

UPCATET Agronomy Sample Paper-9

Duration: 20 Minutes

Maximum Marks: 100

Instructions

- This paper contains **25** Multiple Choice Questions.
- Each correct answer carries **+4** mark. Incorrect answer: **-1** marks. Only **one** correct option.
- Unattempted questions carry **0** marks.
- Use of mobile phones, smartwatches, or any electronic gadgets is strictly prohibited.

Q1. Which of the following packages of practices is ideal for the sowing of timely-sown wheat in the plains of Uttar Pradesh?

- (A) Sowing in late December with a seed rate of 150 kg/ha and 15 cm row spacing
- (B) Sowing in first fortnight of November with a seed rate of 100 kg/ha and 22.5 cm row spacing
- (C) Sowing in early October with a seed rate of 75 kg/ha and 30 cm row spacing
- (D) Sowing in mid-December with a seed rate of 125 kg/ha and 18 cm row spacing

Q2. The most dominant soil order found in the Indo-Gangetic plains of Uttar Pradesh, characterized by high agricultural productivity and lack of well-developed horizons, is:

- (A) Vertisols
- (B) Alfisols
- (C) Inceptisols
- (D) Entisols



- Q3.** Which critical growth stage of wheat requires irrigation precisely at 21 days after sowing (DAS) to prevent drastic reduction in tillering and spikelet numbers?
- (A) Tillering stage
 - (B) Jointing stage
 - (C) Crown Root Initiation (CRI) stage
- Q4.** Which of the following herbicides is most effective for the selective control of *Phalaris minor* in wheat, especially in areas where resistance to Isoproturon has been widely reported?
- (A) Sulfosulfuron
 - (B) 2,4-D Ethyl Ester
 - (C) Atrazine
 - (D) Fluchloralin
- Q5.** The optimum seed rate and row spacing recommended for the cultivation of rainfed chickpea (*Cicer arietinum*) in the Bundelkhand region of Uttar Pradesh are:
- (A) 50-60 kg/ha and 20 cm row spacing
 - (B) 75-80 kg/ha and 30 cm row spacing
 - (C) 90-100 kg/ha and 45 cm row spacing
 - (D) 110-120 kg/ha and 60 cm row spacing
- Q6.** The process of inversion, breaking, and shattering of soil to a depth of 15 to 30 cm to prepare a deep seedbed for root crops is categorized as:
- (A) Shallow tillage
 - (B) Secondary tillage
 - (C) Primary tillage
 - (D) Year-round tillage
- Q7.** Which irrigation method is considered most efficient for closely spaced crops like mustard or groundnut grown in undulating terrains with scarce water resources?



- (A) Check basin method
- (B) Furrow method
- (C) Sprinkler irrigation method
- (D) Border strip method

Q8. Under dryland agricultural conditions, which of the following physiological mechanisms is primarily responsible for maintaining cell turgor during prolonged dry spells?

- (A) Osmotic adjustment through accumulation of solutes like proline
- (B) Rapid increase in transpiration rate
- (C) Closing of stomata completely during night hours
- (D) Reduction in root-to-shoot ratio

Q9. The ideal sugarcane planting time for the 'Eksali' crop in northern India, which yields optimum sucrose and biomass accumulation, is:

- (A) July to August
- (B) October to November
- (C) February to March
- (D) May to June

Q10. The highly erosive form of water erosion where small, well-defined channels are formed on the soil surface due to concentrated overland flow, which can be easily leveled by normal tillage operations, is called:

- (A) Splash erosion
- (B) Sheet erosion
- (C) Rill erosion
- (D) Gully erosion

Q11. If the electrical conductivity (EC) of a soil saturation extract is greater than 4 dS/m at 25 degrees Celsius, exchangeable sodium percentage (ESP) is less than 15, and the pH is less than 8.5, the soil is classified as:



- (A) Saline soil
- (B) Sodic soil
- (C) Saline-alkali soil
- (D) Acid soil

Q12. The water use efficiency (WUE) of a crop is mathematically defined as the ratio of:

- (A) Crop yield to the total water applied through irrigation
- (B) Crop yield to the total evapotranspiration (ET) of the crop
- (C) Evapotranspiration to the total volume of deep percolation
- (D) Water absorbed by roots to the total water lost by transpiration

Q13. Which type of weed competes aggressively with rice crops due to its morphological mimicry during the vegetative stage?

