Rajasthan JET Agriculture Sample Paper-8

Duration: 40 Minutes **Maximum Marks: 160**

Instructions

- This paper contains **40** Multiple Choice Questions (Single Correct).
- Each correct answer carries **+4 marks**.
- Each incorrect answer carries: **−1 marks**.
- Use of mobile phones, smartwatches, calculators, or any electronic gadgets is strictly prohibited.

Q1. Which of the following statements about the National Programme for Organic Production (NPOP) is **correct**?

(A) NPOP permits limited use of synthetic pesticides if crop damage exceeds 30%

(B) **NPOP strictly prohibits the use of synthetic pesticides and chemical fertilizers in certified organic farming**

(C) NPOP certification is issued by the State Agriculture Department and is valid for 10 years

(D) NPOP allows use of genetically modified organisms (GMOs) if they are government-approved

Q2. The most commonly used earthworm species in vermicomposting is *Eisenia fetida*. What is its optimal temperature range for maximum composting activity?

(A) **20–30°C**

(B) 35–45°C

(C) 10–15°C

(D) 50–60°C

Q3. For efficient aerobic composting, the optimal carbon-to-nitrogen (C:N) ratio of the **raw material** at the start of composting should be:

(A) 10:1 to 15:1

(B) 50:1 to 60:1

(C) **25:1 to 30:1**

(D) 5:1 to 8:1

Q4. Which nitrogen loss mechanism occurs predominantly under **anaerobic** soil conditions and results in the production of N_2O and N_2 gases?

(A) Leaching of nitrate ions in sandy soils

(B) Ammonia volatilization from urea at high pH

(C) Immobilization by soil microorganisms

(D) **Denitrification by anaerobic bacteria**

Q5. Soil compaction due to repeated use of heavy machinery reduces macropore space and restricts root growth. The most effective tillage practice to break up a compacted subsoil layer (hardpan) is:

(A) Rotavation to a depth of 10 cm

(B) **Subsoiling (deep tillage) to a depth of 45–60 cm**

(C) Ridge-furrow cultivation

(D) Zero-tillage with herbicide application

Q6. In precision farming, Variable Rate Application (VRA) technology is used to:

(A) **Apply fertilizers and pesticides at site-specific rates guided by GPS and soil variability maps**

(B) Apply a fixed dose of fertilizer uniformly across the entire field

(C) Vary irrigation water depth based on crop variety

(D) Adjust planting density only in rainfed areas

Q7. In sub-surface drip irrigation, emitter lines are buried at a depth of 20–30 cm. Which of the following is a major advantage of this method over surface drip?

(A) It allows easy inspection and cleaning of emitters

(B) It is suitable only for annual crops and not for orchards

(C) **It reduces surface evaporation and suppresses weed seed germination**

(D) It increases surface runoff during heavy rains

Q8. Gypsum ($CaSO_4 \cdot 2H_2O$) is applied to reclaim sodic (alkaline) soils because it:

(A) Increases soil pH above 9.0 for better microbial activity

(B) Provides sulphur and nitrogen simultaneously

(C) Reduces soil salinity by increasing drainage porosity only

(D) **Replaces exchangeable Na^+ with Ca^{2+}, reducing the sodium adsorption ratio (SAR)**

Q9. The correct sequence of wheat crop developmental stages from germination to maturity is:

(A) Germination $\rightarrow$ Booting $\rightarrow$ Tillering $\rightarrow$ Jointing $\rightarrow$ Heading $\rightarrow$ Grain filling $\rightarrow$ Maturity

(B) **Germination $\rightarrow$ Tillering $\rightarrow$ Jointing $\rightarrow$ Booting $\rightarrow$ Heading $\rightarrow$ Grain filling $\rightarrow$ Maturity**

(C) Germination $\rightarrow$ Jointing $\rightarrow$ Tillering $\rightarrow$ Heading $\rightarrow$ Booting $\rightarrow$ Grain filling $\rightarrow$ Maturity

(D) Germination $\rightarrow$ Tillering $\rightarrow$ Heading $\rightarrow$ Booting $\rightarrow$ Jointing $\rightarrow$ Grain filling $\rightarrow$ Maturity

Q10. Paddy (rice) can tolerate waterlogged conditions because of a special anatomical adaptation in its roots. This adaptation is:

(A) **Formation of aerenchyma cells that create air channels to supply O_2 to submerged roots**

(B) Production of ethanol to fuel anaerobic respiration indefinitely

(C) Development of thick suberized root cortex that blocks water entry

(D) Secretion of root exudates that oxidize the surrounding rhizosphere permanently

Q11. For making quality maize silage, the crop should be harvested when the grain is at the **dough stage** because at this point:

(A) The whole plant has dried to less than 30% moisture

(B) The crop is at maximum leaf area index with 90% moisture

(C) **The whole plant moisture is 65–70%, providing ideal conditions for lactic acid fermentation**

(D) The ears have fully matured and the husk is brown

Q12. To obtain the best quality green fodder from bajra (pearl millet), it should be harvested at:

(A) Pre-emergence stage (15 days after sowing)

(B) Full grain maturity stage

(C) Vegetative stage, 25 days after germination

(D) **50% flowering stage, when protein content is highest (8–10%)**

Q13. Which of the following correctly describes the **kabuli** type of chickpea (*Cicer arietinum*)?

(A) Small, dark brown seed with rough seed coat; predominantly grown in India for domestic consumption

(B) **Large, cream-coloured seed with smooth seed coat; preferred in Middle East and European markets**

(C) Reddish-brown seed with high tannin content; used exclusively for dal production

(D) Pale yellow seed with wrinkled seed coat; susceptible to Fusarium wilt

Q14. The most widely cultivated mustard species in Rajasthan, used both as an oilseed and as a vegetable (saag), is:

(A) ***Brassica juncea* (Indian mustard / rai)**

(B) *Brassica napus* (rapeseed / canola)

(C) *Brassica oleracea* (cabbage / kale family)

(D) *Brassica nigra* (black mustard)

Q15. Sunflower (*Helianthus annuus*) is an important oilseed crop. Its seed oil content ranges between:

(A) 20–25%

(B) 55–65%

(C) **40–45%**

(D) 10–15%

Q16. Sesame (*Sesamum indicum*), locally called *Til*, contains a bioactive lignan antioxidant that contributes to its exceptional oxidative stability. This compound is:

(A) Erucic acid

(B) Gossypol

(C) Glucosinolate

(D) **Sesamin**

Q17. Papaya (*Carica papaya*) is unusual among fruit crops because it is:

(A) A monoecious plant where male and female flowers are borne on the same tree

(B) **Dioecious, producing separate male, female, and hermaphrodite plant types in the field**

(C) Self-pollinated and produces only bisexual flowers

(D) Wind-pollinated with no insect dependence

Q18. A farmer can judge the maturity of watermelon fruit in the field by:

(A) **Tapping the fruit — a ripe fruit gives a dull, hollow metallic sound, and the ground spot turns yellow**

(B) Measuring Brix value above 5% using a refractometer

(C) Checking that the fruit skin has turned completely dark green

(D) Observing that the fruit stem has elongated and thickened

Q19. Coconut (*Cocos nucifera*) is called a multi-purpose palm. The fibrous material **coir**, used in making ropes, mats, and brushes, is obtained from the:

(A) Endosperm (white kernel / copra)

(B) Coconut water (liquid endosperm)

(C) **Mesocarp (fibrous husk surrounding the shell)**

(D) Shell (endocarp) of the coconut

Q20. Which variety of bell pepper (capsicum) is most commonly grown in polyhouse cultivation in Rajasthan due to its blocky fruit shape and high marketability?

