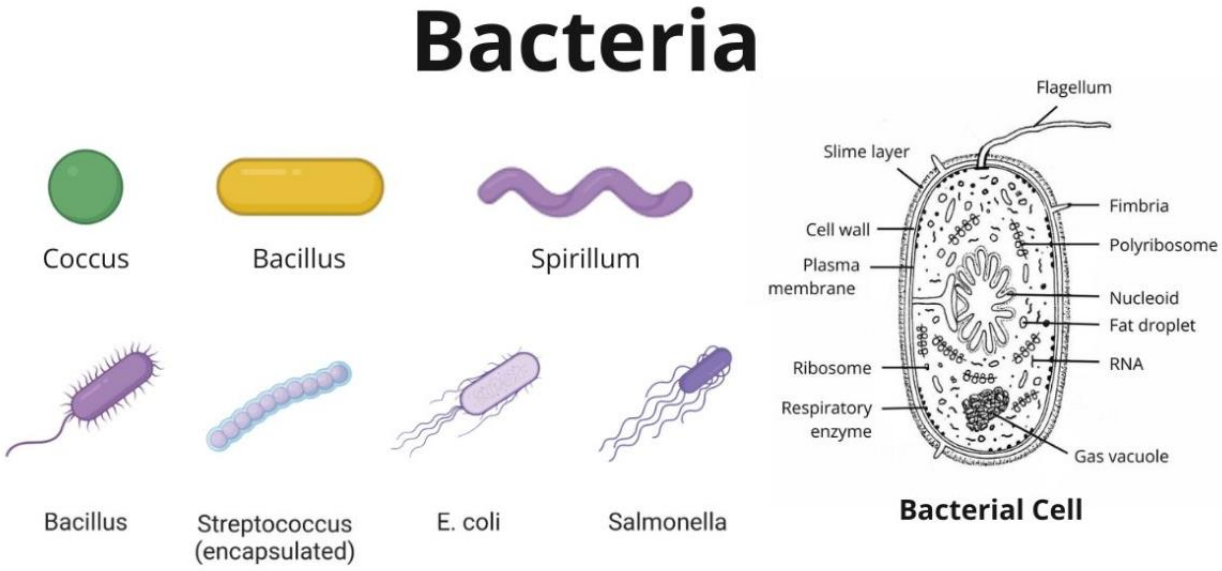
These bacteria can survive and function in oxygen-deficient environments, breaking down complex organic compounds into simpler forms like methane (CH_4), carbon dioxide (CO_2), and organic acids.

Information Booster:

- In submerged soils like those found in paddy fields, oxygen is scarce.
- Aerobic organisms like fungi and insects cannot survive well in such conditions.
- Anaerobic bacteria (such as ***Clostridium*, *Methanogens*, and *Desulfovibrio***) dominate the decomposition process.

Knowledge Booster:

- **Fungi:** Fungi are aerobic decomposers; they **require oxygen** to break down organic matter.
- **Algae:** Algae are autotrophic and perform **photosynthesis.**
- **Insects:** Insects like earthworms contribute to decomposition in aerated soils.



S4. Ans.(b)

Sol. The correct answer is: B) C3 & Short day

Explanation:

Soybean is a **C3 type plant**, meaning it uses the C3 pathway (Calvin cycle) for carbon fixation during photosynthesis.

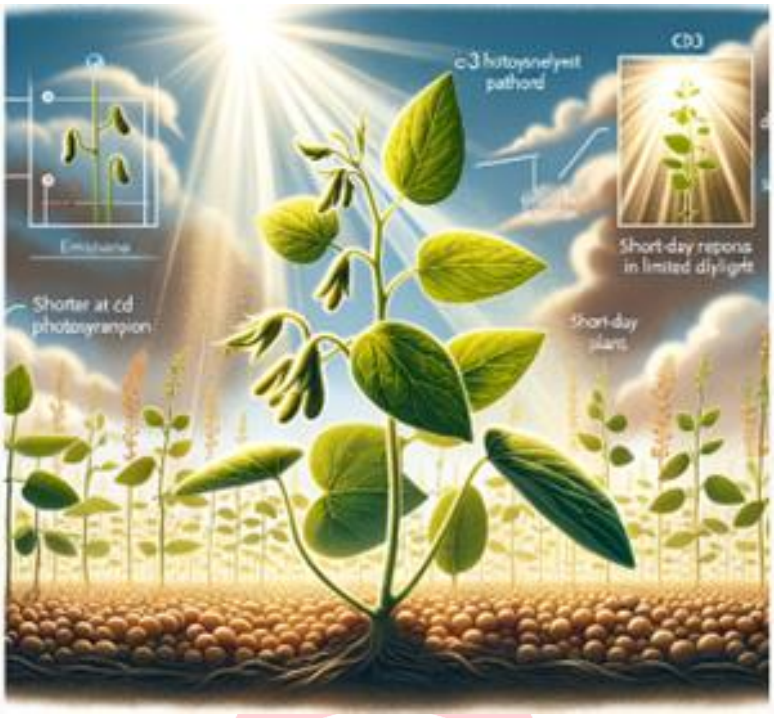
It is also a **short day plant**, which means it flowers when the duration of daylight is shorter than a critical length.

Information Booster:

- **C3 Plants** fix carbon dioxide into a 3-carbon compound (3-phosphoglycerate) during photosynthesis.
- They are more efficient in **cool, moist climates** and **under normal light intensity**.
- **Short day plants** require a night longer than a critical period to initiate flowering.

Knowledge Booster:

- **C4 & Long day:** C4 plants like maize and sorghum use the Hatch-Slack pathway and thrive in hot, dry environments.
- **C4 & Short day :** Though some C4 plants can be short day (e.g., sorghum).
- **C3 & Long day:** C3 long day plants include wheat and barley, which flower under longer daylight.



S5. Ans.(c)

Sol. The correct answer is: C) Top one-third to half portion

The **top one-third to half portion of the sugarcane stalk** is commonly used for sett (seed) purposes in many regions.

This part contains **younger, actively growing buds**, which tend to germinate **faster and more uniformly**.

Information Booster:

- **Top portion** of cane:
- Contains **viable and fresh buds**
- Is **softer** and retains **more moisture**
- Leads to **better sprouting** under proper soil and moisture conditions.

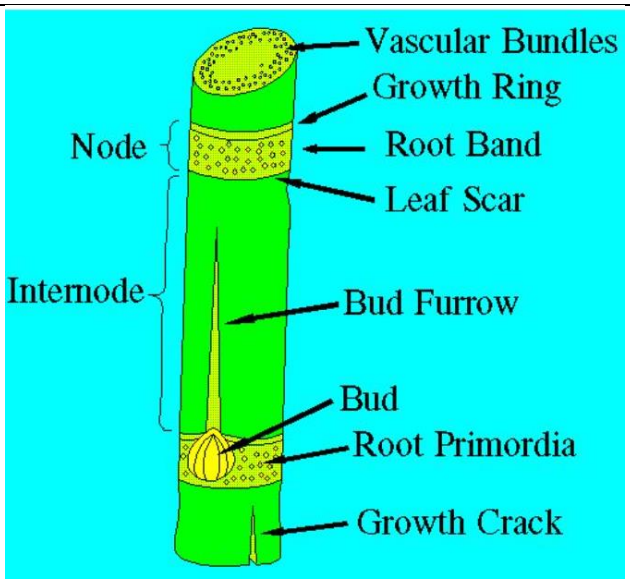
While selecting the planting material for sugarcane, the following characteristics should be considered-

Φ Healthy seed material, free from pests and diseases like red rot, wilt, smut, ratoon stunting etc. and should be selected for seed purpose.

Φ **The top one-third to half portion** of a cane being comparatively immature has buds of high viability and is **best for sowing**.

Φ Bottom portion of cane is rich in sugar and takes a long time in germination; **this should be used in jaggery making.**

Φ Seed cane should be taken from well mannered, erect and healthy crop of not more than 10-12 months age.



S6. Ans.(d)

Sol. The correct answer is: D) Isoneph

A line that connects points having **equal cloud cover** on a weather map is called an **Isoneph**. It is used in meteorology to represent the distribution of cloudiness across a region.

Information Booster:

- **Isoneph** helps in analyzing weather patterns, especially in aviation, agriculture, and climate studies.
- Cloud cover is usually measured in **oktas (eighths of the sky)**.
- These lines help visualize areas with **similar cloudiness levels**.

Knowledge Booster :

- **Isobar:** A line joining points of **equal atmospheric pressure**.
- **Isohyet:** A line joining points of **equal rainfall** or precipitation.
- **Isotherm:** A line joining points of **equal temperature**.

S7. Ans.(c)

Sol. The correct answer is: C) Medium-range

Explanation:

Medium-range weather forecasts (typically for **3 to 10 days**) are the most useful for **agricultural planning and operations**.

These forecasts provide enough time for farmers to make informed decisions about **sowing, irrigation, fertilization, pesticide application**, and **harvesting**, based on expected weather conditions.

Information Booster:

Medium-range forecasts allow farmers to:

- Prepare for expected rainfall or dry spells
- Plan field operations like spraying or harvesting
- Avoid weather-related losses by adjusting schedules.

Knowledge Booster:

- **Short-range (1–2 days):** Useful for very **immediate decisions.**
- **Long-range (more than 10 days or seasonal):** Good for **overall seasonal outlook.**
- **Immediate (few hours):** Used for **real-time alerts** like storms or frost, helpful for **emergency response.**

S8. Ans.(b)

Sol. The correct answer is: B) Sunhemp

Sunhemp (Crotalaria juncea) is the most commonly used **green manure crop in India**. It is a **fast-growing leguminous plant** that enriches the soil by fixing atmospheric **nitrogen** through **Rhizobium bacteria** present in its root nodules.

Sunhemp is typically grown and ploughed back into the soil when it is young and succulent, improving soil fertility and structure.

Information Booster:

- **Sunhemp** grows rapidly and is usually incorporated into the soil within **6–8 weeks**.
- It adds about **60–80 kg nitrogen per hectare**.
- It also suppresses **weeds**, prevents **soil erosion**, and adds **organic matter**.
- Suitable for **alluvial, loamy, and sandy soils**.

Knowledge Booster:

- **Alfalfa:** While it is a legume and can fix nitrogen, in India it is primarily grown as a **fodder crop.**
- **Clover:** More commonly used in **temperate regions** for grazing and fodder.
- **Soybean:** Although it fixes nitrogen and improves soil fertility, it is grown mainly as an **oilseed crop.**

Sun Hemp Seeds

S9. Ans.(c)

Sol. The correct answer is: C) Chloride

The **burning quality of tobacco** is **negatively affected** by the presence of **chloride** in the leaf.

High levels of chloride cause **uneven and harsh burning**, which reduces the **smoothness and flavor** of tobacco.

Chloride interferes with the proper combustion of tobacco leaves, making them **less desirable** for smoking.

Information Booster:

- **Ideal burning quality** in tobacco means:
  - Uniform combustion
  - Smooth smoke
  - Minimal residue

- Excess **chloride** content leads to:
  - Harsh taste
  - Poor ash formation
  - Irritation during smoking

Knowledge Booster:

- **Sulphate:** Necessary for plant growth In fact, balanced sulphate improves **leaf structure** and protein formation.
- **Nitrate:** Plays a role in nitrogen supply but **excess nitrate** may affect nicotine levels.
- **Phosphate:** Important for **root development and energy transfer** in plants.

S10. Ans.(b)

Sol. The correct answer is: B) Cross resistance

When a **plant selected for resistance to one herbicide** also shows resistance to **other herbicides of the same chemical group or with similar modes of action**, it is known as **cross resistance**.

This happens because the same **mechanism** (e.g., **altered target site or enhanced metabolism**) confers resistance to multiple herbicides that act similarly.

Information Booster:

- **Cross resistance** often results from:
  - **Single resistance mechanism** affecting several herbicides.
  - **Example:** Resistance to one ALS-inhibitor herbicide often leads to resistance to **all ALS-inhibitors**.

Knowledge Booster :

- **Multiple resistance:** Refers to resistance to **two or more herbicides** that have **different modes of action.**
- **Target-site resistance:** Caused by changes in the **enzyme or protein** that the herbicide targets.
- **Non-target-site resistance:** Involves mechanisms like **enhanced metabolism** or **reduced herbicide uptake.**

S11. Ans.(c)

Sol. Antidotes are substances used to counteract the phytotoxic effects of specific herbicides on certain plants.

S12. Ans.(b)

Sol. The correct answer is: B) Lysimeter

Explanation:

A **lysimeter** is a scientific instrument used to **measure percolation and leaching losses** of water and nutrients from a column of soil under **controlled or field conditions**.

It helps study **water balance**, **nutrient transport**, and **chemical movement** through the soil profile. Lysimeters are essential in **agronomy, soil science, and environmental studies**.

Information Booster:

- Lysimeters simulate **natural conditions** but allow measurement of **water input and output**.
- Used to:
  - Measure **evapotranspiration**
  - Quantify **leachate volume and content**
  - Assess **nutrient and pesticide losses**

Knowledge Booster :

- **Tensiometer:** Measures the **soil water tension** or **suction**, indicating how tightly water is held by soil particles.
- **Hygrometer:** Used to measure **humidity** (moisture content) in the atmosphere.
- **Pycnometer:** A device to determine the **specific gravity (density)** of liquids or fine powders.