- (A) *Cyperus rotundus*
- (B) *Echinochloa crus-galli*
- (C) *Eichhornia crassipes*
- (D) *Cynodon dactylon*

Q14. The optimum temperature range required for the proper germination of maize (*Zea mays*) seeds under field conditions is:

- (A) 10 to 15 degrees Celsius
- (B) 21 to 27 degrees Celsius
- (C) 35 to 40 degrees Celsius
- (D) 5 to 8 degrees Celsius

Q15. The implement most suitable for breaking hardpans created below the plow layer due to continuous shallow plowing is the:

- (A) Disc harrow



- (B) Rotavator
- (C) Chisel plow or Subsoiler
- (D) Country plow

Q16. A drainage system that consists of a network of pipes buried below the soil surface to lower the water table below the root zone is known as:

- (A) Surface drainage
- (B) Sub-surface tile drainage
- (C) Vertical drainage
- (D) Open ditch drainage

Q17. The maturity of sugarcane is commonly assessed using a hand refractometer. A brix reading within which of the following ranges indicates that the crop is fully mature?

- (A) 10 to 12
- (B) 14 to 15
- (C) 18 to 20
- (D) 24 to 26

Q18. Which index is calculated to evaluate the degree of water deficit or moisture stress in dryland agriculture by comparing rainfall with potential evapotranspiration?

- (A) Crop logging index
- (B) Aridity index
- (C) Harvest index
- (D) Leaf area index

Q19. The critical stage for moisture and nutrient competition by weeds in most of the rainy season (Kharif) crops is during the first:

- (A) 5 to 10 days after sowing
- (B) 15 to 45 days after sowing



- (C) 60 to 75 days after sowing
- (D) 90 to 105 days after sowing

Q20. The companion crop ideal for intercropping with Autumn sugarcane in Uttar Pradesh to maximize land equivalent ratio (LER) and provide early economic returns is:

- (A) Potato
- (B) Sorghum
- (C) Pearlmillet
- (D) Pigeonpea

Q21. The unique red-colored soils locally termed as 'Parwa' and 'Rakar', which are susceptible to severe erosion and possess low water-holding capacity, are predominantly found in which agro-climatic zone of Uttar Pradesh?

- (A) Bhabhar and Terai Zone
- (B) Western Plain Zone
- (C) Bundelkhand Zone
- (D) Eastern Plain Zone

Q22. The absolute water requirement (in mm) for the successful cultivation of a long-duration lowland transplant rice crop generally ranges between:

- (A) 300 to 400 mm
- (B) 500 to 700 mm
- (C) 1200 to 1500 mm
- (D) 2500 to 3000 mm

Q23. The distinctive physiological phenomenon of 'nipping' in chickpea is practiced to:

- (A) Reduce the excessive vegetative growth and promote lateral branching
- (B) Hasten the opening of flower buds



- (C) Increase the size of individual pods and seeds
- (D) Facilitate easy mechanical harvesting

Q24. Which type of tillage practice involves leaving at least 30% of the crop residue on the soil surface to minimize water and wind erosion?

- (A) Clean tillage
- (B) Conservation tillage
- (C) Intensive tillage
- (D) Deep tillage

Q25. The critical nutrient deficiency that leads to 'Khaira' disease in rice, causing rusty brown spots on leaves, can be corrected by the soil application of:

- (A) Ammonium sulfate
- (B) Zinc sulfate
- (C) Ferrous sulfate
- (D) Borax



Detailed Solutions**Q1.****Solution**

Concept: Agronomic recommendations for wheat cultivation depend significantly on the sowing window. Timely-sown wheat in the fertile Indo-Gangetic plains yields optimal biomass and tillering when established during the first half of November. This allows the crop to fully utilize the winter cooling period for vegetative and reproductive stages.