(A) Pusa Jwala

(B) Arka Meghna

(C) Yellow Wonder

(D) **California Wonder**

Q21. A major advantage of vegetative propagation over seed propagation in fruit crops is:

(A) Vegetatively propagated plants have higher genetic variability and adaptability

(B) **Plants are true-to-type, maintaining exactly the same genotype and characteristics as the parent**

(C) Vegetative propagation produces disease-free planting material automatically

(D) Vegetatively propagated trees take longer to bear fruit than seedling trees

Q22. In modified atmosphere storage (MAS) for apple and pear, the atmosphere inside the storage chamber is adjusted to:

(A) **Reduce O_2 to 2–5% and increase CO_2 to 2–8%, combined with low temperature ($<4^\circ$C)**

(B) Increase O_2 to 30–40% and maintain CO_2 below 0.1%

(C) Replace all atmosphere with pure nitrogen gas

(D) Maintain normal air composition but reduce humidity to 20%

Q23. A **composite variety** in plant breeding is:

(A) A variety produced by crossing two inbred lines and releasing the F1 hybrid directly

(B) A variety developed from a single superior pure line through mass selection

(C) **A blend of several open-pollinated lines or ecotypes that freely cross-pollinate, providing genetic diversity and stable performance**

(D) A variety produced by systematic backcrossing to transfer one gene from a donor parent

Q24. A synthetic variety differs from a composite variety in that a synthetic variety is:

(A) A blend of ecotypes collected from farmers' fields without any selection

(B) Produced exclusively from a single superior self-pollinated line

(C) Developed by random mating of landraces only, without any inbreeding

(D) **Produced by inter-mating several superior inbred lines in a polycross, maintaining partial heterosis over multiple generations**

Q25. A practical rule of thumb for safe seed storage states that for every seed lot:

(A) Relative humidity of storage room must not exceed 90%

(B) **The sum of storage temperature (°F) and seed moisture content (%) should be less than 100**

(C) Seed moisture must be maintained between 15% and 18% for all crop species

(D) Temperature must be above 25°C to prevent seed dormancy during storage

Q26. The **National Seed Corporation (NSC)** is a Government of India enterprise primarily responsible for:

(A) **Production and supply of breeder, foundation, and certified seed, and implementation of the Seed Village Programme**

(B) Regulating the import and export of all agricultural produce including grain

(C) Providing crop insurance to farmers under PM Fasal Bima Yojana

(D) Managing minimum support price (MSP) procurement operations

Q27. The biological control agent **Ha-NPV** (Nuclear Polyhedrosis Virus) is commercially used to manage which major pest in chickpea and cotton?

(A) *Chilo partellus* (stem borer)

(B) *Bemisia tabaci* (whitefly)

(C) ***Helicoverpa armigera* (gram pod borer / American bollworm)**

(D) *Spodoptera litura* (tobacco cutworm)

Q28. The characteristic symptom of **dead heart** in young maize plants (30–40 days after sowing) is caused by:

(A) Fungal infection by *Colletotrichum graminicola* (anthracnose)

(B) Root-knot nematode (*Meloidogyne* spp.) feeding on roots

(C) Deficiency of zinc causing white bud before emergence

(D) **Larvae of *Chilo partellus* (spotted stem borer) tunnelling into the central shoot and killing it**

Q29. Collar rot of groundnut, characterized by a black mass of powdery spores at the soil-plant junction, is caused by:

(A) ***Aspergillus niger***

(B) *Sclerotium rolfsii*

(C) *Fusarium oxysporum*

(D) *Rhizoctonia solani*

Q30. Yellow mosaic disease of green gram (mung bean) causes golden-yellow patches on leaves and spreads rapidly in the kharif season. The insect vector that transmits this virus is:

(A) *Aphis gossypii* (cotton aphid)

(B) ***Bemisia tabaci* (whitefly)**

(C) *Thrips tabaci* (onion thrips)

(D) *Myzus persicae* (green peach aphid)

Q31. Endosulfan, an organochlorine insecticide, was banned in India in 2011 and is listed under the Stockholm Convention. The primary reasons for this ban include:

(A) Low efficacy against target pests and high cost of production

(B) Rapid breakdown in soil making it ineffective after one season

(C) **Persistence in the environment, bioaccumulation in the food chain, and reproductive/endocrine toxicity**

(D) Development of resistance in all pest species within two years of use

Q32. Pheromone traps in integrated pest management work on the principle of:

(A) Attracting and trapping both male and female insects using food-based lures

(B) Releasing sterile insects to compete with wild populations

(C) Using fungal spores (entomopathogenic fungi) to infect and kill insects

(D) **Using synthetic sex pheromone lures to attract and trap male moths, enabling pest population monitoring and mass trapping**

Q33. The **Mewati** (also called Kosi) cattle breed is recognized by NBAGR and is native to:

(A) **Mewat region, primarily Alwar district of Rajasthan and Gurgaon area of Haryana; it is a dual-purpose breed**

(B) Bikaner district of Rajasthan; it is primarily a draught breed used in desert agriculture

(C) Barmer and Jaisalmer districts; known for high milk production in arid conditions

(D) Udaipur and Chittorgarh districts; recognized for meat production

Q34. Compared to cow milk, camel milk is distinctive because it:

(A) Contains very high fat (above 10%) and is rich in Vitamin D

(B) **Has low fat content (2–3%), contains insulin-like proteins, and possesses natural antibiotic properties**

(C) Lacks all immunoglobulins and is not suitable for human consumption

(D) Is identical in composition to buffalo milk with extra beta-carotene

Q35. The **Sonadi** sheep breed of Rajasthan, also called Patanwadi, is characterized by long drooping ears and is predominantly found in:

(A) Barmer, Jaisalmer, and Bikaner districts (western arid zone)

(B) Kota, Jhalawar, and Baran districts (Hadoti region)

(C) **Tonk, Bundi, and Sawai Madhopur districts (eastern Rajasthan)**

(D) Sirohi, Pali, and Jalor districts (south-western Rajasthan)

Q36. Artificial insemination (AI) in cattle and buffaloes offers several advantages over natural mating. Which of the following is the **most significant** genetic benefit of AI?

(A) AI eliminates all risk of diseases transmitted through cattle movement

(B) AI allows the same bull to be used only within the same breed

(C) AI reduces the cost of feed for the herd

(D) **Semen from a single proven superior bull can be extended and used to inseminate thousands of females, accelerating genetic improvement**

Q37. Under the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), every rural household is guaranteed:

(A) **At least 100 days of wage employment per financial year**

(B) A minimum monthly income of Rs. 10,000 regardless of work done

(C) Free supply of seeds and fertilizers for one acre of land

(D) 200 days of employment only in drought-declared districts

Q38. Farmer Producer Organisations (FPOs) are promoted by the Government of India to help small and marginal farmers. The apex body that provides **equity grant support** to FPOs is:

(A) National Bank for Agriculture and Rural Development (NABARD)

(B) **Small Farmers' Agri-Business Consortium (SFAC)**

(C) Agricultural and Processed Food Products Export Development Authority (APEDA)

(D) National Cooperative Development Corporation (NCDC)

Q39. The **e-NAM** (National Agriculture Market) platform was launched in India in 2016 to:

(A) Provide online crop insurance to farmers directly without agents

(B) Distribute subsidized fertilizers through digital tokens to registered farmers

(C) **Create an online trading platform integrating APMC mandis across states, enabling transparent price discovery and quality assaying**

(D) Facilitate direct export of agricultural commodities to international buyers

Q40. In agricultural extension, a **result demonstration** is different from a method demonstration because:

(A) Result demonstration is conducted in a laboratory to show scientific principles

(B) Result demonstration involves training farmers at a Krishi Vigyan Kendra

(C) Result demonstration focuses only on showing how to perform a new technique step by step

(D) **Result demonstration is conducted on a farmer's own field to show the *outcome* (yield/profit advantage) of an improved practice compared to a traditional practice**

Detailed Solutions

Q1.