S13. Ans.(d)

Sol. The correct answer is: D) < 2000 ha

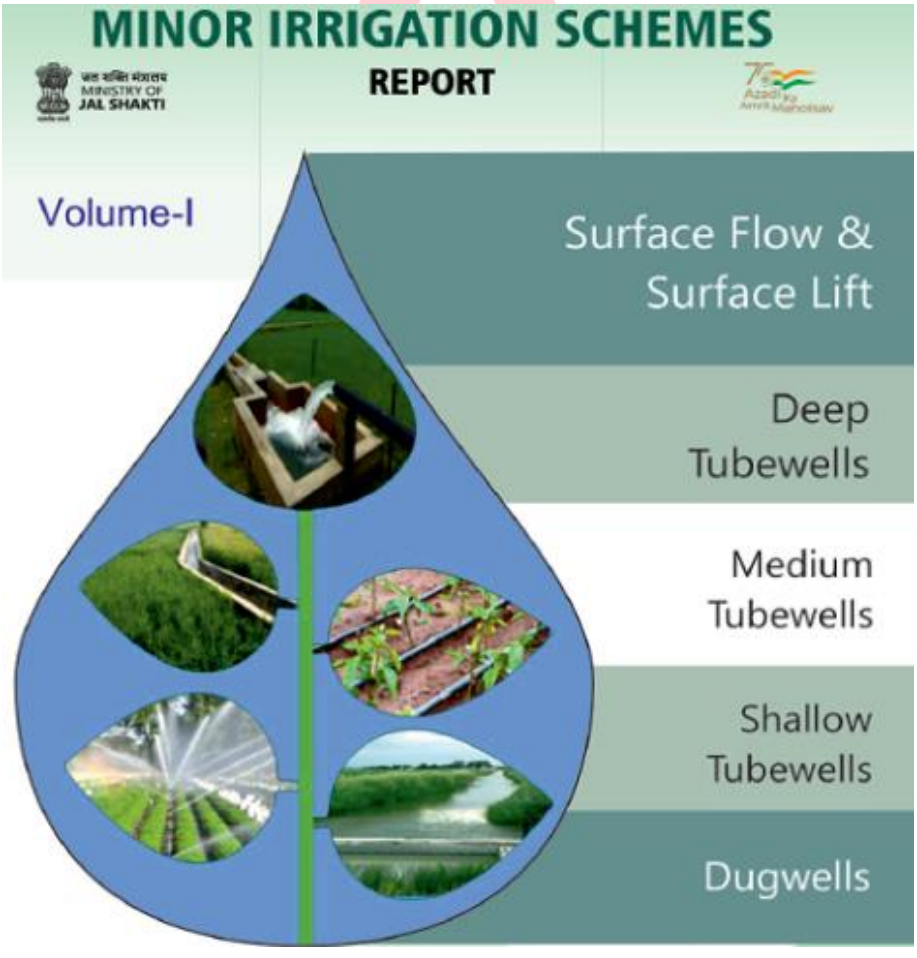
Explanation:

A **Minor Irrigation Project** is defined as an irrigation scheme that has a **command area less than 2000 hectares**.

These projects are typically developed for **localized irrigation**, often managed by farmers or local bodies, and involve **low-cost, small-scale infrastructure** like tanks, tube wells, canals, and ponds.

Information Booster:

- **Classification of irrigation projects based on command area:**
  - **Minor Irrigation Project:** < 2000 hectares
  - **Medium Irrigation Project:** 2000 – 10,000 hectares
  - **Major Irrigation Project:** > 10,000 hectares
- Minor projects are crucial for **rainfed and tribal areas**, ensuring **water availability** at micro levels.



S14. Ans.(d)

Sol. The correct answer is: D) Chilling injury

Chilling injury occurs in **tropical and subtropical plants** when they are exposed to **low (but above freezing) temperatures**, typically between **0°C to 15°C**.

It causes physiological damage such as **discoloration, surface pitting, internal browning, poor ripening**, and ultimately reduced shelf life or plant death.

Information Booster:

- Commonly affected crops: **banana, papaya, mango, tomato, cucumber**
- It **does not involve ice formation**, unlike freezing injury.

Knowledge Booster:

- **Frostbite:** This term is used for **tissue damage in animals/humans.**
- **Freezing injury:** Occurs when temperatures fall **below 0°C**, leading to **ice crystal formation** inside plant cells.
- **Frost injury:** A general term for injury caused by **frost conditions.**

S15. Ans.(c)

Sol. The correct answer is: C) Gibberella fujikuroi fungus

Gibberellin, a plant growth hormone, was **first isolated from the fungus Gibberella fujikuroi**, which causes the **"foolish seedling" disease** in rice.

Infected rice plants showed **abnormal elongation**, leading to the discovery of gibberellins as compounds that promote **cell elongation, seed germination, and flowering**.

Information Booster:

- Discovered in **Japan** in the 1930s by **Eiichi Kurosawa**.
- Gibberellins are a group of **diterpenoid acids**, with **GA_3 (gibberellic acid)** being one of the most biologically active forms.
- Widely used in agriculture to:
  - **Break seed dormancy**
  - **Induce flowering**
  - **Increase fruit size (e.g., grapes, apples.**

Knowledge Booster (Other Option Information):

- **Aspergillus niger:** A fungus used for **industrial production of citric acid.**
- **Penicillium chrysogenum:** Known for producing **penicillin**, an antibiotic.
- **Rhizopus stolonifer:** Commonly known as **black bread mold**, used in fermentation and alcohol production.

S16. Ans.(c)

Sol. The correct answer is: C) Cotton

Explanation:

Bacillus thuringiensis (Bt) is a **biocontrol agent** that produces **crystalline (Cry) proteins** toxic to **lepidopteran pests** like **bollworms**, which are a major pest in **cotton crops**.

Bt is widely used in both **biopesticide formulations** and in **genetically modified Bt cotton**, providing effective pest control without harming beneficial insects.

Information Booster:

- **Lepidopterous pests** include: **Helicoverpa armigera (cotton bollworm), Spodoptera spp.**
- Bt cotton is genetically engineered to express **Cry genes** from Bacillus thuringiensis.
- Bt is **eco-friendly** and safe for **non-target organisms**.

Knowledge Booster (Other Option Information):

- **Rice:** Though some lepidopteran pests (like stem borers) affect rice.
- **Wheat:** Wheat is mostly attacked by pests like **aphids and armyworms.**
- **Maize:** Bt maize is used in several countries to control **corn borers** (also lepidopterous).

S17. Ans.(c)

Sol. The correct answer is: C) Relay cropping

Relay cropping is a system where **a second crop is sown before the first crop is harvested**, so that **both crops share the field for a part of their life cycles**.

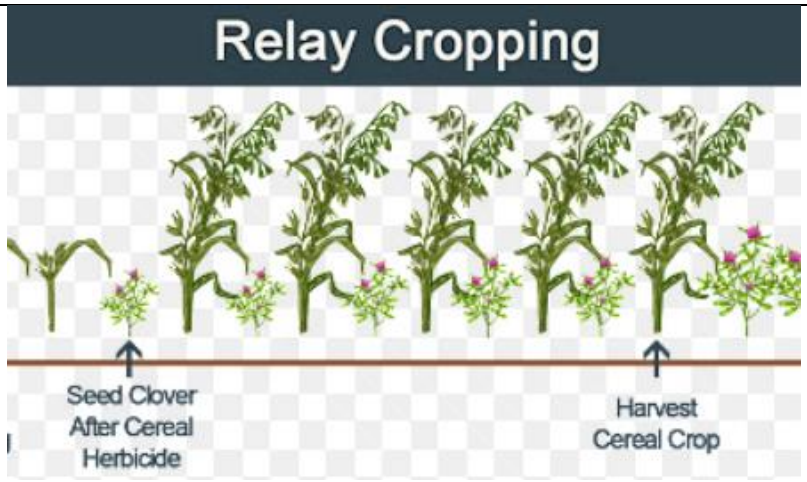
This allows the land to be used **more efficiently and continuously**, minimizing the fallow period between two crops.

Information Booster:

- Example: **Sowing lentils or chickpeas into standing rice crop** before harvesting.
- Ensures **quick succession** of crops and better **utilization of soil moisture and nutrients**.
- Helps in **weed suppression and erosion control**.

Knowledge Booster (Other Option Information):

- **Mixed cropping:** Growing **two or more crops simultaneously** on the **same field**, without any definite row arrangement (e.g., **wheat + mustard**).
- **Intercropping:** Growing **two or more crops in a specific row pattern** on the same field at the same time (e.g., **maize + beans in alternate rows**).
- **Crop rotation:** Growing **different crops one after another in a planned sequence** over seasons or years to maintain soil health and reduce pest buildup.



S18. Ans.(b)

Sol. The correct answer is: B) Farm mechanization

Explanation:

Farm mechanization refers to the use of **machinery and equipment** to carry out **agricultural operations** like ploughing, sowing, harvesting, threshing, and irrigation.

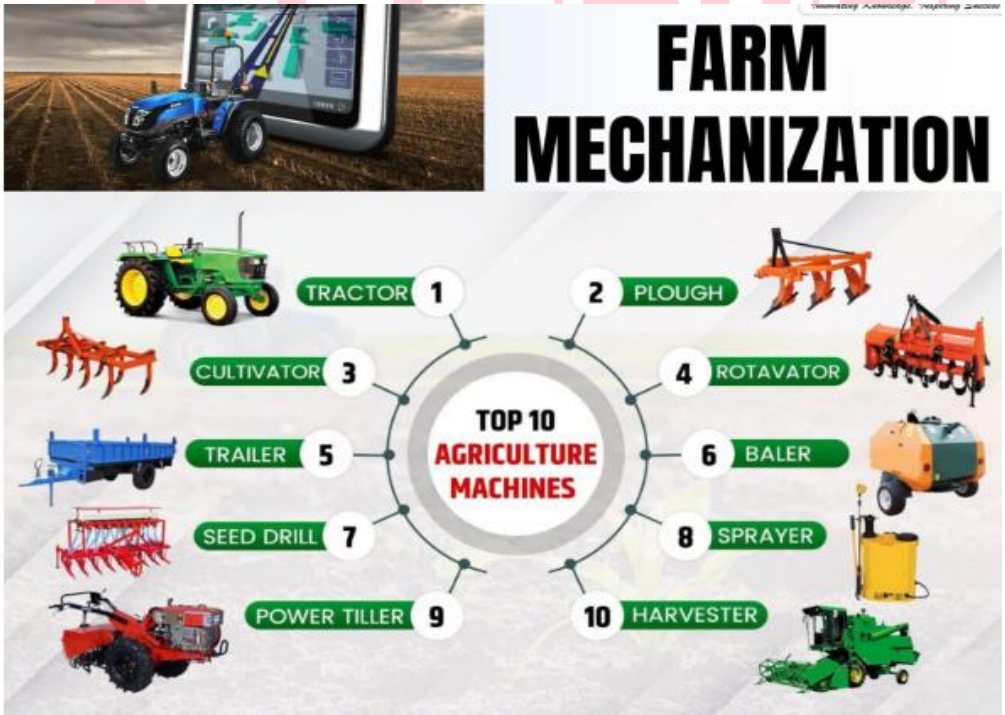
It replaces or reduces **human and animal labor** and helps in **enhancing productivity**, reducing cost and time.

Information Booster:

- Includes tools like: **tractors, harvesters, seed drills, rotavators, threshers**.
- Promotes **timely farm operations**, **better precision**, and **higher efficiency**.
- Essential for **modern and large-scale farming**.

Knowledge Booster (Other Option Information):

- **Farm transformation:** generally refers to **structural or developmental changes** in farming practices.
- **Farm utilization:** Refers to the **efficient use of farm resources** like land, labor, and capital, not specifically mechanical operations.



S19. Ans.(b)
Sol. The correct answer is: B) < 1.25 me/l
Explanation:
The **safe limit** for **Residual Sodium Carbonate (RSC)** in irrigation water is **less than 1.25 me/litre**.
RSC values above this can negatively impact **soil structure**, **permeability**, and **crop productivity**, especially in clayey soils.
Information Booster:
- **RSC < 1.25 me/l → Safe for irrigation**
- **1.25–2.5 me/l → Marginal quality** (use with caution)
- **> 2.5 me/l → Unsuitable** (can lead to **sodicity** and reduced crop yield)

RSC is calculated as:
RSC = $(CO_3^{2-} + HCO_3^-) - (Ca^{2+} + Mg^{2+})$ (in me/l)
If RSC is high, it can cause **sodium to accumulate** in the soil, which **displaces calcium and magnesium**, leading to poor soil aeration and structure.

S20. Ans.(c)
Sol. The correct answer is: C) Consumptive use of water
Absolute water requirement refers to the **total quantity of water** required by a crop to meet its **evaporation and transpiration needs** during its entire growth period.
This is also known as the **consumptive use of water**, as it includes both **transpiration (through plant leaves)** and **evaporation (from soil surface)**.
Information Booster:
- **Consumptive use of water = Transpiration + Evaporation**
- It is measured in **mm or cm** over the crop period.
- It does **not include runoff, percolation, or deep drainage losses**.
- Helps in **efficient irrigation scheduling** and **water resource planning**.

Knowledge Booster (Other Option Information):
- **Transpiration:** Loss of water from **plant surfaces**, mainly through **stomata.**
- **Evaporation:** Water loss from **soil and water surface.**
- **Field capacity:** Refers to the **amount of water retained in soil** after excess water has drained, and the **drainage stops**. It is a soil property.

S21. Ans.(d)
Sol. The correct answer is: D) ATMA (Agricultural Technology Management Agency)
Explanation:
ATMA was launched in the **late 1990s** in India to **reform the public sector agricultural extension system**. Its aim was to make extension **farmer-driven and participatory**, ensuring that technology and knowledge reach farmers more effectively.
ATMA integrates various departments like agriculture, horticulture, animal husbandry, and fisheries at the district level for better coordination.
Information Booster:
- **ATMA** was first introduced as a pilot project under the **National Agricultural Technology Project (NATP)** in 1998.
- It promotes **bottom-up planning**, **public-private partnerships**, and **farmer group involvement**.

Knowledge Booster :

- **NARS (National Agricultural Research System):** Refers to the **network of agricultural research institutions**, mainly ICAR and SAUs, involved in research.
- **Green Revolution:** A movement started in the **1960s** to improve food grain production through **high-yielding varieties and chemical inputs.**
- **T&V (Training and Visit system):** An earlier extension reform introduced in the **1970s** with support from the **World Bank**, It became less effective by the 1990s.

S22. Ans.(b)

Sol. The correct answer is: B) Sprinkler irrigation

Explanation:

Sprinkler irrigation is an **automated** method of surface irrigation where water is distributed under pressure through a system of pipes, pumps, and sprinklers, mimicking natural rainfall.

It is commonly used to irrigate large areas of land in a uniform manner, often automated with timers and sensors for precise water application.

Information Booster:

Sprinkler irrigation is widely used for **row crops, lawns, and gardens**.

- The system can be **automated** with controllers, allowing for efficient and precise water application.
- It is effective for **irrigating uneven terrain** and can be used for **large-scale farming**.

Knowledge Booster (Other Option Information):

- **Drip irrigation:** A highly efficient system that delivers water directly to the root zone, It is more suited for **localized irrigation**.
- **Subsurface irrigation:** A method where water is applied below the soil surface, typically using buried pipes or tubes.

S23. Ans.(b)

Sol. The correct answer is: B) Furrow

A **furrow** is the **trench or narrow groove** created in the soil by an implement (such as a plough or cultivator) during field operations.

Furrows are primarily formed for **planting seeds**, improving **irrigation**, or promoting **soil drainage**. They play a crucial role in various cropping and tillage systems.

Information Booster:

- Furrows help in:
  - **Seed placement** at proper depth.
  - **Water channeling** during irrigation.
  - **Soil aeration** and **root development**.
- Common in crops like **sugarcane, potato, cotton**, etc.