Solution:

- (a) For the plains of Uttar Pradesh, the ideal time for sowing timely-sown irrigated wheat is the first fortnight of November (November 1 to 15).
- (b) The recommended seed rate for a timely-sown crop using the conventional drilling method is 100 kg/ha, ensuring an optimal plant population.
- (c) The standardized row-to-row spacing for timely-sown wheat is 22.5 cm, which balances light interception, nutrient uptake, and inter-cultivation space.
- (d) Deviating from this schedule—such as sowing in October or late December—requires modifying the seed rates and narrow row spacings (e.g., 125-150 kg/ha and 15-18 cm) to compensate for poor tillering caused by temperature variations.

Final Answer: Sowing in first fortnight of November with a seed rate of 100 kg/ha and 22.5 cm row spacing

Answer: (B)

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Q2.

Solution

Concept: Soil taxonomy categorizes soils based on their diagnostic horizons and genesis features. The Indo-Gangetic plains are formed by massive, continuous alluvial deposits from Himalayan river systems, which undergo constant dynamic modification, leading to specific young or weakly developed soil profiles.

Solution:

- (a) Inceptisols are the most dominant soil order covering the Indo-Gangetic alluvial plains of Uttar Pradesh.
- (b) These soils are characterized by an embryonic stage of horizon differentiation, showing some color, structure, or chemical alterations without fully mature horizons.
- (c) They possess high inherent agricultural productivity because they are continuously replenished with fertile silt and nutrients by river flooding and runoff.
- (d) Unlike Entisols (which show absolutely no diagnostic horizons) or Vertisols and Alfisols (which exhibit heavy swelling clays and distinct illuvial clay accumulation, respectively), Inceptisols dominate this intensive cropping zone.

Final Answer: Inceptisols

Answer: (C)

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Q3.

Solution

Concept: The growth cycle of wheat involves several critical moisture-sensitive physiological stages. Missing an irrigation during these windows causes permanent developmental damage that cannot be fully corrected by subsequent watering, severely lowering grain yield components.

Solution:

- (a) The Crown Root Initiation (CRI) stage occurs precisely 21 days after sowing (DAS) and is the most critical irrigation stage in wheat.
- (b) During this period, the transition from seminal roots to crown roots takes place just beneath the soil surface.
- (c) Crown roots form the main anchorage and nutrient-absorption system responsible for supporting robust tillering and head development.
- (d) Moisture stress at 21 DAS drastically impairs the initiation of these roots, directly restricting the number of productive tillers and spikelets per spike, resulting in irreversible yield penalties.

Final Answer: Crown Root Initiation (CRI) stage

Answer: (C)

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Q4.

Solution

Concept: Phalaris minor (little seed canary grass) is a notorious mimic weed in wheat fields. The widespread, continuous application of traditional herbicides like Isoproturon over decades triggered widespread genetic resistance in this weed, mandating the shift toward newer, highly selective alternative chemical classes.

Solution:

- (a) Sulfosulfuron is a selective, systemic post-emergence sulfonylurea herbicide widely recommended to control Isoproturon-resistant Phalaris minor in wheat.
- (b) It works by inhibiting the acetolactate synthase (ALS) enzyme in target weeds, halting cell division and growth without harming the wheat crop.
- (c) Other broadleaf herbicides like 2,4-D Ethyl Ester are ineffective against grassy weeds like Phalaris minor.
- (d) Pre-emergence herbicides like Atrazine and Fluchloralin are not suitable or recommended for post-emergence selective control of canary grass within established wheat stands.

Final Answer: Sulfosulfuron

Answer: (A)

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Q5.

Solution

Concept: The Bundelkhand region features semi-arid climates with heavy, expansive soils and severe moisture limitations. Rainfed pulse cultivation in this topography requires adjusting plant populations and layout configurations to preserve soil moisture while optimizing yields.