Solution

The **National Programme for Organic Production (NPOP)**, established under the Foreign Trade (Development and Regulation) Act by the Ministry of Commerce and Industry, lays down comprehensive standards for organic production in India. The cornerstone of NPOP is the **complete prohibition of synthetic pesticides, chemical fertilizers, growth regulators, genetically modified organisms (GMOs), and irradiation** in all certified organic operations.

Why other options are wrong:

- (A) NPOP does *not* permit any synthetic pesticides even at threshold damage levels; only approved biopesticides and natural substances are allowed.
- (C) Organic certification under NPOP is granted by accredited Certification Bodies (CBs), not the State Agriculture Department; it is typically renewed annually after inspection.
- (D) GMOs are explicitly prohibited under NPOP standards.

The certification process involves: application to a CB $\rightarrow$ inspection of farm records, inputs, and practices $\rightarrow$ soil/product testing $\rightarrow$ certificate issue (after 3-year conversion period for previously conventional farms).

Final Answer: NPOP strictly prohibits synthetic pesticides, chemical fertilizers, GMOs, and irradiation in all certified organic farming operations.

Answer: (B) Go Back to Q1

Q2.

Solution

Eisenia fetida (red wiggler or red worm) is the most widely used earthworm species in vermicomposting due to its high reproductive rate and tolerance to organic wastes. Its **optimal temperature range is 20–30°C**, with peak activity and cocoon production at about 25°C.

Temperature effects:

- Below 10°C: worms become sluggish and cocoon production stops.
- Above 35°C: heat stress, mortality increases sharply.
- 20–30°C: maximum feeding, growth, and reproduction.

Other vermicomposting parameters:

- Moisture: 60–75% (bedding should feel like a wrung-out sponge)
- pH: 6.5–7.5
- C:N ratio of feedstock: 25–30:1
- Finished vermicompost C:N ratio: approximately 15:1

Options (B), (C), and (D) represent temperatures too high (35–45°C causes stress; 50–60°C is lethal) or too low (10–15°C suppresses activity).

Final Answer: *Eisenia fetida* performs best in vermicomposting at 20–30°C, where feeding, growth, and cocoon production are all at their maximum.

Answer: (A) Go Back to Q2

Q3.

Solution

For efficient **aerobic composting**, the C:N ratio of the raw material mixture at the start should be **25:1 to 30:1**. This range provides sufficient carbon as an energy source for microorganisms while supplying adequate nitrogen for their protein synthesis.

Why this range matters:

- C:N below 15:1 (nitrogen-rich): excess ammonia is released, causing bad odour and nitrogen loss through volatilization.
- C:N above 40:1 (carbon-rich): microbial activity is nitrogen-limited; decomposition slows, compost takes longer to mature.
- Optimal 25–30:1 supports rapid decomposition, pile temperature rises to 50–60°C (killing pathogens and weed seeds), and compost matures in 3–4 months.

Finished compost has a C:N ratio of about 12–15:1 because carbon is lost as CO_2 during decomposition. The pile is turned regularly to maintain aeration and prevent anaerobic zones.

Options (A) 10:1–15:1 is too low (excess N); (B) 50:1–60:1 is too high (excess C, slow decomposition); (D) 5:1–8:1 would be extremely N-rich, causing severe ammonia loss.

Final Answer: The optimal C:N ratio of raw material for aerobic composting is

25:1 to 30:1, which supports rapid microbial decomposition while preventing ammonia loss.

Answer: (C) Go Back to Q3

Q4.

Solution

Denitrification is the microbial reduction of nitrate (NO_3^-) and nitrite (NO_2^-) to gaseous products — primarily **nitrous oxide (N_2O) and dinitrogen gas (N_2)** — under **anaerobic conditions**. This is a major pathway of nitrogen loss from waterlogged soils, flooded paddy fields, and poorly drained soils.

Denitrification pathway:

$$NO_3^- \rightarrow NO_2^- \rightarrow NO \rightarrow N_2O \rightarrow N_2$$

Key microorganisms: *Pseudomonas*, *Paracoccus denitrificans*, *Bacillus* spp.

Why other options are wrong:

- (A) Nitrate leaching occurs in *aerobic* sandy soils with high rainfall – it is a physical, not biological, process.
- (B) Ammonia volatilization from urea occurs at *high pH* and *high temperature* on the soil surface (aerobic condition).
- (C) Microbial immobilization is the temporary incorporation of inorganic N into microbial biomass – it does not produce gaseous N.

N_2O is also a potent greenhouse gas (298$\times$ global warming potential of CO_2), making denitrification an important environmental concern.

Final Answer: Denitrification by anaerobic bacteria under waterlogged soil conditions converts nitrate to N_2O and N_2 gases, causing significant nitrogen loss.

Answer: (D) Go Back to Q4

Q5.

Solution

Soil compaction creates a dense **hardpan** (impervious layer) at or below tillage depth. The most effective way to break this layer is **subsoiling** (deep tillage), where a chisel plow or subsoiler is run at 45–60 cm depth. This fractures the hardpan, improves water infiltration, and allows roots to penetrate deeper.

Effects of soil compaction:

- Reduced macropore space $\rightarrow$ poor aeration and drainage
- Root restriction $\rightarrow$ reduced nutrient and water uptake
- Increased surface runoff and risk of waterlogging
- Reduced earthworm and microbial activity

Why other options are wrong:

- (A) Rotavation at 10 cm only works in the topsoil layer and does not reach the hardpan.
- (C) Ridge-furrow cultivation improves surface drainage but does not break deep compaction.
- (D) Zero tillage avoids disturbing the soil but does not remove an existing hardpan.

Subsoiling is recommended every 3–5 years in fields with heavy machinery use. It should be done when the soil is slightly dry to ensure shattering rather than smearing.

Final Answer: Subsoiling (deep tillage) at 45–60 cm depth is the most effective practice to break a compacted hardpan, restore root penetration, and improve water infiltration.

Answer: (B) Go Back to Q5

Q6.

Solution

Precision farming uses information technology to manage within-field variability. **Variable Rate Application (VRA)** is a key technology that uses **GPS positioning** and soil variability maps (created from soil sampling, remote sensing, or yield maps) to apply fertilizers, pesticides, and water at **site-specific rates** rather than a single uniform rate.

Components of VRA system:

- GPS receiver on the tractor/machinery for real-time positioning
- Prescription maps (generated from soil test data and yield maps) loaded into a controller
- Variable-rate spreader/sprayer that adjusts application rate based on GPS position

Benefits of VRA in Indian context:

- Reduces fertilizer over-application in productive zones
- Increases input use efficiency and reduces pollution
- Drone-based crop monitoring (NDVI maps) complements VRA for targeted pest/disease management

Options (B), (C), and (D) describe fixed-rate or non-GPS applications that do not constitute VRA.

Final Answer: In precision farming, VRA technology uses GPS and soil variability maps to apply fertilizers and pesticides at site-specific rates, maximising input use efficiency across the field.

Answer: (A) Go Back to Q6

Q7.