Knowledge Booster):

- **Ridge:** A **raised strip of soil** made alongside furrows, often used for **planting** and better **drainage**.
- **Terrace:** A **levelled or stepped strip** on hilly terrain used to **reduce soil erosion** and control water flow.
- **Ditch:** A **wide and deep channel**, usually constructed for **drainage or irrigation.**

S24. Ans.(b)

Sol. The correct answer is: B) Fertigation

Explanation:

Fertigation is the method of applying **fertilizer nutrients through irrigation water**. This technique combines **fertilization** and **irrigation**, allowing nutrients to be delivered **directly to the plant root zone** with water.

It enhances nutrient efficiency, reduces wastage, and supports uniform distribution.

Information Booster:

- Commonly used with **drip and sprinkler irrigation systems**.
- Ensures **timely nutrient availability** to plants.
- Improves **crop yield and quality**.
- Especially effective in **high-value horticultural crops** and precision farming.

Knowledge Booster:

- **Hydroponics:** A **soil-less cultivation** technique where plants grow in **nutrient-rich water** solutions.
- **Aeroponics:** Plants are grown in air or mist environment without soil or an aggregate medium, and **nutrients are delivered in mist form**.
- **Inundation:** Refers to **flooding or submergence**,

S25. Ans.(a)

Sol. The correct answer is: (A) Bollworm of cotton

Explanation:

Trichogramma chilonis is an egg parasitoid wasp widely used in biological control programs. It parasitizes the eggs of various lepidopteran pests, including **bollworms**, which are major pests in cotton.

By laying its eggs inside the eggs of bollworms, the parasitoid prevents them from developing, effectively controlling the pest population.

Information Booster:

- **Trichogramma chilonis** is a tiny wasp (~0.3 mm) that attacks over 200 species of moth pests.
- It is most effective against **Helicoverpa armigera** and **Earias spp.**, which are serious bollworms in cotton.
- It is mass-reared and released in fields as part of **Integrated Pest Management (IPM)** strategies.

Knowledge Booster:

- **Whitefly** – These are **sap-sucking pests**, and **Encarsia formosa** is commonly used for their biological control.
- **Aphid** – These pests are also controlled by predators like **ladybird beetles (Coccinellids)** and parasitoids like **Aphidius spp.**
- **Thrips** – These are controlled biologically using **predatory mites** (like Amblyseius spp.).

S26. Ans.(b)

Sol. The correct answer is: (B) 0.3 to 31 ATM

Explanation:

Capillary water is the water held in the micropores of soil by surface tension. It is available to plants and retained in the soil at a **tension ranging from 0.3 to 31 atmospheres (ATM)**.

This type of water forms a continuous film around soil particles and is the main source of water for plant uptake.

Information Booster:

- Capillary water lies **between field capacity and permanent wilting point**.
- Water held below **0.3 ATM** is gravitational and drains quickly.
- Water held above **31 ATM** becomes unavailable to plants and is called **hygroscopic water**.

S27. Ans.(c)

Sol. The correct answer is: (C) Pre-flowering

Explanation:

In pulse crops (like gram, lentil, moong, urad, etc.), the **pre-flowering stage** is considered the most **critical stage for irrigation**. Water stress during this period can drastically **reduce flowering, pod setting, and ultimately yield.**

Providing adequate moisture before flowering ensures better development of reproductive parts and enhances pod formation.

Information Booster:

- Pulses are usually grown under **rainfed conditions**, but one or two **life-saving irrigations** are recommended.
- **Pre-flowering** and **pod development** are two sensitive stages to moisture stress.
- Irrigation during pre-flowering helps in **initiation of flower buds** and **reduces flower drop**.

Knowledge Booster (Other Option Information):

- **Seedling stage** – Moisture is important for germination, but this stage is usually covered by residual soil moisture or early rainfall.
- **Maturity stage** – Irrigation at this stage may delay harvest and increase pest/disease risk.

S28. Ans.(b)

Sol. The correct answer is: (B) Moisture release curve / Soil moisture characteristics curve

The **moisture release curve**, also called the **soil moisture characteristics curve**, shows the relationship between **soil moisture tension (matric potential)** and **absolute moisture content (volumetric or gravimetric)**.

This curve helps to understand how tightly water is held in the soil and how much of it is available to plants—especially in the range **from field capacity to permanent wilting point**.

Information Booster:

- At **field capacity**, soil holds maximum water against gravity (~0.3 ATM).
- At **permanent wilting point**, water is held so tightly (>15 ATM) that plants cannot extract it.
- The **moisture release curve** helps in determining **available water capacity** of soil.
- It is essential in **irrigation planning and water management**.

S29. Ans.(b)

Sol. The correct answer is: (B) Annidation

Annidation refers to the **complementary interaction** between component crops in an intercropping system where they **utilize space and time efficiently**.

One crop may grow faster and complete its lifecycle early, while the other takes longer—thus they occupy **different ecological niches** without much competition. This helps in **better utilization of light, nutrients, water, and space**.

Information Booster:

- Annidation occurs both in **time (temporal annidation)** and **space (spatial annidation)**.
- It is a principle of **intercropping and mixed cropping systems**.
- Example: In **maize + cowpea intercropping**, maize uses vertical space while cowpea spreads horizontally.

S30. Ans.(b)

Sol. The correct answer is: (B) Stomatal closure

Explanation:

Antitranspirants are substances applied to plants to reduce **transpiration losses**. Chemicals like **2,4-D, Atrazine, PMA, Phosphon D, and Potassium metabisulphate** function by inducing **stomatal closure**, thus reducing water loss through stomata.

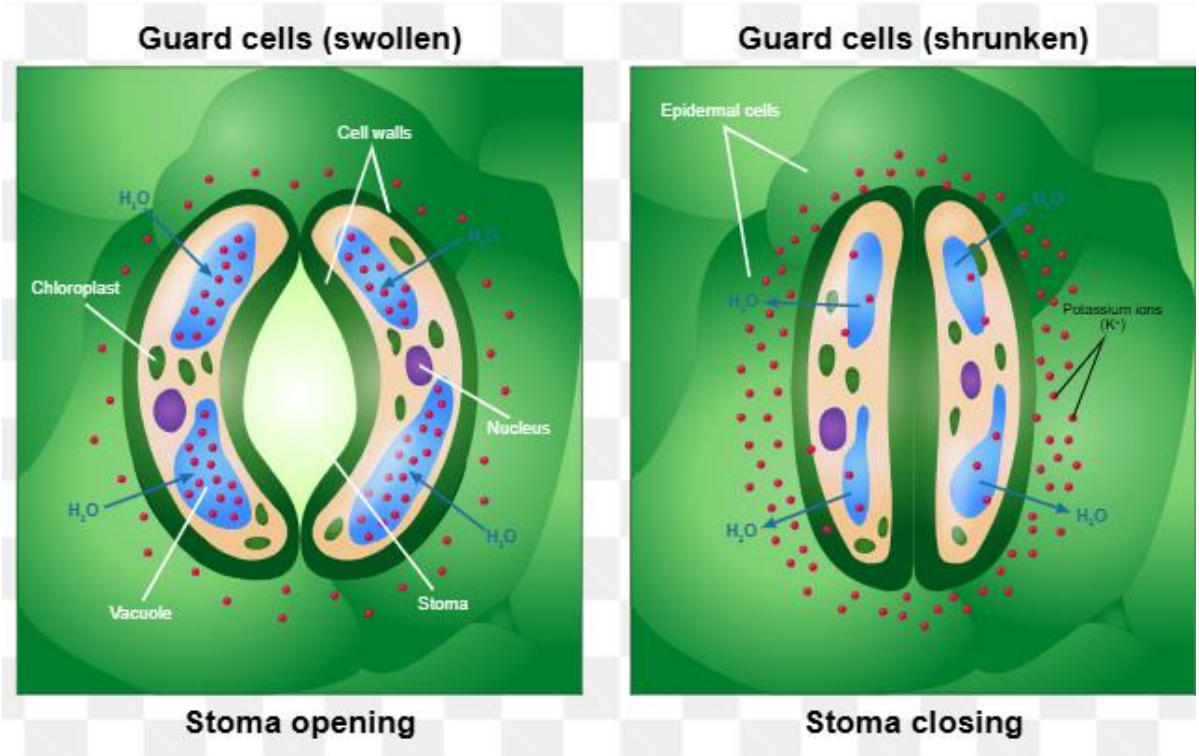
These are **physiological antitranspirants** which alter the plant's internal processes to reduce stomatal opening.

Information Booster:

- **Antitranspirants** are classified into:
  - **Stomatal closing types** (like 2,4-D, Atrazine, PMA)
  - **Film-forming types** (e.g., waxes)
  - **Reflectant types** (e.g., kaolin, which reflects sunlight)
  - **Growth retardants** (reduce leaf area or stomatal density)

Knowledge Booster :

- **Leaf abscission** – Usually caused by hormonal changes (like increased ethylene).
- **Root elongation** – Promoted by auxins and favorable soil moisture.
- **Cell expansion** – Driven by turgor pressure and gibberellins



S31. Ans.(a)

Sol. The correct answer is: (A) Rosica

Rosica is a **mutant variety of mango**, developed through **mutation breeding**, which involves the use of physical or chemical mutagens to create genetic variations.

This variety is known for improved traits such as **fruit quality and yield**.

Information Booster:

- **Rumani** – A **regular mango cultivar**, mainly grown in **southern India**, known for its **medium-sized yellow fruits** and good table quality.
- **Ratna** – A **hybrid variety** developed by crossing **Neelum × Alphonso**. It inherits Alphonso's taste with better resistance and yield.
- **Sindhu** – Also a **hybrid mango variety**, developed from a cross between **Ratna and Alphonso**. It is **seedless or has very small stones.**

S32. Ans.(b)

Sol. The correct answer is: (B) **Factor-Product relationship**

Explanation:

The **Principle of Diminishing Returns** (also called the **Law of Diminishing Marginal Returns**) explains how **output (product) responds to an increasing input (factor), while other factors remain constant**.

- When **more units of a variable factor (e.g., labor, fertilizer)** are added to a **fixed factor (e.g., land, machinery)**, the **additional output (marginal product) initially increases** but **eventually decreases** after a certain point.
- This principle is **fundamental in agricultural and economic production theories**, describing **Factor-Product relationships** where an increase in input does not always result in a proportional increase in output.

Knowledge Booster:

- **Product-Product relationship** →
  - Deals with how **two or more products (outputs) are related** when produced using the same set of resources.
  - Example: **Producing wheat and barley on the same farm**.

- **Factor-Factor relationship →**
  - Explores the relationship between **two or more inputs (factors)** used in production.
  - Example: **Balancing labor and machinery usage** for optimal productivity.
- **Input-Input relationship →**
  - Refers to **how different inputs (resources) interact** in the production process.
  - Example: **Water and fertilizer application in farming**.

S33. Ans.(c)

Sol. The correct answer is: (C) Dryland farming

Dryland farming is characterized by **low to moderate rainfall** (usually between **750–1150 mm annually**). This type of farming typically has a **growing period of 75–120 days**, and **crop failure is less frequent** due to the use of drought-resistant crops and moisture conservation practices.

It is suited for regions where **irrigation is not feasible**, and crops are grown primarily based on **rainwater**.

Information Booster:

- Dryland farming is common in regions with **limited rainfall** but still supports agriculture through careful soil and water management techniques, such as **rainwater harvesting** and **crop rotation**.
- Common crops grown in dryland farming systems include **millets**, **sorghum**, and **pulses**.

Knowledge Booster :

- **Rainfed farming** – Relies entirely on natural rainfall, but the specific rainfall range and growing period mentioned in the question are more typical of **dryland farming**.
- **Irrigated farming** – Involves artificial water supply through irrigation systems, and is typically used in areas with low rainfall or during dry seasons.
- **Wetland farming** – Focuses on areas with abundant water (like river deltas or marshes) and involves crops such as rice.

S34. Ans.(d)

Sol. The correct answer is: (D) Linseed rust

Explanation:

Linseed rust (*Melampsora lini*) is an **autoecious rust**, meaning it completes its entire life cycle on a single host, in this case, **linseed**.

Unlike heteroecious rusts, which require an alternate host to complete their life cycle, autoecious rusts like **linseed rust** are capable of reproducing solely on their host plant.

Information Booster:

- **Autoecious rust** fungi complete their entire reproductive cycle on a single host, unlike heteroecious rusts, which need a secondary host plant.
- Linseed rust is a **significant disease** in linseed (also known as flax), causing **yellowing and premature defoliation** of leaves, which can lead to yield loss.

Knowledge Booster :

- **Stem rust of wheat** – Caused by *Puccinia graminis*, this is a **heteroecious rust**, requiring an alternate host such as **barberry** to complete its life cycle.
- **Bajra rust** – Caused by *Puccinia sorghi*, this is a **heteroecious rust**, which requires an alternate host (like **barberry**) for its lifecycle.
- **Apple rust** – Caused by *Gymnosporangium*, a **heteroecious rust** that requires an alternate host, **juniper**, for completing its lifecycle.

S35. Ans.(c)

Sol. The correct answer is: (C) Integrated farming

Integrated farming refers to a farming approach that combines both **chemical and organic sources** of plant nutrients, aiming to achieve a balanced and sustainable agricultural system.

It seeks to optimize the use of **organic fertilizers (like compost)** and **chemical fertilizers** in such a way that the environmental impact is minimized, and crop yield is maximized. This system also includes a diverse mix of **crops and livestock**, promoting ecological balance.

Information Booster:

- **Conventional farming** – Involves the use of **primarily chemical fertilizers and pesticides** to achieve higher crop yields.
- **Organic farming** – Relies exclusively on **organic sources** for soil fertility, such as **manure, compost, and green manure.**
- **Precision farming** – Utilizes **advanced technologies** (e.g., GPS, sensors, and data analytics) to optimize farming practices, focusing on **targeted nutrient application.**

S36. Ans.(b)

Sol. The correct answer is: (B) Taungya cultivation

Explanation:

Taungya cultivation is a type of agro-forestry system where **food crops** are grown alongside **tree seedlings**. The food crops serve as a **nursery** for the young trees, providing protection and favorable conditions for the tree seedlings to grow.

Once the trees mature, the food crops are usually harvested, and the area is then fully utilized for forest growth. This method is commonly used in forest plantations.

Information Booster:

Taungya system is especially common in tropical and subtropical regions and helps in **reforestation** and **afforestation** while also providing farmers with an income from food crops in the early stages of tree growth.

- **Shifting cultivation** – Involves the practice of clearing land by cutting and burning vegetation to grow crops for a few years before moving to a new area.
- **Alley cropping** – Involves planting **trees or shrubs** in rows with **crops** grown in between.
- **Silvopasture** – This system integrates **livestock** with **trees or shrubs**, providing benefits such as shade for animals and improved pasture quality.