Solution:

- (a) For rainfed chickpea in Bundelkhand, a seed rate of 75-80 kg/ha is highly recommended to establish an ideal plant stand under limited moisture conditions.
- (b) The recommended row-to-row spacing is 30 cm, which ensures appropriate ground coverage and minimizes evaporation losses from bare soil.
- (c) Wider spacing (like 45 or 60 cm) is generally reserved for long-duration or irrigated bold-seeded varieties, whereas narrower spacing creates excessive vegetative competition for scarce water.
- (d) This practice ensures that chickpea roots deep into the profile, utilizing residual soil moisture efficiently throughout its life cycle.

Final Answer: 75-80 kg/ha and 30 cm row spacing

Answer: (B)

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Q6.

Solution

Concept: Tillage operations are sequentially categorized based on their depth, timing, and primary objectives during field preparation. The mechanical manipulation of soil to open up dense layers constitutes the foundational phase of seedbed preparation.

Solution:

- (a) Operations involving deep cutting, inversion, breaking, and shattering of hard soil down to 15 to 30 cm constitute primary tillage.
- (b) This phase aims to bury weeds and crop residues, improve aeration, and loosen tough soil structures for upcoming root development.
- (c) It is performed using heavy implements like moldboard plows, disc plows, or subsoilers, especially before cultivating deep-rooted crops.
- (d) Secondary tillage follows primary tillage, focusing on shallower surface refinements like harrowing, leveling, and clod crushing to create a fine tilth for sowing seeds.

Final Answer: Primary tillage

Answer: (C)

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Q7.

Solution

Concept: Irrigation methods are selected based on field topography, crop geometry, and water availability. Undulating terrains make surface flooding methods inefficient due to uneven water distribution, high runoff losses, and excessive localized deep percolation.

Solution:

- (a) Sprinkler irrigation is the most efficient method for closely spaced crops grown on undulating lands where water resources are limited.
- (b) It conveys water through a pressurized pipe network and sprays it over the crop canopy like natural rainfall, ensuring uniform distribution regardless of slope variations.
- (c) Surface methods like check basin, furrow, and border strip require precision land leveling and suffer from immense water losses on irregular terrains.
- (d) Using sprinklers saves up to 30-40

Final Answer: Sprinkler irrigation method

Answer: (C)

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Q8.

Solution

Concept: Plants employ diverse physiological, morphological, and biochemical adaptations to tolerate extended periods of moisture stress. Maintaining cellular turgor under dry conditions is essential for sustaining basic metabolic functions and cell elongation.

Solution:

- (a) Osmotic adjustment via the active accumulation of compatible cellular solutes, such as the amino acid proline, is a crucial mechanism for maintaining cell turgor.
- (b) This biochemical adaptation lowers the internal osmotic potential of cells, allowing roots to continue extracting water from increasingly dry soils.
- (c) Increasing the transpiration rate would deplete cellular water rapidly, accelerating dehydration and wilting.
- (d) While stomatal closure reduces water loss during the day, osmotic adjustment dynamically sustains cellular structural integrity and metabolic pathways during persistent dry spells without starving the plant of carbon dioxide completely.

Final Answer: Osmotic adjustment through accumulation of solutes like proline

Answer: (A)

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Q9.

Solution

Concept: Sugarcane cropping systems vary by region based on the total duration the crop occupies the field. The 'Eksali' system refers to a crop cycle that matures within approximately one year, matching specific thermal and seasonal patterns in subtropical India.

Solution:

- (a) The optimum planting window for 'Eksali' sugarcane in northern India is during the spring season, spanning from February to March.
- (b) Planting during these spring months ensures rapid bud germination as temperatures rise after the harsh winter chill.
- (c) This timeline provides the crop with an extensive summer and monsoon phase for tillering and vegetative growth, followed by cool autumn conditions that stimulate sucrose accumulation.
- (d) Autumn planting (October-November) belongs to the 'Adsali' or special long-duration systems, while summer planting (May-June) results in poor germination and low biomass due to extreme heat stress.

Final Answer: February to March

Answer: (C)

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Q10.

Solution

Concept: Water erosion progresses through several distinct morphological stages as the volume and velocity of overland water flow increase across a landscape, creating visible markings on the land surface.