Solution

Sub-surface drip irrigation (SDI) places emitter lines at 20–30 cm soil depth. Compared to surface drip, the key advantages are:

- **Reduced surface evaporation**: water is delivered directly to the root zone; no surface wetness means no evaporative loss.
- **Suppressed weed germination**: the soil surface remains dry, so weed seeds

lack the moisture to germinate.

- Reduced soil crusting and better aeration at the soil surface.
- Longer system life (protection from UV radiation, mechanical damage, and rodents).

Crops suited for SDI: sugarcane, cotton, orchards (mango, pomegranate), and vegetables.

Why other options are wrong:

- (A) Inspection and cleaning of buried emitters is *more difficult*, not easier.
- (B) SDI is used for *both* annual crops and orchards.
- (D) SDI *reduces* runoff because water infiltrates directly.

Final Answer: Sub-surface drip irrigation reduces surface evaporation and suppresses weed germination by keeping the soil surface dry while delivering water directly to the root zone.

Answer: (C) Go Back to Q7

Q8.

Solution

Sodic soils (alkaline soils, previously called "usar" or "reh" in India) have excessive exchangeable sodium ions (Na^+) on the clay surface, causing the soil to disperse, form a hard crust, and become impermeable to water.

Gypsum ($CaSO_4 \cdot 2H_2O$) reclaims sodic soils by the following ion exchange reaction:

$$2\,\text{Na-clay} + CaSO_4 \rightarrow \text{Ca-clay} + Na_2SO_4$$

The Na_2SO_4 formed is then leached out of the root zone with irrigation water. Ca^{2+} on the clay improves soil structure, aggregation, and permeability.

Why other options are wrong:

- (A) Gypsum is a neutral-to-slightly acidic salt; it *lowers* pH in sodic soils, not raises it.
- (B) Gypsum does not contain nitrogen; it provides calcium and sulphur only.
- (C) While improved permeability aids drainage, the primary mechanism is the Ca^{2+}–Na^+ exchange, not drainage alone.

Gypsum requirement (GR) is calculated based on the soil's Exchangeable Sodium Percentage (ESP) and cation exchange capacity. For moderately sodic soils in Rajasthan, 5–10 tonnes/ha is common.

Final Answer: Gypsum reclaims sodic soils by replacing exchangeable Na^{+} with Ca^{2+} through an ion exchange reaction, lowering the sodium adsorption ratio and restoring soil permeability.

Answer: (D) Go Back to Q8

Q9.

Solution

The correct developmental sequence of wheat (*Triticum aestivum*) from sowing to harvest is:

Germination → Tillering → Jointing → Booting → Heading → Grain filling → Maturity

Key stage descriptions:

- **Tillering** (15–40 DAS): daughter shoots emerge from axillary buds; critical stage for irrigation (CRI – Crown Root Initiation, 20–25 DAS).
- **Jointing**: internodes begin to elongate; stem feels jointed when squeezed.
- **Booting**: flag leaf sheath swells as ear develops inside.
- **Heading**: ear (spike) emerges from the boot.
- **Grain filling**: starch accumulates; milk stage → soft dough → hard dough.

Critical irrigation stages in Rajasthan wheat: CRI (20–25 DAS), tillering (40–45 DAS), jointing, booting, and grain filling.

Options (A), (C), and (D) have booting before jointing or other incorrect sequences.

Final Answer: The correct wheat developmental sequence is Germination → Tillering → Jointing → Booting → Heading → Grain filling → Maturity.

Answer: (B) Go Back to Q9

Q10.

Solution

Rice (*Oryza sativa*) is adapted to flooded conditions primarily through **aerenchyma** — specialized spongy tissue in the roots, stems, and leaf sheaths containing large air-filled intercellular spaces (lacunae). These air channels allow oxygen to diffuse from the shoot (above water) to the submerged roots, maintaining aerobic root respiration even in anaerobic soil.

Additional flood adaptations in paddy:

- **Adventitious roots** form above the waterline to aid O_2 uptake.
- Radial oxygen loss (ROL) from roots oxidizes a thin rhizosphere zone, enabling nutrient uptake.
- Shoot elongation response in deepwater rice to keep leaves above water surface.

Why other options are wrong:

- (B) Ethanol production is a short-term anaerobic response (only a few hours); it is toxic and cannot sustain the plant indefinitely.
- (C) Suberin in root cell walls reduces water entry but does not supply O_2.
- (D) Rhizosphere oxidation is a consequence of O_2 diffusion through aerenchyma, not an independent mechanism.

Final Answer: Paddy tolerates waterlogging through aerenchyma cells that form continuous air channels, supplying oxygen from the shoot to submerged roots and maintaining aerobic respiration.

Answer: (A) Go Back to Q10

Q11.

Solution

For quality maize silage, the crop is harvested when the grain is at **dough stage** (R4 growth stage), at which point the **whole-plant moisture is 65–70%** (dry matter 30–35%). This moisture level is critical for:

- Providing sufficient fermentable carbohydrates (starch + sugars) for lactic acid bacteria (LAB).
- Achieving rapid pH drop (below 4.2) through lactic acid fermentation, which

preserves the silage.

- Avoiding excessive seepage (too wet >75% moisture) or poor packing (too dry <60%).

Silage-making process: Harvest at dough stage → chop to 1–2 cm → pack tightly in silo/bunker to exclude air → cover with airtight polythene sheet → fermentation for 3–4 weeks → good silage: pH 3.8–4.2, pleasant acidic smell, no visible mould.

Why other options are wrong:

- (A) Below 30% moisture: too dry; silage cannot be packed tightly; fungal growth likely.
- (B) 90% moisture (vegetative stage): too wet; excessive seepage, poor fermentation.
- (D) After full grain maturity: dry stover with very low fermentable sugars; poor silage quality.

Final Answer: Maize for silage should be harvested at dough stage when whole-plant moisture is 65–70%, providing the ideal conditions for lactic acid fermentation and preservation.

Answer: (C) Go Back to Q11

Q12.

Solution

For obtaining **best-quality green fodder from bajra (pearl millet)**, the crop should be harvested at the **50% flowering stage**. At this growth stage:

- **Crude protein content is highest** (approximately 8–10% on dry matter basis) because leaves and stems still retain maximum protein before senescence.
- Stem is succulent and palatable; digestibility is good.
- Dry matter yield is near-maximum: further delay reduces protein but increases fibre.

Comparison of harvest stages:

Stage	Crude Protein	Digestibility
Vegetative (25 DAS)	High	Very high but low yield
50% flowering	**8–10% (optimal)**	**Good**
Full grain maturity	4–5%	Poor (high NDF)

In irrigated conditions, 2–3 cuts are possible per season. The first cut is the most nutritious.

Options (A), (B), and (C) represent suboptimal harvest timings that reduce either yield or quality.

Final Answer: Bajra green fodder should be harvested at 50% flowering stage when crude protein content is highest (8–10%) and digestibility is still good.

Answer: (D) Go Back to Q12

Q13.

Solution

Chickpea (*Cicer arietinum*) has two main commercial types:

Character	**Desi type**	**Kabuli type**
Seed size	Small (10–25 g/100 seeds)	Large (25–60 g/100 seeds)
Seed colour	Dark brown/black	Cream/white
Seed coat	Rough, wrinkled	Smooth, thin
Tannin content	High	Low
Markets	India (dal)	Middle East, Europe

Kabuli type is preferred in Middle Eastern and Mediterranean markets because its large, cream-coloured seeds are used in hummus, salads, and whole-cooked dishes.

Why other options are wrong:

- (A) Small, dark seed with rough coat describes *desi* type.
- (C) Reddish-brown high-tannin seed describes a specific desi subtype.
- (D) Wrinkled seed coat is associated with field pea, not chickpea.