S37. Ans.(c)

Sol. The correct answer is: (C) Protected cultivation

Explanation:

Protected cultivation refers to growing crops in controlled environments such as **greenhouses, polyhouses, or shade nets**, where factors like temperature, humidity, and light can be regulated.

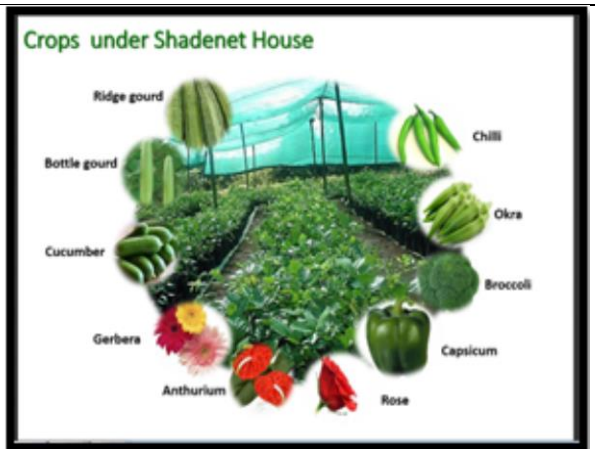
This system allows for **year-round crop production**, overcoming weather constraints and providing better control over pests and diseases. It also leads to higher crop yields and **more income per unit area** due to the ability to grow high-value crops throughout the year.

Information Booster:

- **Protected cultivation** enables growing crops in environments where traditional farming is not possible or is limited by seasons. It is often used for high-value crops like **tomatoes, cucumbers, and flowers**.
- It helps in **reducing water usage**, improving **crop quality**, and increasing **productivity** by allowing precise control over growing conditions.

Knowledge Booster:

- **Open field cultivation** – Involves growing crops directly in the field under natural environmental conditions.
- **Rainfed farming** – Relies on natural rainfall for irrigation, making it susceptible to seasonal changes in weather and inconsistent income.
- **Agroforestry** – Involves the integration of trees with crops or livestock, focusing more on sustainability and ecological balance.



S38. Ans.(a)

Sol. The correct answer is: (A) Teaching- Informal- Flexible

Extension is a process that involves **teaching** and guiding individuals, often in rural or agricultural settings, to improve their knowledge and practices. The three key characteristics of extension are:

Teaching: Extension services focus on educating individuals and communities, particularly farmers, about new methods, techniques, and technologies.

Informal: Unlike formal education, extension activities are often **informal** in nature, using practical demonstrations, workshops, and discussions rather than structured classroom settings.

Flexible: Extension programs are **flexible**, meaning they can adapt to the needs of different communities, regions, and individuals, offering personalized support.

Information Booster:

- **Extension** aims to improve the quality of life by providing individuals with information that they can practically apply.
- It often involves **community engagement** and participatory approaches, allowing people to learn by doing rather than through strict, formal curricula.

S39. Ans.(a)

Sol. The correct answer is: (A) Sun drying

Explanation:

Sun drying is one of the most common methods used for processing coffee beans. After the beans are harvested, they are spread out in the sun to dry.

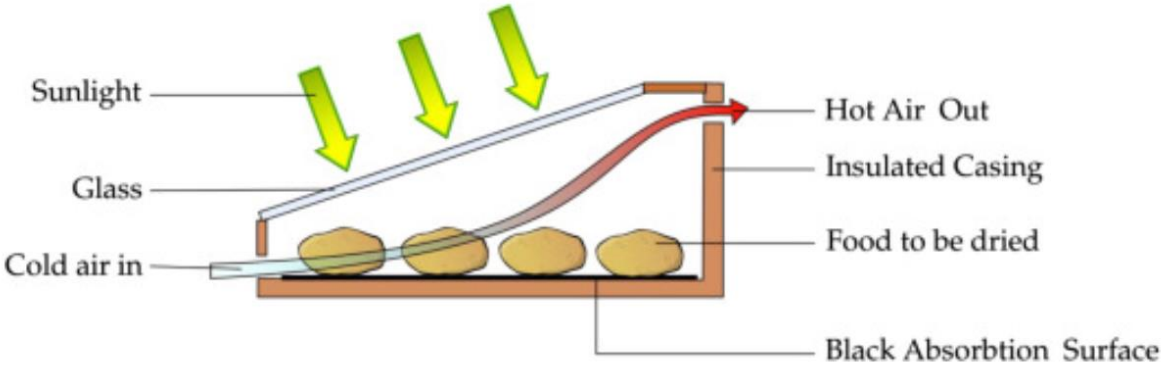
This method helps in removing excess moisture from the beans, which is crucial for proper storage and later roasting. Sun drying is preferred because it is cost-effective and retains the natural flavors of the beans.

Information Booster:

- **Sun drying** is used in many coffee-producing regions due to its simplicity and affordability.
- The beans are spread out on large mats or patios and turned regularly to prevent mold growth.
- The process can take a few days, depending on the weather conditions, and results in a naturally dried bean with enhanced flavor characteristics.

Knowledge Booster :

- **Fermentation** : A metabolic process in which microorganisms like bacteria or yeast convert sugars into acids, gases, or alcohol. Commonly used in products like **yogurt**, **sauerkraut**, and **alcohol**.
- **Blanching** : A cooking process where food, typically vegetables or fruits, is briefly immersed in boiling water and then quickly cooled, usually with ice water.



S40. Ans.(c)

Sol. The correct answer is: (C) Long-term credit

Explanation:

Long-term credit is the type of credit advanced for periods of more than 5 years, especially when secured against the **mortgage of immovable property**.

This type of credit is often used for undertaking large-scale development projects, infrastructure, or investments that require substantial time to yield returns.

Explanation:

- **Long-term credit** is advanced for periods more than 5 years against mortgage of immovable property for undertaking development works such as sinking wells, purchasing tractors, and making permanent improvements in the farm. It has to be repaid in half-yearly or annual installments.
- **Short-term credit** is given for periods ranging from 6 to 18 months and is primarily meant to meet cultivation expenses such as purchasing seeds, fertilizers, pesticides, and paying wages to laborers.
- **Medium-term credit** is for the purchase of pump-sets, farm machinery, implements, and to carry out minor improvements in the farm.

S41. Ans.(c)

Sol. The correct answer is: (C) Mahsana

Explanation:

Mahsana is a breed of buffalo that has been **evolved by crossing the Murrah and Surti breeds**. It is one of the best milch breeds found in Gujarat, especially in the Mehsana district.

This breed combines the high milk yield of **Murrah** and the adaptability and good fat content of **Surti**. The result is a buffalo breed that is productive and well-suited for dairy farming.

Information Booster:

- **Origin**: Mahsana district, Gujarat
- **Milk yield**: Moderate to high (1200–1500 liters per lactation)
- **Milk fat content**: Around 6–8%
- **Physical Features**: Medium-sized body, slightly curved horns, black or greyish-black color

Knowledge Booster :

- **Nili Ravi**: Origin: Pakistan (Punjab region) Known for: High milk yield (2000–3000 liters per lactation) Distinctive feature: White markings on forehead, tail switch, and udder
- **Jafarabadi**: Origin: Gujarat Features: Heaviest Indian buffalo breed Known for: Long, drooping horns and high milk production (1500–1800 liters/lactation) Ancestors: Indigenous breeding.

- **Nagpuri**: Origin: Maharashtra (Vidarbha region) Also called: Ellichpur Features: Suitable for drought and milch purposes Milk yield: Moderate (800–1200 liters/lactation)

S42. Ans.(b)
Sol. The correct answer is: (B) 1966
Explanation:
The **Seed Act was passed in India in the year 1966** to regulate the quality of seeds sold for agriculture.
This act was introduced to ensure that **farmers get access to quality seeds** of notified varieties, with proper labeling, certification, and truthfully labeled seeds.
The act provides a **legal framework** for seed certification and labeling, helping in improving agricultural productivity.
Important Key Points:
- **Name of Act**: The Seeds Act, 1966
- **Purpose**: To regulate the quality of seeds used in agriculture
- **Main Provisions**: Seed certification, labeling, establishment of seed testing laboratories
- **Enforcement Year**: Came into force in **1969.**

S43. Ans.(d)
Sol. The correct answer is: (D) Public funding
A **long-term sustainable agricultural extension system** depends primarily on **public funding**, which ensures **stability, continuity, and accessibility** of extension services for farmers.
Public funding comes from government budgets and is crucial for reaching small and marginal farmers across rural areas who may not afford private services.

Important Key Points:

- **Public funding** ensures equitable access for all farmers.
- It promotes **institutional support**, infrastructure, and trained personnel.
- **World Bank Funding:** Often **short-term or project-based**. Useful for initiating programs.
- **Plot Projects:** These are **small-scale, localized demonstrations**. Important for awareness.
- **Donor Funding:** Includes support from **international organizations or NGOs**. **Temporary and goal-specific.**

S44. Ans.(b)

Sol. The correct answer is: (B) Cabbage

The **Diamondback moth (Plutella xylostella)** is a **serious pest of cabbage and other cruciferous crops** like cauliflower, broccoli, and mustard.

The larvae feed on the undersides of leaves, creating holes and reducing market value. It is considered one of the most **destructive pests of Brassicaceae crops** worldwide.

Important Key Points:

- Scientific name: ***Plutella xylostella***
- **Nature of damage:** Larvae feed on foliage, creating windows and holes
- **Reproduction:** Multiple generations per year
- Management: **Biological control,insecticides, pheromone traps**

Knowledge Booster (Other Option Information):

- **Cotton:** Major pests: Bollworms (American, spotted, pink), aphids, jassids
- **Rice:** Common pests: Stem borer, brown planthopper, leaf folder
- **Soybean:** Common pests: Girdle beetle, pod borer, whitefly, stem fly.

S45. Ans.(b)

Sol. The correct answer is: (B) Early adopters

The **Early adopters** are individuals who adopt new ideas and innovations soon after the innovators. They are **respected members of society**, often **looked upon as opinion leaders**, and play a vital role in influencing the majority.

They are known for their **high empathy**, **local orientation**, **less dogmatism**, and **social respectability**, making them essential for the diffusion of innovations in a community.

Important Key Points:

Position in adoption curve: Second after innovators

- **Traits**:
  - High opinion leadership
  - Localite (well-integrated in the community)
  - High social status
  - High empathy (understanding others' needs)
  - Less dogmatic (open to new ideas)
- **Role**: Bridge between innovators and majority

S46. Ans.(c)

Sol. The correct answer is: (C) -196°C

Frozen semen is stored in liquid nitrogen at -196°C, which is the boiling point of liquid nitrogen under atmospheric pressure.

This extremely low temperature ensures that the sperm cells remain in a **viable and suspended state**, halting all biological activity and preserving them for long-term use in artificial insemination.

Important Key Points:

- Storage medium: **Liquid nitrogen**
- Purpose: Preservation of semen for **long-term use in artificial breeding**
- Common in: Dairy and livestock breeding centers
- Maintains: **Viability and motility** of sperm upon thawing

S47. Ans.(a)

Sol. The correct answer is: (A) T-budding or Patch budding

The **most common and successful method of propagating sweet orange (Citrus sinensis)** is **T-budding or Patch budding**.

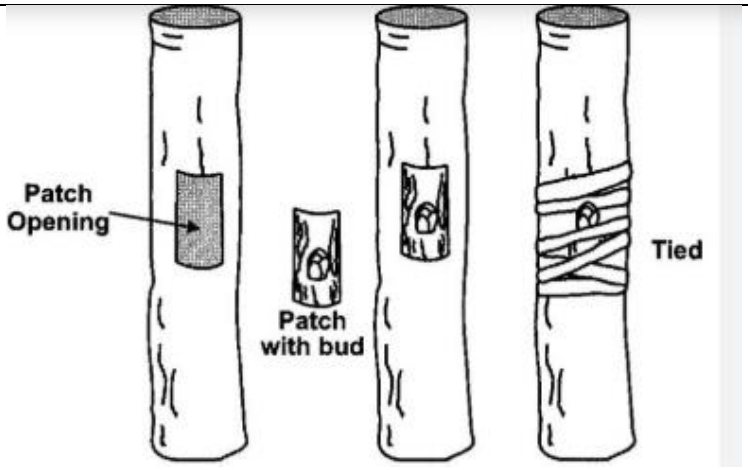
This method ensures **true-to-type plants**, better compatibility with rootstock, early fruiting, and improved disease resistance.

Important Key Points:

- **T-budding and Patch budding** are **vegetative propagation** methods.
- Used to **propagate quality varieties** on **suitable rootstocks**.
- Produces **uniform plants** with **earlier bearing**.
- Rootstocks often used: **Rough lemon, Rangpur lime, or Carrizo citrange.**

Knowledge Booster :

- **Grafting:** Also a method of vegetative propagation, Used more for other fruit crops like mango and guava.
- **Cutting:** due to **poor rooting ability** and **weak plant structure**. Suitable for crops like grapes and pomegranate.
- **Seed sowing:** it leads to **genetic variability** and **late fruiting**. Used only for **raising rootstock** plants.



S48. Ans.(b)

Sol. The correct answer is: (B) Angora goats

Explanation:

Mohair is a **luxurious fiber** obtained from **Angora goats** (*Capra aegagrus hircus*). It is **soft, silky, and durable**, making it highly valued in the textile industry.

- **Production regions:** The leading producers of mohair are **Turkey, South Africa, and the United States (mainly Texas)**.
- **Fiber properties:** Mohair is known for its **shine, strength, and elasticity**. It is often blended with wool to enhance its softness and durability.
- **Uses:** It is widely used in **high-quality fabrics, scarves, shawls, suits, and upholstery**.

Knowledge Booster :

- **Merino:**
  - Merino sheep are primarily found in **Australia and New Zealand**.
  - Used in **thermal wear, activewear, and fine clothing**.
- **Nagori:**
  - it is a **cattle breed** from **Rajasthan, India**, known for its **strong build and use in agriculture**.
- **Mehsana:**
  - **Indian buffalo breed**). Popular for **high milk yield** in Gujarat.

S49. Ans.(d)

Sol. The correct answer is: (D) CGMS (Cytoplasmic Genetic Male Sterility) system

The **three-line system of breeding** is known as the **Cytoplasmic Genetic Male Sterility (CGMS) system**. This system is widely used in **hybrid seed production** and involves three different types of plant lines to ensure controlled pollination and hybrid seed development.

Important Key Points:

The **three-line system** consists of:

1. **A-line (Male Sterile Line)**
   - This line lacks functional pollen due to **cytoplasmic male sterility**.
   - It is used as the **female parent** in hybrid breeding.
2. **B-line (Maintainer Line)**
   - It is **genetically identical** to the A-line but **fertile**.
   - It helps **maintain the A-line** because A-line cannot self-propagate.
3. **R-line (Restorer Line)**
   - It carries **fertility restorer (Rf) genes**.
   - When crossed with the A-line, it produces **fertile hybrid seeds**.