Solution:

- (a) Rill erosion is characterized by the formation of small, well-defined channels on the soil surface due to the concentration of scouring overland water flow.
- (b) These rills represent an advanced stage after sheet erosion, where topsoil is removed evenly in thin layers.
- (c) A defining feature of rill erosion is that the micro-channels are small enough to be easily obliterated and leveled out by standard field tillage operations.
- (d) If neglected, rills widen and deepen into gullies, which form permanent, deep ravines that cannot be remedied by normal plowing machinery.

Final Answer: Rill erosion

Answer: (C)

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Q11.

Solution

Concept: Diagnostic criteria based on chemical parameters are used to classify salt-affected soils. These parameters evaluate the total concentration of soluble salts, the proportion of sodium ions adsorbed on the soil exchange complex, and the resultant systemic alkalinity or acidity levels.

Solution:

- (a) Saline soils are characterized by an electrical conductivity (EC) of the saturation extract greater than 4 dS/m at 25 degrees Celsius due to an excess accumulation of soluble salts.
- (b) The exchangeable sodium percentage (ESP) remains below 15, and the soil pH is typically below 8.5 because neutral salts like chlorides and sulfates dominate over sodium carbonates.
- (c) Sodic soils show an ESP greater than 15 and a pH above 8.5, whereas saline-alkali soils present a high salt concentration alongside a high exchangeable sodium status.
- (d) Management of saline soils focuses primarily on leaching the soluble salts out of the root zone using high-quality irrigation water, provided proper drainage is maintained.

Final Answer: Saline soil

Answer: (A)

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Q12.

Solution

Concept: Water use efficiency measures an agricultural system's ability to convert available water assets into harvestable biomass. It serves as a standard metric to assess water optimization strategies across diverse microclimatic zones.

Solution:

- (a) Crop water use efficiency is mathematically defined as the ratio of economic crop yield to the total evapotranspiration of the crop during its life cycle.
- (b) It measures the amount of grain or biomass produced per unit of water lost to the atmosphere through joint evaporation from the soil surface and plant transpiration.
- (c) Field water use efficiency relates crop yield to the total volume of water applied through irrigation and rainfall combined.
- (d) Maximizing this specific ratio involves minimizing non-productive evaporation losses, optimizing leaf canopy coverage, and selecting drought-resilient cultivars.

Final Answer: Crop yield to the total evapotranspiration (ET) of the crop

Answer: (B)

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Q13.

Solution

Concept: Weed-crop competition becomes severe when weed species evolve to morphologically match the target crop. This adaptation protects them from manual weeding and visual selection during the crucial early vegetative phases of crop growth.

Solution:

- (a) Echinochloa crus-galli, commonly known as barnyard grass, is a destructive weed that exhibits strict vegetative mimicry with young rice plants.
- (b) Its stem structure, color, leaf arrangements, and initial growth habits match rice seedlings, making manual eradication difficult.
- (c) Cyperus rotundus is a sedge with distinct triangular stems, while Cynodon dactylon grows as a prostrate perennial grass, neither resembling upright rice plants.
- (d) This close mimicry enables the weed to utilize available nitrogen, solar radiation, and moisture, which stunts the host rice crop and reduces yields.

Final Answer: Echinochloa crus-galli

Answer: (B)

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Q14.

Solution

Concept: Seed germination depends heavily on ambient soil temperatures, which regulate key enzymatic processes, respiration rates, and cellular division within the metabolic systems of the embryo.

Solution:

- (a) The optimum temperature range required for uniform and rapid germination of maize seeds under field conditions is 21 to 27 degrees Celsius.
- (b) Temperatures within this specific physiological window promote maximum enzymatic activity, ensuring rapid mobilization of stored starches from the endosperm.
- (c) Low temperatures, such as 10 to 15 degrees Celsius, delay sprout emergence, which increases exposure to soil-borne pathogens and seed rot.
- (d) Extremely high temperatures above 35 degrees Celsius denature vital cellular proteins and disrupt metabolic systems, leading to reduced seedling vigor.

Final Answer: 21 to 27 degrees Celsius

Answer: (B)

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Q15.

Solution

Concept: Continuous shallow tillage with light implements at identical depths creates dense, compacted subsurface soil structures called hardpans. These hardpans restrict vertical root elongation and impede the downward movement of water.