Final Answer: Kabuli chickpea is distinguished by its large, cream-coloured seed with a smooth, thin seed coat, preferred in Middle Eastern and European markets for hummus and salads.

Answer: (B) Go Back to Q13

Q14.

Solution

Brassica juncea (Indian mustard, locally called *rai* or *sarson*) is the **most widely cultivated Brassica species in Rajasthan** and accounts for over 80% of India's mustard production. Rajasthan alone contributes nearly 45% of national mustard output.

Why *B. juncea* dominates Rajasthan:

- Better adaptation to semi-arid conditions compared to *B. napus*.
- Both the seeds (for oil) and young leaves/shoots (saag) are used.
- Shorter crop duration (110–130 days) suits Rajasthan's rabi season.
- Important varieties: Pusa Bold, Varuna, RH-749, RH-30.

Comparison of Brassica species:

- *B. napus* (rapeseed/canola): double zero (low erucic acid + low glucosinolate); suited to cooler climates.
- *B. oleracea*: vegetable crops (cabbage, cauliflower, broccoli).
- *B. nigra*: black mustard with pungent seeds; minor crop.

Final Answer: *Brassica juncea* (Indian mustard/rai) is the most widely cultivated mustard species in Rajasthan, used both as an oilseed crop and as a leafy vegetable (saag).

Answer: (A) Go Back to Q14

Q15.

Solution

Sunflower (*Helianthus annuus*) seeds contain **40–45% oil**, making it one of the highest oil-content oilseed crops. The oil is rich in linoleic acid (polyunsaturated fatty acid), making it heart-healthy.

Oilseed crop comparison (approximate oil content):

Crop	Oil content (%)
Coconut (copra)	65–70
Sesame (*til*)	44–52
Sunflower	**40–45**
Groundnut	44–50
Mustard (*B. juncea*)	38–42
Soybean	18–22

Sunflower notes:

- Grown as both kharif and rabi crop in eastern Rajasthan.
- **Heliotropism**: young plants track the sun (east to west) during the day.
- Hybrid varieties such as KBSH-44 and Morden are commercially popular.

Options (A) 20–25% is soybean range; (B) 55–65% is coconut copra; (D) 10–15% is castor seed range.

Final Answer: Sunflower seeds contain 40–45% oil rich in linoleic acid, placing it among the highest-yielding oilseed crops cultivated in Rajasthan.

Answer: (C) Go Back to Q15

Q16.

Solution

Sesamin is a naturally occurring **lignan** (polyphenolic antioxidant) found in sesame (*Sesamum indicum*) seeds and oil. Along with sesamolin, it is responsible for the **exceptional oxidative stability** of sesame oil, which does not turn rancid as quickly as other vegetable oils.

Bioactive properties of sesamin:

- Potent antioxidant that prevents lipid peroxidation.
- Hepatoprotective (liver-protecting) properties.
- Anti-inflammatory and anti-hypertensive effects in clinical studies.

Why other options are wrong:

- (A) Erucic acid is a fatty acid in mustard/rapeseed, not sesame.
- (B) Gossypol is the toxic phenolic compound in cottonseed.

- (C) Glucosinolates are the secondary metabolites in Brassica species.

Popular variety in Rajasthan: RT-346 (released by RARI, Durgapura, Jaipur).

Final Answer: Sesamin is the bioactive lignan antioxidant in sesame seeds that gives sesame oil its exceptional oxidative stability and several health-promoting properties.

Answer: (D) Go Back to Q16

Q17.

Solution

Papaya (*Carica papaya*) is **dioecious** — it has **three distinct plant sexes** in a population:

(a) **Male plants**: produce only staminate (male) flowers; no fruit.

(b) **Female plants**: produce only pistillate (female) flowers; require pollen from a male plant.

(c) **Hermaphrodite plants**: produce perfect flowers that are self-pollinating; preferred commercially because their elongated fruits are more marketable.

Practical implication: In a papaya field, approximately 10% male plants are retained (1 male per 10 females) for pollination. Hermaphrodite plants are preferred by the processing industry.

Sex identification: By flower morphology at first flowering (5–6 months after transplanting).

Important varieties for Rajasthan: Pusa Dwarf (compact, suited for high-density planting), Pusa Nanha (dwarf, ideal for kitchen gardens).

Options (A), (C), and (D) incorrectly describe papaya as monoecious, self-pollinated only, or wind-pollinated.

Final Answer: Papaya is dioecious with three plant sexes (male, female, and hermaphrodite); hermaphrodite plants are commercially preferred because they bear elongated, marketable fruits.

Answer: (B) Go Back to Q17

Q18.

Solution

Maturity indices for watermelon (*Citrullus lanatus*) in the field:

- **Tap test**: A ripe watermelon produces a **dull, hollow metallic sound** when tapped, due to the breakdown of internal cellular connections. Unripe fruit gives a sharp, high-pitched sound.
- **Ground spot**: The patch where the fruit rests on the ground turns from white/green to **creamy yellow** at maturity.
- Tendril nearest to fruit: turns brown and dries up at maturity.
- The fruit surface lustre changes from shiny to dull.

Varieties grown in Rajasthan: Sugar Baby (round, dark green, red flesh), Arka Jyoti (oblong, high TSS).

Why other options are wrong:

- (B) Brix >5% is too low a threshold; ripe watermelon has 8–12% TSS.
- (C) Fully dark green skin is seen in *immature* Sugar Baby fruits too; colour alone is unreliable.
- (D) Stem elongation and thickening occur during active growth, not at maturity.

Final Answer: A ripe watermelon can be identified in the field by a dull, hollow sound when tapped and a creamy yellow ground spot where the fruit rested on the soil.

Answer: (A) Go Back to Q18

Q19.

Solution

The coconut fruit is a drupe. Its structure from outside inward is:

Layer	Botanical name	Product
Outer skin	Exocarp	—
Fibrous husk	Mesocarp	**Coir (fibre)**
Hard shell	Endocarp	Activated carbon, shell craft
White kernel	Endosperm (solid)	Copra, coconut oil
Liquid centre	Liquid endosperm	Tender coconut water

Coir is extracted from the **mesocarp (fibrous husk)** by retting (soaking in water for 6–10 months to soften and separate fibres). Coir is used for making ropes, floor mats, brushes, mattress stuffing, and geotextiles.

Other coconut products:

- **Copra**: dried endosperm; pressed for coconut oil.
- **Toddy**: fermented inflorescence sap.

Options (A), (B), and (D) are incorrect: endosperm → copra/oil; liquid endosperm → coconut water; endocarp → shell charcoal.

Final Answer: Coir fibre is obtained from the mesocarp (fibrous husk) of the coconut fruit by retting, and is used to make ropes, mats, and brushes.

Answer: (C) Go Back to Q19

Q20.

Solution

California Wonder is the most widely grown bell pepper (capsicum) variety in India's polyhouse cultivation. Its characteristics:

- Large, blocky 4-lobed green fruit turning red at maturity.
- High yield potential under polyhouse conditions (300–400 q/ha).
- Good post-harvest shelf life and marketability.

Polyhouse cultivation of capsicum in Rajasthan:

- Capsicum is **sensitive to waterlogging** and extreme temperatures; polyhouse provides controlled environment.
- Temperature range for growth: 18–25°C; below 10°C causes flower drop.
- Drip irrigation with fertigation is standard practice.

- High-value crop (Rs. 20–50 per kg).