Knowledge Booster:

- **Single-line system**
  - Self-pollination or open pollination methods are used.
- **Double-line system:** Uses **two lines (Male Sterile + Restorer)** instead of three. Less effective than the three-line system.
- **Three-line system**: Specifically used in crops like **rice, sorghum, sunflower, and pearl millet**.

S50. Ans.(a)

Sol. The correct answer is: (A) Viral

Ranikhet disease, also known as **Newcastle Disease**, is a **highly contagious viral disease** that primarily affects **poultry birds** such as chickens.

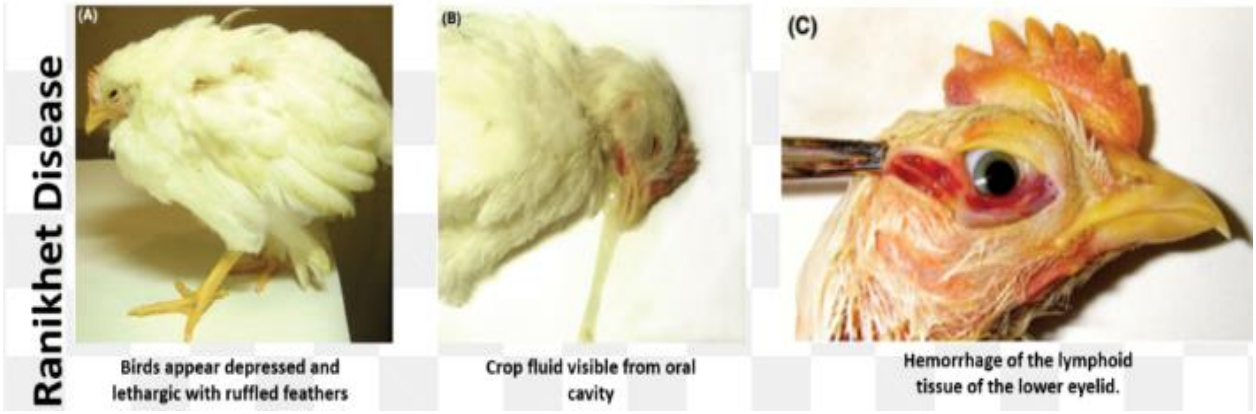
It is caused by the **Newcastle Disease Virus (NDV)**, which belongs to the **Paramyxoviridae family**. The disease leads to respiratory distress, nervous signs, drop in egg production, and high mortality in birds.

Important Key Points:

- Causative agent: **Newcastle Disease Virus (NDV)**
- Transmission: Through **aerosols, droppings, contaminated feed, and water**
- Symptoms: Sneezing, coughing, twisted neck (torticollis), paralysis, greenish diarrhea
- Prevention: **Vaccination** is the main control method
- Affects: Mostly poultry birds – **chickens, turkeys, pigeons**

Knowledge Booster (Other Option Information):

- **Bacterial:** Bacterial diseases in poultry include **Fowl cholera (caused by *Pasteurella multocida*)**, **Salmonellosis**, and **Infectious Coryza**.
- **Fungal:** Fungal infections like **Aspergillosis** are caused by **Aspergillus fungi**, affecting the respiratory system.
- **Nematodal:** Nematodal diseases are caused by **parasitic roundworms** (e.g., Ascaridia galli).



S51. Ans.(c)

Sol. Correct Answer: C) 2008

Explanation:

The **Food Safety and Standards Authority of India (FSSAI)** was officially established on **5th September 2008** under the **Food Safety and Standards Act, 2006**.

Information Booster:

The Food Safety and Standards Authority of India is a statutory body under the administration of the Ministry of Health and Family Welfare, Government of India.

It regulates the manufacture, storage, distribution, sale, and import of food articles, while also establishing standards to ensure food safety.

- Founded: **5 September 2008**
- Founder: **Anbumani Ramadoss**
- Formed: **September 5, 2008**
- Headquarters: **New Delhi**
- Jurisdiction: **India**

Parent Regulatory authority: Ministry of Health &Family Welfare, Government of India

Regulatory authority executives: Ms. Punya Salila Srivastava, Chairperson; Ganji Kamala V. Rao, Chief executive officer.

S52. Ans.(a)

Sol. The correct answer is: (A) ssRNA

Explanation:

The **majority of plant viruses** possess a genome made up of **single-stranded RNA (ssRNA)**.

These ssRNA viruses are usually **positive-sense RNA viruses**, which means their RNA can act directly as messenger RNA (mRNA) and can be immediately translated by the host plant's ribosomes to produce viral proteins.

Information Booster:

- Examples of ssRNA plant viruses include:
  - **Tobacco mosaic virus (TMV)**
  - **Cucumber mosaic virus (CMV)**
  - **Potato virus Y (PVY)**

Knowledge Booster :

- **dsRNA (Double-stranded RNA):** Found in a few plant viruses like **Wound tumor virus** and **Rice dwarf virus.**
- **ssDNA (Single-stranded DNA):** Present in some plant viruses like **Geminiviruses**, which infect many dicotyledonous plants.
- **dsDNA (Double-stranded DNA):** Very **rare in plant viruses**. These are mostly seen in **animal or bacteriophage viruses.**

S53. Ans.(c)

Sol. The correct answer is: (C) Quercetin

Explanation:

The **yellow color in onion**, especially in **yellow onions**, is primarily due to the presence of a **flavonoid called quercetin**. Quercetin is a naturally occurring **plant pigment (flavonol)** that belongs to the class of polyphenols. It contributes not only to the **yellow to brown coloration** in onions but also provides **antioxidant and anti-inflammatory properties**.

Information Booster:

- Quercetin is highly concentrated in the **outer layers** of the onion.
- It is also known for its health benefits, including reducing blood pressure and boosting immunity.
- It is **water-soluble**, hence cooking can sometimes reduce its levels in food.

Knowledge Booster :

- **Carotene:** It is a pigment responsible for **orange-yellow color** in vegetables like carrots and sweet potatoes.
- **Anthocyanin:** This gives **red, purple, or blue colors** in plants like red onions, berries, and grapes.
- **Chlorophyll:** Provides the **green color** in plant leaves and some vegetables.

S54. Ans.(b)
Sol. Correct Answer: B) Maharashtra
Explanation:
The **Warna Project** was initiated in the state of **Maharashtra**, specifically in the **Kolhapur and Sangli districts**. This project encompasses various initiatives aimed at enhancing irrigation, promoting cooperative development, and leveraging information technology to improve rural livelihoods.
Key Components of the Warna Project:
1. **Warna Irrigation Project**: A significant irrigation initiative located in the Sangli district, designed to provide water resources to numerous villages in the region .
2. **Warna Wired Village Project**: Launched in 1998, this project aimed to connect a cluster of 70 villages in Warana Nagar through information technology.

The objective was to provide villagers with access to information on agriculture, education, health, and other services via computer booths established in each village .

S55. Ans.(d)
Sol. The correct answer is: (D) A mixture of spherical and bacilliform viruses
Explanation:
Rice tungro disease is a major viral disease affecting rice crops, especially in Southeast Asia and India. It is caused by a **combination of two distinct viruses**:
- **Rice tungro bacilliform virus (RTBV)** – a **bacilliform (rod-shaped)** DNA virus
- **Rice tungro spherical virus (RTSV)** – a **spherical RNA virus**

Information Booster:
- **Vector:** Green leafhopper (*Nephotettix virescens*)
- **Symptoms:** Yellowing, stunting, reduced tillering, and poor grain filling
- **Control Measures:** Use of resistant varieties, vector control, and field sanitation

Knowledge Booster :
- **A mixture of spherical and flexuous viruses:** Flexuous viruses (like Potyviruses) are not associated with tungro.
- **A bacilliform virus alone:** RTBV alone cannot cause the full disease symptoms; it needs RTSV for effective transmission and severity.
- **A mixture of bacilliform and flexuous viruses:** No flexuous virus is involved in tungro disease. Only spherical and bacilliform viruses are responsible.

S56. Ans.(b)
Sol. The Correct Answer is: (B)**E-mail**
Explanation:
E-mail is the most suitable visual aid for technology transfer among the options listed.
- It allows for the easy sharing of documents, images, diagrams, and other visual materials that can effectively convey technical information.
- E-mail also enables asynchronous communication, allowing recipients to review and process information at their own pace.

Other Options Explanations:
(a) Audio teleconference: While teleconferencing facilitates communication, it primarily relies on audio and lacks the visual component crucial for effective technology transfer.
(c) Cultural programme: Cultural programs are valuable for cultural exchange and understanding.

S57. Ans.(c)

Sol. The correct answer is: (C) Vitamin A

Explanation:

Mangoes are an excellent source of **Vitamin A**, primarily in the form of **beta-carotene**, which is a precursor to Vitamin A.

This vitamin plays a crucial role in maintaining healthy vision, skin, and the immune system. Mangoes are especially rich in **Vitamin A when they are ripe** and have a vibrant yellow or orange color.

Important Key Points:

- Mangoes are rich in **beta-carotene**, which is converted into **Vitamin A** in the body.
- Vitamin A supports **vision**, **immune function**, and **skin health**.
- **Ripe mangoes** have a higher concentration of Vitamin A.

Knowledge Booster :

Vitamin E: Vitamin E is primarily found in nuts, seeds, and green leafy vegetables.

Vitamin D: Vitamin D primarily comes from sunlight and fortified foods.

S58. Ans.(a)

Sol. The correct answer is: (A) Chicken

Explanation:

Gumboro disease, also known as **Infectious Bursal Disease (IBD)**, primarily affects **chickens**, especially young birds under 6 weeks of age.

It is caused by a virus that targets the **bursa of Fabricius**, an organ involved in immune function. The disease leads to immunosuppression, making the affected birds more susceptible to secondary infections.

Information Booster:

- **Symptoms: Diarrhea, depression, swelling**, and **loss of appetite** in chickens.
- **Transmission:** The disease spreads through **fecal-oral route** and contaminated feed or water.
- **Prevention:** Vaccination is key to controlling the disease in poultry farms.

Knowledge Booster:

- **Cow:** Cows can suffer from various other diseases like **Foot and Mouth Disease** or **Bovine Tuberculosis**.
- **Goat:** Goats can suffer from diseases like **Peste des Petits Ruminants (PPR)** or **Caprine Arthritis Encephalitis (CAE)**.
- **Sheep:** Common diseases in sheep include **Scrapie** or **Blue Tongue**.

S59. Ans.(a)

Sol. The correct answer is: (A) Marketable surplus

Explanation:

Marketable surplus refers to the quantity of agricultural produce that can be made available for sale or transfer to the non-farm population, after meeting the needs of the farm household.

This surplus is the portion of the total production that is not consumed or used by the farmer but is instead intended for external markets, such as urban areas or export.

Information Booster:

- **Marketable surplus** is the portion of the total production available for sale after satisfying the consumption needs of the producing household.
- It is important for the economy as it contributes to the availability of food and other agricultural products for the urban population and other sectors.

S60. Ans.(b)

Sol. The correct answer is: (B) India

Explanation:

India is the **largest producer of okra (lady's finger)** in the world. It contributes a significant share to the global production of okra, thanks to its favorable climate, large area under cultivation, and high domestic demand.

Okra is widely grown across many Indian states and is an important vegetable crop in Indian agriculture.

Information Booster:

- India accounts for over **60% of the world's total okra production**.
- Major okra-producing states include **West Bengal, Bihar, Gujarat, Odisha, and Andhra Pradesh**.
- It is a rich source of **vitamin C, fiber, and antioxidants**.

Knowledge Booster :

- **Nigeria:** Nigeria is one of the top producers of okra in Africa but ranks **second globally** after India.
- **Brazil:** Brazil produces okra for domestic consumption, but its global contribution is minimal compared to India and Nigeria.
- **United States:** The US produces okra mainly in southern states like **Texas, Georgia, and Florida.**

S61. Ans.(c)

Sol. The correct answer is: (C) Trehalose

Explanation:

Trehalose is the **major blood sugar found in insects**. It is a disaccharide composed of two glucose molecules and is the primary sugar circulating in the hemolymph (**the insect equivalent of blood)**.

Trehalose serves as a crucial source of energy for flight and other metabolic processes in insects.

Information Booster:

- Trehalose helps insects survive under stress conditions such as **desiccation (drying)** and **cold temperatures**.
- It is synthesized in the **fat body** (analogous to the liver in vertebrates) and released into the hemolymph.
- Acts as an **energy reservoir** and **protective sugar** in many insects.

Knowledge Booster :

Glucose

- **Type**: Monosaccharide (Simple sugar): $C_6H_{12}O_6$
- **Structure**: Aldose sugar (contains an aldehyde group)
- **Sources**: Grapes, blood sugar, honey

Fructose

- **Type**: Monosaccharide (Simple sugar): $C_6H_{12}O_6$
- **Structure**: Ketose sugar (contains a ketone group)
- **Sources**: Fruits, honey, corn syrup

S62. Ans.(a)

Sol. The correct answer is: (A) Atrazine

Explanation:

Atrazine is the most commonly used **pre-emergence herbicide in sorghum** cultivation. It is applied to the soil before the emergence of weeds and sorghum seedlings.

Atrazine effectively controls a wide range of **broadleaf and grassy weeds**, which can otherwise compete with the crop for nutrients, water, and sunlight.

Information Booster:

- **Atrazine** is a **selective systemic herbicide**, absorbed mainly through the roots.
- Recommended dose: Usually **0.5–1.0 kg/ha** depending on soil type and weed pressure.
- Should be applied on a **moist soil surface** soon after sowing.

Knowledge Booster :

- **Alachlor:** Commonly used in crops like **groundnut, soybean, and maize.**
- **Glyphosate:** A **non-selective, post-emergence herbicide**, used for **total weed control**.
- **Paraquat:** A **contact herbicide**, used for quick knockdown of existing vegetation. It is also a **non-selective post-emergence herbicide.**

S63. Ans.(a)

Sol. The correct answer is: (A) Hyderabad

Explanation:

ICRISAT stands for **International Crops Research Institute for the Semi-Arid Tropics**. It is an international agricultural research institute headquartered in **Hyderabad, Telangana, India**.

ICRISAT focuses on improving agriculture in **semi-arid tropical regions**, particularly for crops like **sorghum, pearl millet, chickpea, pigeon pea, and groundnut**.

Information Booster:

- Established in **1972**.
- It works under the **CGIAR** (Consultative Group on International Agricultural Research).
- Its research supports **sustainable agriculture**, **climate resilience**, and **food security** in developing countries.
- Headquarters: **Patancheru, near Hyderabad**.