Solution:

- (a) A chisel plow or subsoiler is the primary implement engineered to break deep hardpans without bringing unproductive subsoil up to the surface.
- (b) This heavy implement operates below the typical plow layer, shattering compacted zones to improve deep water percolation and root exploration.
- (c) Implements like disc harrows and rotavators are designed for shallow secondary tillage to refine surface tilth and incorporate residues.
- (d) Relieving subsoil compaction helps deep-rooted crops access residual moisture stored in lower profiles during periods of moisture stress.

Final Answer: Chisel plow or Subsoiler

Answer: (C)

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Q16.

Solution

Concept: Subsurface drainage systems manage waterlogged conditions by controlling groundwater levels. This prevents salt accumulation in topsoil and maintains an aerated root zone suitable for crop development.

Solution:

- (a) A subsurface tile drainage system consists of a network of perforated pipes or tiles buried at calculated depths beneath the soil surface.
- (b) This configuration uses gravity to collect excess gravitational water from the soil profile and lower the local water table below the active root zone.
- (c) Surface drainage methods rely on open ditches to remove standing surface water, but they do not manage high water tables effectively.
- (d) Subsurface drainage prevents capillary rise, which keeps harmful salts from moving into the upper soil profile and preserves root aeration.

Final Answer: Sub-surface tile drainage

Answer: (B)

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Q17.

Solution

Concept: The synthesis and storage of sucrose in sugarcane stalks follow a distinct physiological timeline. Monitoring juice concentration metrics enables precise scheduling of the harvest to secure maximum sugar recovery rates.

Solution:

- (a) A hand refractometer brix reading within the range of 18 to 20
- (b) The brix value measures the percentage of total soluble solids present in the stalk juice, which correlates closely with sucrose content.
- (c) Lower values, such as 14 to 15
- (d) For accurate maturity assessment, samples are taken from both the top and bottom portions of the stalk to ensure uniform sugar distribution throughout the plant.

Final Answer: 18 to 20

Answer: (C)

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Q18.

Solution

Concept: Agro-climatic indexes track moisture availability by comparing moisture inputs against atmospheric demand. These metrics help determine the severity of water stress across dryland and semi-arid production zones.

Solution:

- (a) The aridity index evaluates regional water deficits by calculating the ratio between annual precipitation and potential evapotranspiration.
- (b) It quantifies the degree of dryness in an area, assisting agronomists in selecting appropriate cropping patterns for dryland agriculture.
- (c) The harvest index measures the ratio of economic yield to total biological yield, while the leaf area index quantifies canopy coverage.
- (d) Tracking this index helps predict prolonged dry spells, enabling farmers to schedule defensive actions like applying mulches or anti-transpirants.

Final Answer: Aridity index

Answer: (B)

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Q19.

Solution

Concept: The critical period for weed control defines the growth window during which weed competition causes the greatest loss in crop yield. Managing weeds during this timeframe is essential to protect yield potential.

Solution:

- (a) The critical stage for weed competition in most rainy season (Kharif) crops occurs during the first 15 to 45 days after sowing.
- (b) During this initial phase, young crop seedlings grow slowly and can be easily outcompeted by fast-growing weeds for light, space, and nutrients.
- (c) Controlling weeds after 45 days provides minimal benefit, as the primary crop has already suffered irreversible structural and developmental damage.
- (d) Maintaining clean fields during this critical 15 to 45 DAS window allows the crop canopy to close, which naturally suppresses subsequent weed growth.

Final Answer: 15 to 45 days after sowing

Answer: (B)

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Q20.

Solution

Concept: Intercropping systems maximize spatial and temporal land use by combining crops with complementary growth habits, rooting depths, and canopy structures to optimize resource utilization.

Solution:

- (a) Potato serves as an ideal companion crop for intercropping with Autumn-planted sugarcane in the plains of Uttar Pradesh.
- (b) Because Autumn sugarcane grows slowly during the winter months, the intervening row space can be utilized to cultivate a short-duration crop like potato.
- (c) This combination increases the land equivalent ratio (LER) by utilizing shared inputs like irrigation water, residual fertilizers, and field labor.
- (d) Tall companion crops like sorghum or pearl millet create excessive shading and compete directly for resources, which stunts the primary sugarcane crop.