Why other options are wrong:

- (A) Pusa Jwala is a *hot chili* variety, not a bell pepper.
- (B) Arka Meghna is not a standard capsicum variety.
- (C) Yellow Wonder is a real capsicum variety but not the most popular polyhouse variety.

Final Answer: California Wonder is the most commonly grown bell pepper variety in Rajasthan's polyhouses due to its blocky 4-lobed fruit shape, high yield potential, and good market acceptability.

Answer: (D) Go Back to Q20

Q21.

Solution

The most fundamental advantage of vegetative propagation over seed propagation in **perennial fruit crops** is that it produces **true-to-type plants** — clones that are genetically identical to the parent plant. This ensures:

- Preservation of the exact fruit quality, flavour, size, and yield of the selected superior parent.
- Uniformity in the orchard (important for mechanised harvesting and marketing).
- Earlier bearing (vegetatively propagated plants bear fruit 2–4 years earlier than seedling trees).

Why other options are wrong:

- (A) Higher genetic variability is the *advantage of seed propagation*; vegetative propagation reduces variability.
- (C) Disease perpetuation (e.g., virus transmission through cuttings) is a *disadvantage* of vegetative propagation.
- (D) Vegetatively propagated trees bear *earlier*, not later, than seedling trees.

Final Answer: Vegetative propagation produces true-to-type clones of the parent plant, preserving exact fruit quality and genotype while also enabling earlier bearing than seedling trees.

Answer: (B) Go Back to Q21

Q22.

Solution

Modified Atmosphere Storage (MAS) extends the shelf life of climacteric fruits (apple, pear, mango) by modifying the storage atmosphere:

Gas	Normal air	MAS (apple)
O_2	21%	**2–5%**
CO_2	0.04%	**2–8%**
N_2	79%	Balance
Temperature	Ambient	0–4°C

Mechanism:

- **Low O_2**: slows aerobic respiration and ethylene-mediated ripening.
- **Elevated CO_2**: inhibits ethylene action, slows senescence.
- Combined with **low temperature**: enzyme activity and microbial growth are further reduced.

Options (B), (C), and (D) would accelerate ripening or cause other damage rather than extending shelf life.

Final Answer: Modified atmosphere storage for apple and pear uses reduced O_2 (2–5%) and elevated CO_2 (2–8%) combined with low temperature to slow respiration and extend shelf life.

Answer: (A) Go Back to Q22

Q23.

Solution

A **composite variety** is developed by **blending several open-pollinated lines, ecotypes, or locally adapted varieties** that are allowed to freely cross-pollinate by wind or insects. Key features:

- **High genetic diversity**: different genotypes represented in the population.
- **Stable performance across environments**: the variety performs across a range of conditions.

- Developed mainly for **cross-pollinated crops** (maize, pearl millet, sorghum).
- Farmers can save and re-use seed with manageable yield decline.

Examples: Vijay composite (maize), Bundelkhand composite (sorghum).

Why other options are wrong:

- (A) Crossing two inbred lines and releasing F_1 describes an *F_1 hybrid*.
- (B) Mass selection from a single pure line describes a *pure line variety*.
- (D) Backcrossing to transfer one gene describes *backcross breeding*.

Final Answer: A composite variety is a blend of several open-pollinated lines or ecotypes that freely inter-pollinate, providing broad genetic diversity and stable performance across variable environments.

Answer: (C) Go Back to Q23

Q24.

Solution

A **synthetic variety (SYN)** is produced by **inter-mating a specific set of superior inbred lines** in a **polycross** (random mating among all selected parents). The key features:

- **Partial heterosis**: since the founding parents are selected inbred lines (with high GCA), the synthetic retains some heterosis.
- Can be **maintained and multiplied** by open pollination; less expensive than F_1 hybrids.
- Over successive generations (SYN-1, SYN-2, SYN-3), heterozygosity declines slightly but performance is more stable than a composite.

Synthetic vs. Composite:

Feature	Synthetic	Composite
Parent material	Selected inbred lines	Open-pollinated lines/ecotypes
Heterosis	Partial, maintained	Lower
Genetic base	Narrower	Wider

Options (A), (B), and (C) describe composites or pure-line varieties rather than the polycross approach of synthetic varieties.

Final Answer: A synthetic variety is produced by inter-mating selected superior inbred lines in a polycross, retaining partial heterosis and allowing low-cost multiplication through open pollination.

Answer: (D) Go Back to Q24

Q25.

Solution

The **Harrington Rule of Thumb** for seed storage states:

$$\text{Temperature } (^\circ\text{F}) + \text{Seed Moisture Content } (\%) < 100$$

For example, if storage temperature is 70°F (21°C), seed moisture should be $< 30\%$; but practically seed moisture of <12% is the target for safe storage.

Practical seed storage conditions:

- Safe moisture for short-term storage: <12%; <8% for long-term storage (gene bank).
- Ideal temperature: <20°C.
- Relative humidity: <60% in the storage facility.
- Containers: moisture-proof (hermetic bins, triple-layer plastic bags, metal tins).

Why other options are wrong:

- (A) Relative humidity of 90% would cause rapid seed deterioration; standard is <60% RH.
- (C) Moisture of 15–18% promotes germination, fungal growth, and heating — never recommended for storage.
- (D) High temperature (>25°C) accelerates deterioration.

Final Answer: The Harrington Rule of Thumb states that the sum of storage temperature (°F) and seed moisture content (%) must remain below 100 to ensure safe seed viability during storage.

Answer: (B) Go Back to Q25

Q26.

Solution

The **National Seed Corporation (NSC)** was established in 1963 as a Government of India enterprise under the Ministry of Agriculture and Farmers' Welfare. Its primary mandate is:

- **Production of Breeder Seed**: from breeders/ICAR institutions.
- **Production and distribution of Foundation Seed**.
- **Certified Seed supply**: large-scale distribution to farmers.
- **Seed Village Programme**: training village-level seed producers to produce and sell certified seed locally.

Seed production chain in India:

Nucleus Seed $\rightarrow$ Breeder Seed $\rightarrow$ Foundation Seed $\rightarrow$ Certified Seed $\rightarrow$ Farmers

Why other options are wrong:

- (B) Regulation of agricultural produce import/export is done by APEDA and FSSAI.
- (C) Crop insurance is managed by Agriculture Insurance Company (AIC/PMFBY).
- (D) MSP procurement is done by FCI, NAFED, and State agencies.

Final Answer: The National Seed Corporation (NSC) is a Government of India enterprise responsible for producing and supplying breeder, foundation, and certified seed, and for implementing the Seed Village Programme.

Answer: (A) Go Back to Q26

Q27.

Solution

Helicoverpa armigera (gram pod borer / American bollworm) is a polyphagous pest attacking chickpea, cotton, tomato, maize, and many other crops. Its larvae feed on flowers, pods, and bolls causing severe economic losses.

Ha-NPV (Helicoverpa armigera Nuclear Polyhedrosis Virus):

- A **naturally occurring insect virus** specific to *H. armigera*.
- Applied as a biopesticide (spray on crop foliage); larvae ingest polyhedral inclusion bodies.
- Virus replicates in midgut epithelium → larval mortality within 4–7 days.
- Highly specific — safe for humans, beneficial insects, and other organisms.
- Recommended dose: 250 larval equivalents (LE) per hectare.

Why other options are wrong:

- (A) *Chilo partellus* (stem borer) is controlled by Trichogramma parasitoids and Bt, not Ha-NPV.
- (B) *Bemisia tabaci* (whitefly) is a sucking pest; NPV does not target sucking insects.
- (D) *Spodoptera litura* has its own NPV (Sl-NPV), distinct from Ha-NPV.