Knowledge Booster :

- **New Delhi:** It is the headquarters of **ICAR (Indian Council of Agricultural Research).**
- **Kolkata:** Home to some premier institutions like the **Indian Statistical Institute.**

S64. Ans.(c)

Sol. The correct answer is: (C) Agrifound Light Red

Explanation:

Agrifound Light Red is **not** a variety of **garlic**; it is actually a variety of **onion**. The remaining options — **Agrifound White**, **Agrifound Parvati**,
and **Yamuna Safed** — are well-known varieties of **garlic** developed by the **National Horticultural Research and Development Foundation (NHRDF)**.

Information Booster:

- **Garlic varieties** such as Agrifound White, Agrifound Parvati, and Yamuna Safed are high-yielding, disease-resistant, and suitable for various agro-climatic zones.
- These varieties are often named and promoted by NHRDF.
- Garlic is propagated through **cloves.**

Knowledge Booster :

- **Agrifound White:** A popular garlic variety with white cloves, developed by NHRDF. Known for its good yield and storage quality.
- **Agrifound Parvati:** A variety of garlic suited for **hilly regions**, especially **Himachal Pradesh**. It matures early and has good storage qualities.
- **Yamuna Safed:** A prominent garlic variety released by NHRDF. It includes sub-varieties like **Yamuna Safed-2 (G-50)** and **Yamuna Safed-3 (G-282)**.

S65. Ans.(c)

Sol. The correct answer is: (C) Prophase

Explanation:

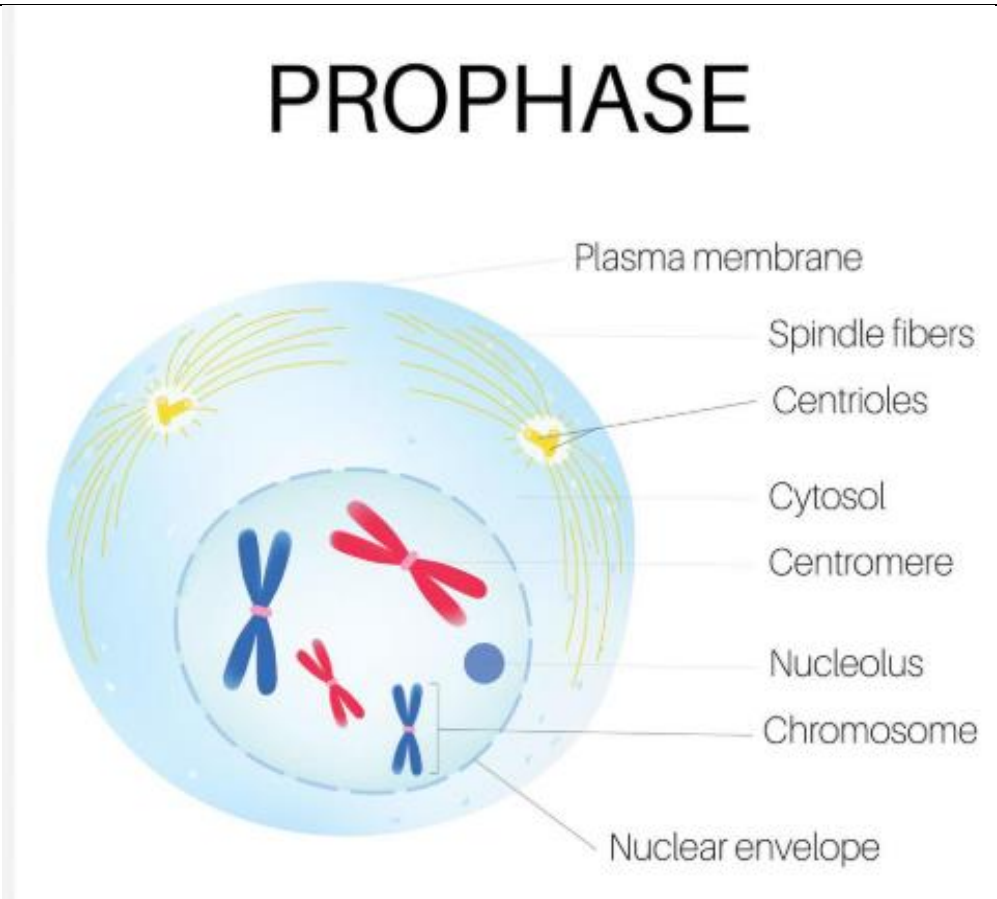
Prophase is the **longest phase of mitosis**, during which the chromatin condenses into visible chromosomes, the nucleolus disappears, the nuclear envelope begins to disintegrate, and the mitotic spindle starts to form.

Information Booster:

- **Mitosis** has four main phases: **Prophase → Metaphase → Anaphase → Telophase**
- In **prophase**:
  - Chromosomes condense and become visible.
  - Centrosomes move to opposite poles.
  - Spindle fibers begin to form.

Knowledge Booster :

- **Anaphase:** It is the **shortest phase** of mitosis. During this phase, sister chromatids are pulled apart to opposite poles of the cell.
- **Metaphase:** Chromosomes align at the equator (metaphase plate), and spindle fibers attach to the centromeres.
- **Telophase:** Final stage where nuclear membranes re-form around the chromosomes, and chromosomes begin to de-condense.



S66. Ans.(b)

Sol. The correct answer is: (B) Leafhopper

Explanation:

Rice tungro virus is **transmitted by leafhoppers**, primarily the species **Nephotettix virescens** and **Nephotettix nigropictus**. Tungro is one of the most serious viral diseases in rice and is caused by a **combination of two viruses**:

- **Rice tungro bacilliform virus (RTBV)**
- **Rice tungro spherical virus (RTSV)**

The **leafhopper vector** plays a key role in the spread of both viruses from infected to healthy plants.

Information Booster:

- **RTSV** helps in the transmission of **RTBV** by enabling infection through vector interaction.
- **Symptoms include:**
  - **Yellow-orange leaf discoloration**
  - **Stunted growth**
  - **Reduced tillering**
- The disease is more common in tropical regions like **India, Philippines, and Southeast Asia**.

Knowledge Booster:

- **Aphid:** Aphids are vectors for several **plant viruses**, especially in **legumes and potatoes.**
- **Whitefly:** Whiteflies transmit viruses like **Yellow Vein Mosaic Virus (YVMV)** in **okra** and **cotton.**
- **Mite:** Mites are vectors for **tospoviruses** (e.g., groundnut bud necrosis).


S67. Ans.(b)

Sol. The correct answer is: (B) Berseem

Explanation:

Berseem (*Trifolium alexandrinum*) is widely regarded as the **"King of Fodder Crops"** in India, especially for the **Rabi season**.

It is **highly nutritious, succulent, palatable,** and has a high **green fodder yield**. It grows quickly and provides multiple **cuttings, making** it ideal for dairy and livestock feeding.

Information Booster:

- **Botanical name:** *Trifolium alexandrinum*
- **Season:** Rabi (winter crop)
- **Green fodder yield:** 80–100 tons/ha
- **Benefits:** High in protein and digestibility, Improves soil fertility via nitrogen fixation, Provides 4–6 cuttings per season

Knowledge Booster:

- **Alfalfa (Medicago sativa):** Known as the **"Queen of Forages"** globally and **"King"** in some temperate countries.
- **Ryegrass (Lolium spp.):** Commonly used in pastures in **temperate regions. Suitable for grazing.**
- **Timothy (Phleum pratense):** Cool-season grass mainly used for **horses and pets.**

S68. Ans.(b)
Sol. The correct answer is: (B) Indian Council of Agricultural Research
Explanation:
The **Indian Council of Agricultural Research (ICAR)** is the apex body in India responsible for **coordinating, guiding, and managing agricultural research and education**.
Established in 1929, ICAR functions under the Ministry of Agriculture and Farmers' Welfare and plays a crucial role in **advancing agricultural science**, promoting **sustainable farming practices.**
Information Booster:
- **ICAR** oversees **agricultural research institutions** and **colleges**, including **State Agricultural Universities**.
- It is responsible for **developing high-yielding crop varieties**, **pest management techniques**, and **innovations** in **agriculture** to ensure food security.
- The **Indian Agricultural Research Institute (IARI)**, Delhi, is one of its prominent research institutes.

Knowledge Booster:
- **Agricultural Support and Services Project:** This refers to specific programs aimed at providing support for **farmers' services.**
- **State Agricultural Universities:** These universities are responsible for **regional agricultural education and research.**
- **Department of Agricultural Extensions:** It focuses on **agricultural extension services**, which help disseminate agricultural knowledge to farmers.

S69. Ans.(d)
Sol. The correct answer is: (D) Zero
Explanation:
In **perfectly inelastic demand**, the quantity demanded remains constant regardless of any change in price. This means that consumers will buy the same quantity of the good even if its price increases or decreases.
As a result, the **elasticity of demand** is **zero**, indicating that the demand does not respond at all to price changes.
Information Booster:
- For **perfectly inelastic demand**, the **% change in quantity demanded** is **zero**, making the elasticity zero.
- Examples of perfectly inelastic demand include **life-saving medications** where the quantity demanded doesn't change regardless of the price.

Knowledge Booster:
- **One (Unitary Elasticity):** When the percentage change in quantity demanded is **equal** to the percentage change in price, the elasticity is **one**.
- **Less than Unity:** When the percentage change in quantity demanded is **less than** the percentage change in price, the demand is **inelastic.**
- **Infinity (Perfectly Elastic Demand):** When the demand is perfectly responsive to any change in price, such as in **perfect competition.**

S70. Ans.(a)
Sol. The correct answer is: (A) Pulse beetle
Explanation:
The **Pulse beetle** (*Callitephus indicus*) is a common pest that attacks both in the **field** and during **storage** of pulses.

The larvae of this beetle infest the pulse seeds, causing significant damage by feeding on them, which leads to the deterioration of the quality of the stored pulses. It is a serious pest for pulses like **gram, pigeon pea, and lentils**.

Information Booster:

- **Pest behavior:** The **pulse beetle** damages pulses in the field by feeding on the pods and seeds. Once harvested, it continues to damage the stored pulses by infesting the seeds, reducing their marketability and quality.
- **Control:** Integrated pest management (IPM), including the use of **chemical treatments** during storage, **maintaining proper storage conditions**, and **biological control** measures, helps manage this pest.

Knowledge Booster:

- **Gram pod borer (Helicoverpa armigera):** This pest primarily attacks the **field** stage of pulses, particularly during the flowering and pod formation stages.
- **Red gram pod fly (Melanagromyza obtusa):** This pest mainly attacks the **field** and **pods** of **pigeon pea (red gram)**.
- **Pod borer (Leguminivora glycine):** Similar to the gram pod borer, it attacks the **field crops** of pulses, especially in the **flowering and pod-filling stages.**

Fig 8. *Callosobruchus chinensis* adult

S71. Ans.(d)

Sol. The correct answer is: (D) Breeder Seed

Explanation:

Breeder Seed has the highest genetic purity among all types of seeds. It is the initial source of seed used to produce all other types of seeds, including **foundation seeds** and **certified seeds**.

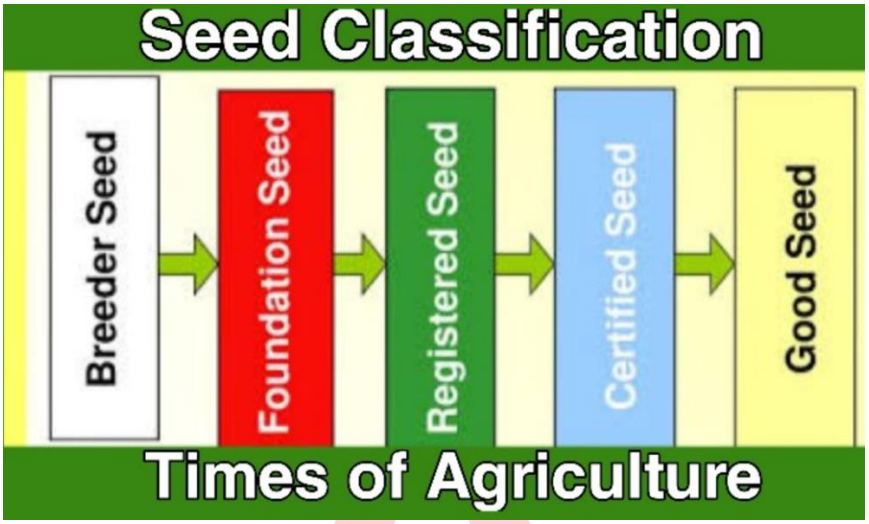
Breeder seeds are produced and maintained by the **research organizations** or **seed-producing agencies** to ensure that the seed is genetically true-to-type and free from any undesirable traits.

Information Booster:

- **Breeder Seed:**
  It is the **original seed** material from which the **foundation** and **certified seeds** are derived. It is produced under the strictest conditions to maintain **genetic purity** and **quality**.
- **Purity:**
  Breeder seed ensures the **genetic integrity** of the variety and is used to maintain the quality of the seed multiplication system. It is produced in small quantities for further multiplication.

Knowledge Booster:

- **Truthful Labelled Seed:** These seeds are labeled with a statement of truth regarding their **quality and variety**.
- **Foundation Seed:** Foundation seeds are produced from **breeder seeds** and are the second level of seed production.
- **Certified Seed:** Certified seeds are produced from **foundation seeds** and are the final step in the seed production chain.



S72. Ans.(c)

Sol. The correct answer is: (C) 6-18 months

Explanation:

Medium-term loans in agriculture generally have a duration of **6 to 18 months**. These loans are typically used for **investments** or **expenditures** that require a longer time frame than a short-term loan.

Such loans are often taken for activities such as **purchasing machinery**, **improving infrastructure**, or **irrigation systems**, where the repayment period aligns with the farming cycle that spans over a season or more.

Information Booster:

- **Medium-term loans** cater to the needs that do not need immediate repayment but still require **relatively quick turnover** for investments and operational costs.
- They are used when the agricultural activities span a season or need improvements for the upcoming seasons.

Knowledge Booster (Other Option Information):

- **1-3 months:** These are **short-term loans**, usually given for **seasonal needs**, like purchasing seeds, fertilizers, and other supplies needed for a single crop season.
- **18-24 months:** These are **long-term loans**, used for significant investments like land purchases, building permanent infrastructure, and acquiring major equipment or assets.