Final Answer: Ha-NPV (Nuclear Polyhedrosis Virus) is a host-specific biopesticide applied to manage *Helicoverpa armigera* (gram pod borer) in chickpea and cotton, killing larvae within 4–7 days of ingestion.

Answer: (C) Go Back to Q27

Q28.

Solution

Dead heart in maize (30–45 DAS) is the characteristic symptom of infestation by ***Chilo partellus* (spotted stem borer)**. The young larva bores into the central shoot (whorl), feeds on the growing point, and kills it. The central leaf yellows, dries, and can be pulled out easily without resistance — giving the appearance of a "dead heart."

Life cycle and damage pattern:

- Eggs laid in batches on leaf surfaces.
- First instar larvae feed on leaf surface ("window pane" feeding).
- Second instar larvae enter the whorl → dead heart in young plants.
- Later instars tunnel down the stalk → stalk weakening, lodging.
- In older plants (after tasseling): "dead ear" symptom.

Distinction from shoot fly (*Atherigona soccata*):

- Shoot fly maggot severs the growing point at seedling stage (7–21 DAS) predominantly in sorghum.
- *C. partellus* dead heart in maize is from larval boring, typically 25–45 DAS.

Options (A), (B), and (C) are incorrect causal organisms for dead heart in young maize.

Final Answer: Dead heart in young maize plants is caused by *Chilo partellus* (spotted stem borer) larvae tunnelling into the central shoot and killing the growing point.

Answer: (D) Go Back to Q28

Q29.

Solution

Collar rot of groundnut is caused by ***Aspergillus niger***. The distinguishing feature is the **black powdery mass of spores** (conidia) at the collar region (soil-plant junction), visible on the lower stem and roots.

Disease characteristics:

- Prevalent in **sandy, light-textured soils** (common in Rajasthan) at **high temperature** (28–35°C).
- Infected plants wilt and die at collar region.

Management:

- Seed treatment with carbendazim + thiram (1:1 mixture) @ 3 g/kg seed.
- Soil application of Trichoderma viride.

Comparison with other groundnut diseases:

- *Sclerotium rolfsii*: stem rot; white mycelial mat + brown sclerotia at collar.
- *Fusarium oxysporum*: root and stem rot; vascular discolouration.
- *Rhizoctonia solani*: web blight on leaves; brown sclerotia without black spores.

Final Answer: Collar rot of groundnut is caused by *Aspergillus niger*, identified by a black powdery mass of conidia at the soil-plant junction in sandy, high-temperature soils.

Answer: (A) Go Back to Q29

Q30.

Solution

Yellow Mosaic Disease (YMD) of green gram (mung bean, *Vigna radiata*) is caused by **Mungbean Yellow Mosaic India Virus (MYMIV)**, transmitted in a persistent manner by the **whitefly *Bemisia tabaci***.

Symptoms:

- Golden-yellow mosaic patches interspersed with green areas on leaflets.
- Spreads rapidly in kharif season when whitefly populations are high (July–September).
- Infected plants produce shrivelled, discoloured seeds; severe yield loss (up to 100%).

Management:

- Grow resistant/tolerant varieties: Pusa Vishal, Meha, SML-668.
- Control whitefly with imidacloprid seed treatment or foliar spray.
- Rogueing infected plants early in the season.

Why other options are wrong:

- (A), (C), (D) Aphids (*Aphis gossypii*, *Myzus persicae*) and thrips (*Thrips tabaci*) transmit other viruses, not MYMIV.

Final Answer: Yellow mosaic disease of green gram is caused by MYMIV and is transmitted persistently by the whitefly *Bemisia tabaci*, spreading rapidly during the kharif season.

Answer: (B) Go Back to Q30

Q31.

Solution

Endosulfan is an organochlorine insecticide/acaricide widely used against aphids, bollworms, and other pests in India. It was banned due to:

(a) **Persistence**: long half-life in soil and water; does not readily degrade.

(b) **Bioaccumulation**: concentrates in fatty tissues of animals; found in arctic species far from use sites (evidence of long-range atmospheric transport).

(c) **Reproductive/endocrine toxicity**: disrupts endocrine system; causes reproductive abnormalities in wildlife and has been linked to congenital deformities in humans (Kerala Kasaragod study).

Timeline:

- India: Supreme Court interim ban (2011), followed by full national phase-out.
- Stockholm Convention (POPs Treaty): listed in 2011 for global elimination.

Why other options are wrong:

- (A) Endosulfan was actually *highly effective*; it was banned for safety, not efficacy reasons.
- (B) Endosulfan is *persistent*, not rapidly broken down.
- (D) Resistance development was not the primary reason for its global ban.

Final Answer: Endosulfan was banned in India in 2011 and listed under the Stockholm Convention because of its persistence in the environment, bioaccumulation in food chains, and reproductive/endocrine toxicity.

Answer: (C) Go Back to Q31

Q32.

Solution

Pheromone traps exploit insect chemical communication. **Sex pheromones** are chemicals released by female insects to attract males for mating. Synthetic sex pheromone lures placed in traps attract male moths, which enter and are trapped or killed.

Applications in pest management:

- **Pest monitoring/surveillance**: counting trapped males per trap per week gives population density data.
- **Mass trapping**: high density of traps reduces male population and mating success.
- **Mating disruption**: aerial pheromone release confuses males so they cannot locate females.

Examples in use in India:

- *Spodoptera litura*: Spodoptera lure
- *Helicoverpa armigera*: Helilure
- *Pectinophora gossypiella* (pink bollworm): Gossyplure

Options (A), (B), and (C) describe food lures, sterile insect technique (SIT), and entomopathogenic fungi – not sex pheromone traps.

Final Answer: Pheromone traps use synthetic sex pheromone lures to attract and trap male moths, enabling pest population monitoring and mass trapping as part of integrated pest management.

Answer: (D) Go Back to Q32

Q33.

Solution

Mewati (also called **Kosi**) cattle is an **indigenous dual-purpose breed** recognized and registered by the **National Bureau of Animal Genetic Resources (NBAGR), Karnal**. Key characteristics:

- **Home tract**: Mewat region — primarily **Alwar district of Rajasthan** and adjacent Gurgaon/Nuh area of Haryana; also Mathura district of Uttar Pradesh.
- **Body**: medium size, compact; grey-white colour with black markings on

extremities.

- **Dual purpose**: moderate milk yield (4–6 litres/day) and good draught capacity.
- Males are used for agricultural work in the fields of the Mewat region.

Why other options are wrong:

- (B) Bikaner-based desert breeds include Tharparkar (milk) and Nagori (draught); Mewati is from Alwar.
- (C) Barmer/Jaisalmer is the home tract of Tharparkar and Jaisalmeri camel; not Mewati.
- (D) Udaipur/Chittorgarh is not the recognized home tract of any major Rajasthan cattle breed.

Final Answer: The Mewati (Kosi) cattle breed is native to the Mewat region of Alwar district (Rajasthan) and Gurgaon (Haryana), and is a dual-purpose breed valued for both milk and draught work.

Answer: (A) Go Back to Q33

Q34.

Solution

Camel milk differs significantly from cow and buffalo milk:

Component	Camel milk	Cow milk	Buffalo milk
Fat (%)	**2–3**	3.5–4	6–8
Protein (%)	3.0–3.5	3.2	4.5
Lactose (%)	4.0	4.6	4.8

Distinctive features of camel milk:

- **Insulin-like proteins**: may help regulate blood glucose; studied for use in managing Type-1 diabetes.
- **Natural antibiotic properties**: contains lactoferrin, lysozyme, and immunoglobulins (including nano-antibodies, unique to camelids).
- Does not form a curd with rennet.
- Characterized at the **NRC on Camel, Bikaner, Rajasthan**.