S73. Ans.(c)

Sol. The correct answer is: (C) 3:1

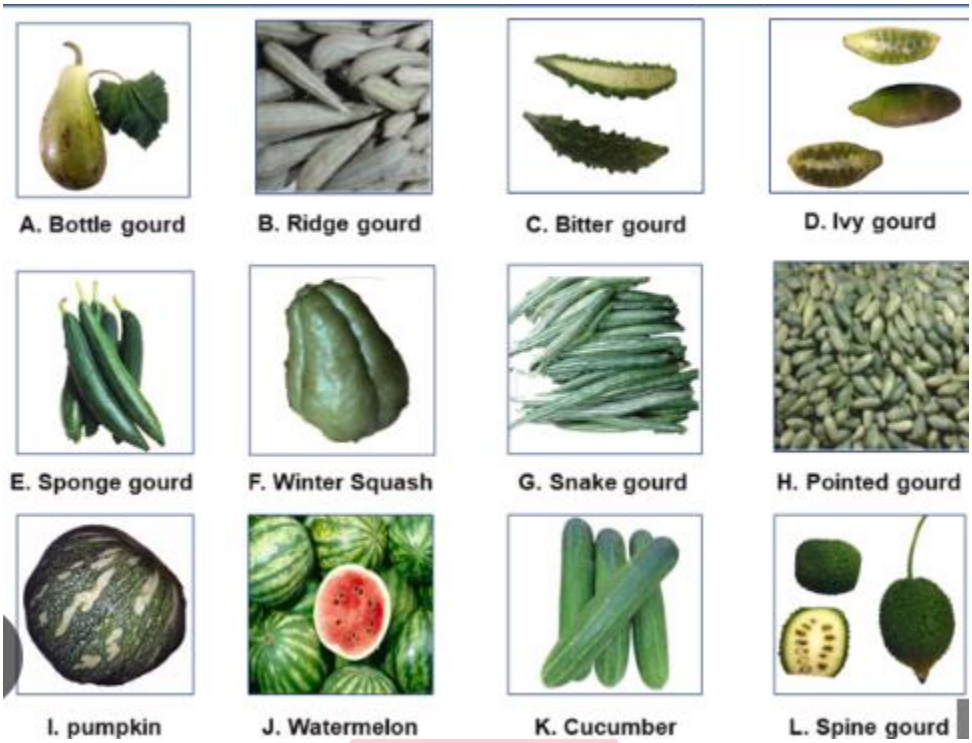
Explanation:

In cucurbit vegetables, such as **cucumbers**, **melons**, and **squash**, the ratio of **male to female flowers** is generally around **3:1**.

While male flowers are produced in higher numbers initially, female flowers are still crucial for fruit production. The high number of male flowers ensures that there is sufficient pollen for the fertilization of female flowers.

Information Booster:

- **Male flowers** are responsible for **pollen production**, which is necessary for **fertilizing** the female flowers.
- The **female flowers**, once fertilized, develop into **fruits**.



S74. Ans.(b)

Sol. The correct answer is: (B) National Bank for Agriculture and Rural Development

Explanation:

NABARD stands for the **National Bank for Agriculture and Rural Development**. It is a development bank in India that focuses on the promotion of agricultural and rural development.

NABARD plays a key role in providing **financial support** and **guidance** to the agricultural sector, as well as to rural infrastructure projects. The institution also aims to improve the livelihood of farmers and rural communities through various schemes and programs.

Information Booster:

- **NABARD** was established in **1982** by an act of the Indian Parliament to support rural and agricultural development through financial services and credit.
- It provides financial assistance for **agriculture**, **rural infrastructure**, and **cooperative societies**.

S75. Ans.(d)

Sol. The correct answer is: (D) 6.7M × 6.7M

Explanation:

For **guava trees**, the recommended spacing for optimal growth and fruit production is **6.7 meters x 6.7 meters**. This distance ensures that the trees have adequate space for root expansion, proper air circulation, and enough sunlight.

The wide spacing also helps to reduce the risk of disease and pest infestations, while promoting healthy tree development.

Information Booster:

- A spacing of **6.7 meters x 6.7 meters** is suitable for **guava trees** in larger orchards where the trees are expected to grow larger, and there is enough land for effective utilization.
- It promotes better growth by providing sufficient room for each tree to spread out and develop its full potential.

S76. Ans.(c)

Sol. The correct answer is: (C) January 21, 2004

Explanation:

The **Kisan Call Centre (KCC)** was officially established on **January 21, 2004** by the Ministry of Agriculture, Government of India.

The primary aim of the KCC is to provide farmers with direct access to information regarding agriculture, including crop management, pest control, weather conditions, and details about government schemes.

Information Booster:

- The **Kisan Call Centre** provides a platform for farmers to connect with agricultural experts for instant guidance and advice on farming practices.
- This initiative is part of the government's efforts to improve agricultural productivity and support farmers with valuable information.

Knowledge Booster :

- **January 1, 2000:** While it is close to the initial efforts towards farmer support, the KCC was formally launched in 2004.
- **January 15, 2003:** Although some government initiatives were aimed at farmer support in the early 2000s, the Kisan Call Centre was officially launched later, in 2004.
- **January 30, 2005:** By this time, the KCC would have already been operating, providing support to farmers across India.

S77. Ans.(c)

Sol. The correct answer is: (C) CACP

Explanation:

The **Commission for Agricultural Costs and Prices (CACP)** is the body responsible for recommending the **Minimum Support Price (MSP)** for various agricultural products in India.

The CACP is an advisory body that submits its recommendations to the Government of India, which then approves the MSP for different crops. The MSP is designed to ensure that farmers get a fair price for their produce and protect them from price fluctuations in the market.

Information Booster:

- The **CACP** considers several factors when recommending the MSP, including the cost of **production, market trends, and the overall economic** condition of the country.
- The **MSP** is an important policy tool used by the government to ensure **food security** and support farmers' income.

Knowledge Booster :

- **Ministry of Agriculture:** The Ministry of Agriculture plays a significant role in agricultural policy, but the **CACP** specifically recommends the MSP.
- **NABARD:** The **National Bank for Agriculture and Rural Development (NABARD)** focuses on the development of agriculture and rural sectors.
- **FCI (Food Corporation of India):** The **Food Corporation of India (FCI)** is involved in the procurement and distribution of food grains.

S78. Ans.(c)

Sol. The correct answer is: (C) Cotton

Explanation:

Pectinophora gossypiella, commonly known as the **Pink Bollworm**, is a major pest of cotton. This insect attacks the cotton plant by feeding on the bolls,
the round structures where cotton fibers are produced. It causes significant damage to cotton crops, reducing both the quality and quantity of cotton yield.

Information Booster:

- The **Pink Bollworm** is particularly harmful to cotton crops during the blooming and boll formation stages. The larvae of this pest feed on cotton bolls and can lead to the decay of the cotton fibers.
- Integrated pest management strategies are commonly employed to control the spread of this pest, including the use of chemical insecticides, biological control methods, and the cultivation of resistant cotton varieties.

Knowledge Booster:

- **Cumin:** a **spice** crop, is prone to different pests.
- **Brinjal (Eggplant):** Brinjal is more susceptible to pests like **fruit and shoot borers.**
- **Spinach:** Spinach faces threats from other pests like **aphids and leaf miners.**

S79. Ans.(b)

Sol. The correct answer is: (B) Entropy

Explanation:

Entropy is a measure of the **degree of randomness, disorder, or uncertainty** in a system. In various scientific fields like **thermodynamics, information theory, and statistics**, entropy quantifies the amount of unpredictability or the number of possible configurations a system can have.

- In **information theory**, entropy represents the average amount of information produced by a stochastic source of data. It tells us how uncertain or random the outcomes are.
- Higher entropy = more randomness or unpredictability.
- **Lower entropy = more order or predictability.**

Information Booster:

- The term **entropy** was originally introduced in **thermodynamics** to describe energy dispersal in a system.
- Later, **Claude Shannon** applied the concept to **information theory** as a way to measure the information content or uncertainty of a message source.

Knowledge Booster :

- **Variability** : Natural changes or fluctuations observed in a system or dataset. Height of students in a class varies naturally.
- **Probability**: The **mathematical likelihood** of an event occurring. Predicting outcomes when there is a known model or data (e.g., rolling a dice).
- **Uncertainty**: Lack of complete certainty; **incomplete knowledge** about outcomes or models.

S80. Ans.(d)

Sol. The correct answer is: (D) Aspergillus flavus

Explanation:

Aflatoxins are toxic secondary metabolites primarily produced by the fungus **Aspergillus flavus** and also by **Aspergillus parasiticus**.

These toxins contaminate a wide range of agricultural commodities, especially **cereals (like maize), nuts (like groundnut), and oilseeds**, particularly when stored under warm and humid conditions.

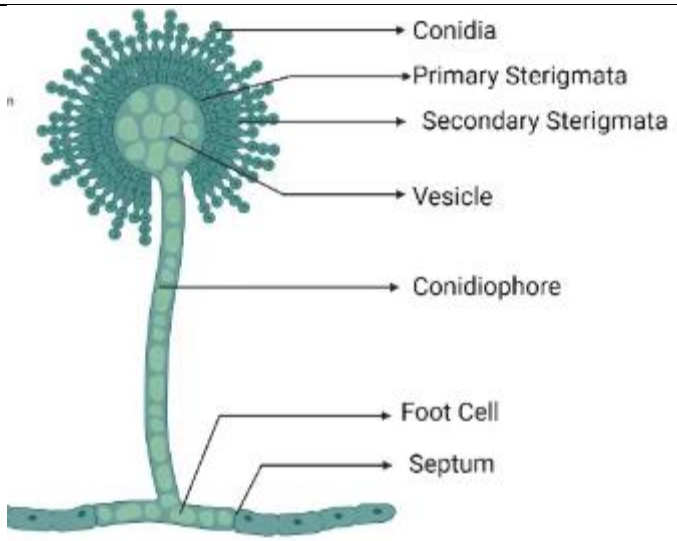
- Aflatoxins are highly carcinogenic and can cause acute poisoning, liver damage, and even death in humans and animals.
- They are one of the most serious **mycotoxins** of concern in food safety.

Information Booster:

- Aflatoxins are classified into several types: **B1, B2, G1, and G2**. Among these, **Aflatoxin B1** is the most toxic and carcinogenic.
- Regulatory bodies like **FSSAI** (India) and **FDA** (USA) set strict limits for aflatoxin content in food products.

Knowledge Booster :

- **Alternaria burnsii:** Causes diseases in plants like **leaf spot** in cumin.
- **Fusarium graminearum:** Produces **trichothecenes** and **zearalenone**, It causes **head blight in wheat**.
- **Cladosporium spp.:** Commonly found as **saprophytes** on plant material.



S81. Ans.(b)

Sol. The correct answer is: (B) IARI, New Delhi

Explanation:

The Indian Journal of Extension Education (IJEE) is a leading peer-reviewed journal in the field of **agricultural extension**. It is published by the **Indian Society of Extension Education (ISEE)**, which is headquartered at the **Indian Agricultural Research Institute (IARI), New Delhi**.

The journal publishes articles, reviews, and research papers related to rural development, agricultural extension, and communication strategies for transferring agricultural technologies to farmers.

It is a reputed source of knowledge for **extension professionals, researchers,** and **students.**

Information Booster:

1. **ISEE** (Indian Society of Extension Education) was established in **1965**.

- IJEE is published **quarterly** and follows **peer-reviewed standards** to ensure high-quality research publication.

Knowledge Booster :

- **ICAR (Indian Council of Agricultural Research):** While ICAR is the apex body for coordinating agricultural research and education in India.
- **UGC (University Grants Commission):** UGC is responsible for higher education regulation.

S82. Ans.(a)

Sol. The correct answer is: (A) Diminishment of essential nutrients

Explanation:

Nutritional degradation in the post-harvest period refers to the **loss or reduction of essential nutrients** like vitamins, proteins, and minerals in food products **after they have been harvested**.

This degradation can occur due to improper storage, exposure to **sunlight, heat, oxidation, enzymatic activity, or microbial contamination.**

Information Booster:

- Common nutrients that degrade post-harvest include **Vitamin C, Vitamin A, and B-complex vitamins**.
- Poor storage and long delays in transportation contribute significantly to **nutritional losses**.
- **Cold storage, vacuum packaging, and quick transportation** can help reduce degradation.

S83. Ans.(c)

Sol. The correct answer is: (C) Gibberellin

Explanation:

During **seed germination**, the **stored food in the endosperm or cotyledons** is broken down and mobilized to supply energy and nutrients for the growing embryo. This **mobilization process is regulated by Gibberellins (GAs)**, especially **Gibberellic Acid (GA_3)**.

- Gibberellin stimulates the **synthesis of hydrolytic enzymes** like **α-amylase** in the aleurone layer of cereal grains.
- These enzymes break down starch into **sugars**, which are then used by the embryo during germination.

Information Booster:

- **Auxin (A):** Promotes cell elongation and root formation.
- **Ethylene (B):** Involved in fruit ripening and stress responses.
- **ABA – Abscisic Acid (D):** It **inhibits seed germination** and promotes **seed dormancy**, acting **antagonistically to gibberellin**.

S84. Ans.(c)

Sol. The correct answer is: (C) Greek

Explanation:

The word **"Agronomy"** comes from the **Greek** words:

- **"Agros"** meaning **field**, and
- **"Nomos"** meaning **management or law**.

Information Booster:

- Agronomy is a branch of agricultural science dealing with:
  - **Soil science,**
  - **Crop physiology,**
  - **Weed control,**
  - **Irrigation and water management,**
  - **Fertilizers and nutrient management.**
- Agronomists work to improve the **efficiency and sustainability** of farming practices.

S85. Ans.(a)

Sol. The correct answer is: (A) Homozygous and homogeneous

Explanation

A **pureline variety** is developed by **self-pollination** over several generations, selecting for desirable traits. As a result:

All individuals become **genetically identical (homozygous)**.

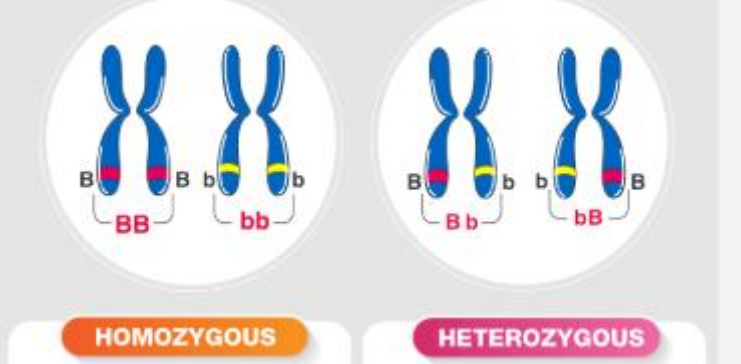
They also appear **phenotypically uniform (homogeneous)**.

Information Booster:

- Pureline selection is used in **self-pollinated crops** like wheat, rice, and barley.
- This method was first introduced by **Johannsen in 1903**.
- Purelines ensure **uniform performance**, **stable yield**, and **true breeding** traits.