Options (A), (C), and (D) are factually incorrect: camel milk is *low* in fat, is nutritious for humans, and is unlike buffalo milk in composition.

Final Answer: Camel milk is distinct from cow milk in having low fat (2–3%), insulin-like proteins with potential anti-diabetic properties, and natural antimicrobial constituents such as lactoferrin and nano-antibodies.

Answer: (B) Go Back to Q34

Q35.

Solution

Sonadi (also called **Patanwadi** in Gujarat) is a **mutton breed** of sheep in Rajasthan. Key features:

- **Home tract**: **Tonk, Bundi, and Sawai Madhopur** districts of eastern Rajasthan.
- **Physical appearance**: white body with black or brown spots on the face and legs; **long pendulous (drooping) ears** are the most distinctive feature.
- **Purpose**: primarily raised for mutton; medium wool quality.
- Body weight: males 35–45 kg; females 25–35 kg.
- Recognized breed by NBAGR.

Other important Rajasthan sheep breeds:

- **Malpura**: Tonk/Sawai Madhopur, mutton breed.
- **Nali**: carpet wool breed (Ganganagar, Hanumangarh, Churu).
- **Chokla**: fine wool breed (Churu, Sikar, Nagaur).

Options (A), (B), and (D) locate Sonadi in wrong districts.

Final Answer: The Sonadi (Patanwadi) sheep breed is native to Tonk, Bundi, and Sawai Madhopur districts of eastern Rajasthan, easily identified by its long drooping ears and white body.

Answer: (C) Go Back to Q35

Q36.

Solution

The **most significant genetic benefit of Artificial Insemination (AI)** is the massive multiplication of superior bull semen. A single ejaculate of a proven bull can be processed into 200–600 straws (frozen semen), and a bull can provide 10,000–50,000 inseminations per year. This accelerates genetic improvement by:

- **Increasing selection intensity**: only the very best proven bulls (top 0.1%) are used.
- **Reducing generation interval**: superior genetics spread faster to the national herd.
- **Eliminating geographic barriers**: frozen semen can be transported anywhere.

Additional benefits of AI:

- Reduces risk of sexually transmitted diseases (e.g., Brucellosis, Trichomoniasis).
- No need to maintain a bull on every farm (cost saving).
- Allows use of semen from deceased bulls (cryopreserved germplasm).

Options (A), (B), and (C) are incorrect: AI does not eliminate all disease risks, is not restricted to one breed, and does not reduce feed costs.

Final Answer: The primary genetic benefit of AI in cattle is that semen from a single proven superior bull can be extended into thousands of doses, dramatically accelerating genetic improvement across the national herd.

Answer: (D) Go Back to Q36

Q37.

Solution

The **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)**, enacted in 2005 and implemented from February 2006, is a social security measure that:

- Guarantees **at least 100 days of unskilled wage employment per financial year** to every rural household whose adult members are willing to do manual work.

- Employment is provided **within 15 days of demand**; if not, applicants receive an unemployment allowance.
- Works include: farm ponds, check dams, land development, rural roads, plantation — linking water conservation with agricultural productivity.

MGNREGA and agriculture linkage:

- Farm ponds created under MGNREGA increase irrigation coverage for small and marginal farmers.
- In Rajasthan, MGNREGA has significantly increased farm pond density in drought-prone districts.

Options (B), (C), and (D) are incorrect: MGNREGA provides *wage employment*, not cash income or free inputs.

Final Answer: MGNREGA guarantees every rural household at least 100 days of unskilled wage employment per financial year, with employment to be provided within 15 days of demand.

Answer: (A) Go Back to Q37

Q38.

Solution

Farmer Producer Organisations (FPOs) are registered entities that aggregate small and marginal farmers for collective input procurement, processing, marketing, and credit access.

Small Farmers' Agribusiness Consortium (SFAC), under the Ministry of Agriculture & Farmers' Welfare, is the nodal agency that provides:

- **Equity grant**: up to Rs. 15 lakh per FPO to strengthen equity base and improve creditworthiness.
- **Credit guarantee**: to facilitate bank loans.
- **Handholding support** through Cluster Based Business Organisations (CBBOs).

The **10,000 FPO formation scheme** (launched 2020, Rs. 6,865 crore) is jointly implemented by SFAC, NABARD, and NCDC.

Why other options are wrong:

- (A) NABARD provides *credit linkage and refinancing* to FPOs, not equity grants directly.
- (C) APEDA focuses on export promotion of processed food.
- (D) NCDC promotes cooperative societies, not FPO equity grants specifically.

Final Answer: SFAC (Small Farmers' Agribusiness Consortium) is the apex body that provides equity grant support of up to Rs. 15 lakh per FPO to strengthen their equity base and creditworthiness.

Answer: (B) Go Back to Q38

Q39.

Solution

e-NAM (National Agriculture Market) is a pan-India electronic trading portal launched on **14 April 2016** by the Government of India. Key features:

- **Online trading platform**: farmers, traders, processors, and exporters can bid and trade from anywhere.
- **APMC integration**: State APMCs are connected; mandis are onboarded after installing quality assaying labs and electronic weighbridges.
- **Price discovery**: real-time online bidding ensures competitive, transparent prices for farmers.
- **Quality assaying**: produce is graded at the mandi before trading begins.

Impact:

- As of 2024, over 1,000 mandis in 22 states integrated with e-NAM.
- Reduces number of middlemen and market fees paid by farmers.
- Rajasthan: major mandis in Jaipur, Jodhpur, and Kota onboarded.

Why other options are wrong:

- (A) Crop insurance: PM Fasal Bima Yojana, not e-NAM.
- (B) Fertilizer distribution: handled by state civil supplies departments.
- (D) Direct international export: handled by APEDA; e-NAM is domestic.

Final Answer: e-NAM, launched in April 2016, is an online trading platform that integrates APMC mandis across states to enable transparent price discovery and quality-based trading of agricultural commodities.

Answer: (C) Go Back to Q39

Q40.

Solution

In agricultural extension, **result demonstration** and **method demonstration** differ in purpose and location:

Feature	Result demonstration	Method demonstration
Purpose	Show *what* the outcome is	Show *how* to do something
Location	Farmer's own field	Extension office / farm school
Duration	Full crop season	Short (hours/days)
Example	New variety vs. old side-by-side	How to apply biofertilizer
Audience	Farmers and neighbours	Trainees / small group

Result demonstration involves laying out a **side-by-side comparison** of an improved practice vs. the farmer's traditional practice on the same field. Neighbours observe the **result** (higher yield, profit) at harvest and are convinced to adopt the innovation.

Other group extension methods:

- **Kisan mela**: brings together farmers, scientists, and input suppliers.
- **Field day / farm visit**: observing demonstration plots with expert explanation.
- **Group discussion**: interactive learning among farmers.

Options (A), (B), and (C) describe method demonstrations or training activities, not result demonstrations.

Final Answer: A result demonstration is conducted on a farmer's own field over a full season to show the yield or profit advantage of an improved practice compared to the traditional method, convincing neighbours to adopt it.

Answer: (D) Go Back to Q40

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	A	3	C	4	D	5	B
6	A	7	C	8	D	9	B	10	A
11	C	12	D	13	B	14	A	15	C
16	D	17	B	18	A	19	C	20	D
21	B	22	A	23	C	24	D	25	B
26	A	27	C	28	D	29	A	30	B
31	C	32	D	33	A	34	B	35	C
36	D	37	A	38	B	39	C	40	D