Knowledge Booster :

- **Heterozygous and homogeneous (C):** Genetically diverse but phenotypically uniform — this may occur in **hybrids.**
- **Heterozygous and heterogeneous (D):** Both genetically and phenotypically diverse — this applies to **cross-pollinated populations.**



S86. Ans.(b)

Sol. The correct answer is: (B) Hermaphrodite

Explanation :

An individual organism that possesses **both male and female reproductive organs** is called a **Hermaphrodite**. Such organisms are capable of producing both sperm and egg cells.

- **Hermaphroditism** is common in **plants**, **invertebrates** like earthworms, and some fish and snails.
- In **botany**, a **hermaphrodite flower** has both stamens (male part) and carpels (female part).

Information Booster:

- Hermaphrodite organisms ensure **self-reproduction** or **cross-fertilization**.
- In animals like **earthworms**, both reproductive organs are functional.
- In plants, **hermaphroditic (bisexual) flowers** are common in crops like **mustard, tomato, and sunflower**.

Knowledge Booster :

- **Dioecious (A):** Male and female organs are found on **separate individuals** (e.g., papaya, date palm).
- **Unisexual (C):** An organism or flower having **either male or female** reproductive organs.
- **Bisexual (D):** In **botany**, bisexual is used for flowers having both male and female parts — similar to hermaphrodite.

S87. Ans.(c)

Sol. The correct answer is: (C) Multiple cropping

Explanation :

Multiple cropping is a farming practice where **two or more crops are grown sequentially** on the **same piece of land** within **one growing season** or year. This helps **maximize the use of land and increase productivity**.

- For example, growing **wheat** followed by **mung bean** in the same field in the same year.

Information Booster:

- It improves **land use efficiency**, **reduces weed growth**, and increases **farm income**.
- Types of multiple cropping include:
  - **Sequential cropping** (one crop after another)
  - **Intercropping** (two or more crops grown together)
  - **Relay cropping** (second crop sown before the first is harvested)

Knowledge Booster:

- **Relay cropping (A):** Involves sowing a second crop **before the first crop is harvested**. Example: sowing wheat in standing rice crop.
- **Intercropping (B):** Growing **two or more crops simultaneously** in the **same field** with a definite row pattern. Example: maize + beans.
- **Monoculture (D):** The practice of growing **only one type of crop** on a field year after year. Example: continuous cultivation of rice.

S88. Ans.(c)

Sol. The correct answer is: (C) CAN (Calcium Ammonium Nitrate)

Explanation (English):

In **alkali soils**, the use of **urea** is not recommended because it can increase soil pH and exacerbate alkalinity. Instead, **Calcium Ammonium Nitrate (CAN)** is preferred because it provides nitrogen while also helping to neutralize the alkalinity of the soil due to the presence of **calcium**.

This helps in improving the soil structure and reduces the risk of toxicity caused by high pH.

- **CAN** provides **both calcium and nitrogen**, which can help in correcting the imbalanced soil conditions in alkali soils.

Information Booster:

- **CAN** is effective in **alkali soils** because calcium helps to **improve soil texture** and **reduce pH**.
- **Other fertilizers** like **ammonium nitrate** or **calcium nitrate** may not be as effective as CAN in balancing soil pH in alkali conditions.

Knowledge Booster :

- **Ammonium Nitrate (A):** It provides nitrogen, It is more suitable for **neutral soils**.
- **Calcium Nitrate (B):** While it provides **calcium and nitrogen**, it is mainly used to treat **calcium deficiencies.**
- **DAP (D): DAP (Di-Ammonium Phosphate)** is a **phosphatic fertilizer.**

S89. Ans.(a)

Sol. The correct answer is: (A) It should be less than 1.5% for safe use.

Explanation:

Biuret is a by-product formed during the synthesis of **urea**. High levels of biuret in urea can be **toxic to plants**, especially during **foliar application**. To ensure safe use, the **biuret content** in urea should be kept **below 1.5%**. This prevents the risk of **leaf burn** and other toxicity issues when urea is applied directly to plant leaves.

Urea with higher biuret content can lead to **leaf damage** and poor plant health when sprayed on foliage.

Information Booster:

- **Biuret** toxicity can **damage leaf tissue**, reducing the efficiency of the foliar application.
- **Urea** with **low biuret content** (below 1.5%) is safe for **foliar feeding** and helps in providing **effective nitrogen nutrition** to plants.

S90. Ans.(c)

Sol. The correct answer is: (C) Hybridization

Explanation :

The process of crossing two plants or lines with **dissimilar genotypes** is called **hybridization**. This is a common method in plant breeding used to combine desirable traits from both parent plants to create a hybrid with improved characteristics.

Hybridization is used to introduce **genetic diversity** and can result in **better disease resistance, improved yield, and other advantageous traits**.

Hybridization helps in **increasing genetic variation** and enhancing plant traits, making it a key tool in crop improvement.

Information Booster:

- **Hybridization** can be performed in two ways: **inter-varietal hybridization** (crossing plants within the same species) and **inter-specific hybridization** (crossing different species).
- **Hybrid vigor (heterosis)**, where the hybrid exhibits superior traits compared to its parents, is often observed in **hybrid crops**.

Knowledge Booster :

- **Mutation (A):** Mutation refers to a **change in the genetic material** of an organism, often caused by external factors like radiation or chemicals.
- **Polyploidy (B):** Polyploidy refers to the condition where an organism has more than two complete sets of chromosomes. It is a result of **chromosomal duplication.**
- **Selection (D):** Selection involves choosing certain individuals based on their desirable traits for further breeding. It is used in combination with **hybridization** for **crop improvement**.

S91. Ans.(b)

Sol. Drip irrigation is widely used in arid regions because it is highly efficient and conserves water by delivering it directly to the roots of plants.

S92. Ans.(a)

Sol. The correct answer is: (A) New Delhi

Explanation:

The **National Seeds Corporation Limited (NSC)**, a Government of India undertaking, has its headquarters located in **New Delhi**.

Established in 1963, NSC is responsible for the production of foundation and certified seeds in India. Its registered and corporate office is situated at **Beej Bhawan, Pusa Complex, New Delhi-110012**.

Information Booster:

- **Establishment:** Founded in **March 1963**, NSC plays a crucial role in the development of the seed industry in India.
- **Functions:** NSC is engaged in the production of **foundation and certified seeds** of various crops, aiming to ensure quality seed availability to farmers across the country.

Knowledge Booster (Other Option Information):

- **Mumbai (B):**Mumbai is a major commercial hub.
- **Bangalore (C):**Bangalore is known for its research institutions.
- **Kolkata (D):**Kolkata is a significant cultural and commercial center.

S93. Ans.(b)

Sol. The correct answer is: (B) 46% N

Explanation:

Urea is a widely used nitrogen fertilizer that contains approximately **46% nitrogen (N)** by weight. This high nitrogen content makes it one of the most concentrated sources of nitrogen available for agricultural use.

The nitrogen in urea is essential for plant growth as it supports the development of leaves and overall plant health. Urea is commonly applied to crops to promote healthy vegetative growth, and it is especially important in promoting high yields in nitrogen-demanding crops like rice, wheat, and maize.

Information Booster:

- **Urea** is commonly used in both **granular** and **liquid form**, and it is a preferred nitrogen fertilizer due to its high nitrogen content and relatively low cost.
- **Chemical formula of urea:** $CO(NH_2)_2$, which indicates that it is made up of carbon, nitrogen, and hydrogen.

S94. Ans.(d)

Sol. The correct answer is: (D) TZ-test

Explanation

The **TZ-test** (also known as **Tetrazolium test**) is a common method used to determine the viability of seeds. This test involves staining the seed with a tetrazolium solution.

If the seed is viable, the stain will turn the tissues red or pink, indicating that the seed is alive and capable of germination. This test is particularly useful for assessing seed viability in cases where germination tests might take too long.

Information Booster:

- **T-test (A):** The T-test is a statistical test used to compare the means of two groups.
- **Z-test (B):** The Z-test is a type of hypothesis test in statistics, used for comparing sample data to population data.
- **Germination test (C):** The **germination test** is indeed used to check if seeds can germinate.

S95. Ans.(a)

Sol. The correct answer is: (A) Nitrogen

Explanation:

Nitrogen is the **most abundant mineral nutrient** found in plants and is essential for plant growth. It is a primary component of amino acids, proteins, nucleic acids (DNA and RNA), and chlorophyll.

Since nitrogen is crucial for photosynthesis and overall plant metabolism, plants absorb it in large quantities from the soil.

Information Booster:

- Nitrogen is absorbed mainly in the form of **nitrate (NO_3^-)** and **ammonium (NH_4^+)** ions.
- Deficiency of nitrogen leads to **yellowing of leaves (chlorosis)** and stunted growth.

Knowledge Booster :

- **Phosphorus (B):** Important for **energy transfer (ATP)**, root development, and flowering. It is required in smaller amounts than nitrogen and is less mobile in the soil.
- **Potassium (C):** Regulates **enzyme activity, stomatal movement, and water regulation** in plants. Though required in large amounts, it is generally **less abundant** in plant tissues compared to nitrogen.
- **Calcium (D):** Vital for **cell wall formation** and **membrane stability**. It is a **secondary nutrient** and less abundant than nitrogen in plant tissue.

S96. Ans.(d)

Sol. The correct answer is: (D) Moisture conservation through weed destruction

Explanation:

According to **modern agricultural concepts**, the **primary function of inter-row tillage** is **moisture conservation through the destruction of weeds**. Weeds compete with crop plants for **soil moisture**, nutrients, and sunlight.

When inter-row tillage is performed, weeds growing between crop rows are uprooted or buried, thereby **reducing moisture loss** and **conserving water for the crop**.

Important Key Points:

- **Inter-row tillage** is a form of **intercultural operation** done **after crop emergence**.
- By eliminating weeds, the **moisture that would otherwise be lost** through their transpiration is preserved for the crop.
- It is commonly practiced in crops like **maize, cotton, and sugarcane** where row spacing is sufficient for tillage equipment.

Knowledge Booster:

- **Moisture conservation through soil mulching (A):** While soil mulching conserves moisture, in **inter-row tillage**, It's more relevant in zero or reduced tillage with residue retention.
- **Improved soil aeration (B):** This is a **secondary benefit** of inter-row tillage.
- **Improved soil granulation (C):** Granulation is associated with **primary or secondary tillage**, especially for seedbed preparation.

S97. Ans.(c)

Sol. The correct answer is: (C) Dichogamy

Explanation:

Dichogamy is the condition in which the stamens and pistils of a bisexual flower mature at different times. This adaptation prevents self-pollination and encourages cross-pollination.

It plays a key role in enhancing genetic diversity in flowering plants. Dichogamy is of two main types:

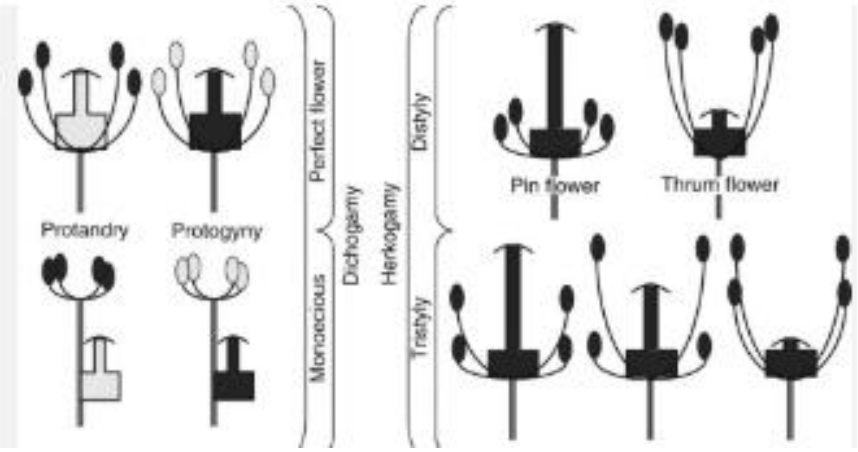
- **Protandry** – stamens mature before pistils (e.g., sunflower)
- **Protogyny** – pistils mature before stamens (e.g., pearl millet)

Important Key Points:

- Prevents self-pollination
- Promotes cross-pollination
- Common in bisexual (hermaphrodite) flowers

Knowledge Booster :

- **Cleistogamy (A):** self-pollination occurs within closed flowers. Common in plants like Viola and Commelina.
- **Dioecy (B):** Male and female flowers are borne on separate plants. Seen in papaya, date palm, and spinach.
- **Dicliny (D):** Male and female flowers are morphologically separate. It includes both monoecious (same plant, e.g., maize) and dioecious (separate plants, e.g., papaya) conditions.



S98. Ans.(a)

Sol. The correct answer is: (A) Gregor Mendel

Explanation:

Gregor Mendel is regarded as the **Father of Plant Breeding** because his experiments on **pea plants (Pisum sativum)** laid the **foundation of genetics**, which is the core of modern plant breeding.

He discovered the fundamental laws of inheritance—**Law of Segregation** and **Law of Independent Assortment**, which are essential principles applied in breeding programs to improve crops.

Important Key Points:

- Conducted hybridization experiments on pea plants
- Discovered basic laws of heredity
- His work remained unrecognized until it was rediscovered in 1900
- Considered the pioneer of **genetics-based breeding**

Knowledge Booster :

- **Norman Borlaug (B):** Known as the **Father of the Green Revolution**. He developed **high-yielding, disease-resistant wheat varieties**, especially in India and Mexico.
- **Charles Darwin (C):** Known for the **Theory of Evolution by Natural Selection**. Though influential in biology.
- **Luther Burbank (D):** A renowned horticulturist who developed over **800 plant varieties**. Often referred to as the **Father of Modern Horticulture.**

S99. Ans.(b)

Sol. The correct answer is: (B) Readily soluble in water

Explanation:

Muriate of Potash (MOP), or **Potassium Chloride (KCl)**, is a highly **soluble fertilizer** that dissolves quickly in water, making potassium readily available to plants.

This water-solubility is one of the main reasons why it is widely used as a source of potassium in agriculture. Potassium plays a crucial role in various plant processes like **photosynthesis**, **protein synthesis**, and **water regulation**.

Important Key Points:

- Potassium is **essential for plant growth**, particularly in improving resistance to disease, drought, and stress.
- It is one of the **most popular potassium fertilizers** due to its easy solubility and cost-effectiveness.
- MOP contains about **60-62% K_2O** (Potash), which is a concentrated form of potassium.
- **MOP is not acidic or basic**, making it a **neutral fertilizer** with a negligible effect on soil pH.

S100. Ans.(c)

Sol. Precision farming uses advanced technology, including computers and GPS, to operate machinery and optimize agricultural practices.

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