Final Answer: Potato

Answer: (A)

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Q21.

Solution

Concept: The physiography of Uttar Pradesh is divided into distinct agro-climatic regions. Each region exhibits specific soil profiles, textural configurations, and moisture-retention characteristics influenced by its local parent material, climate conditions, and topographic layout.

Solution:

- (a) The Bundelkhand Zone of southern Uttar Pradesh is characterized by a unique red and black soil complex. The red soils of this undulating terrain are locally termed as 'Parwa' and 'Rakar'.
- (b) 'Parwa' is a sandy-loam to loam soil, while 'Rakar' is a coarse, gravelly red soil usually found on upper slopes and degraded hillocks.
- (c) These soils feature a high sand and gravel content, which results in low water-holding capacity and makes them susceptible to rapid moisture depletion during dry spells.
- (d) Due to sparse vegetation cover and rolling topography, these soil types suffer from high vulnerability to severe sheet and rill water erosion during sudden monsoon downpours.

Final Answer: Bundelkhand Zone

Answer: (C)

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Q22.

Solution

Concept: The total water requirement of a crop equals the cumulative depth of water needed to support normal transpiration, surface evaporation, metabolic activities, and unavoidable field operational losses from sowing right up to maturity.

Solution:

- (a) Long-duration lowland transplanted rice has a high water requirement, which generally ranges between 1200 mm and 1500 mm under standard conditions.
- (b) This high consumption happens because the crop is grown under continuous water submergence or flooding to suppress weeds and maintain a microclimate.
- (c) A substantial portion of this total water asset is lost through evaporation from the open water surface and deep percolation into the underlying water table.
- (d) Selecting shorter-duration varieties or adopting modern cultivation techniques like the System of Rice Intensification (SRI) can lower this water requirement down to 900-1000 mm.

Final Answer: 1200 to 1500 mm

Answer: (C)

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Q23.

Solution

Concept: Apical dominance occurs when plant hormones produced in the terminal bud suppress the growth of lateral branches. Breaking this dominance through physical manipulation alters the plant architecture and redirects energy reserves into productive reproductive structures.

Solution:

- (a) Nipping in chickpea involves plucking or removing the terminal growing tips of the main shoots when the plant reaches a height of about 15 to 20 cm.
- (b) This operation breaks apical dominance, which diverts nutrients and auxins to stimulate the growth of numerous lateral branches.
- (c) A higher count of lateral branches increases the total number of flower-bearing positions per plant, resulting in more pods and a higher grain yield.
- (d) It can be done manually, by letting sheep graze lightly in the field, or chemically by applying growth retardants like TIBA before flowering starts.

Final Answer: Reduce the excessive vegetative growth and promote lateral branching

Answer: (A)

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Q24.

Solution

Concept: Resource-conserving farming methods manage soil, water, and biological inputs efficiently. They aim to reduce production costs while restoring soil health and protecting agricultural lands from climate-induced degradation.

Solution:

- (a) Conservation tillage is defined as any tillage system that retains at least 30
- (b) This surface residue layer acts as a protective barrier, reducing the kinetic energy of raindrops to minimize splash erosion and soil crusting.
- (c) It lowers water runoff velocity, enhances infiltration rates, decreases evaporation losses, and protects soil particles from wind detachment.
- (d) This practice includes method variations like zero-tillage, strip-tillage, and ridge-tillage, which contrast with intensive clean tillage that leaves fields bare.

Final Answer: Conservation tillage

Answer: (B)

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Q25.

Solution

Concept: Essential micronutrients function as co-factors for key enzyme activations, chlorophyll synthesis, and respiratory pathways. A severe deficiency of these nutrients can cause distinct physiological disorders and visible field symptoms.

Solution:

- (a) Khaira disease in rice is a well-known physiological disorder caused by a critical deficiency of available zinc in the soil.
- (b) The disease shows up as chlorosis near the base of young leaves, which later develops into rusty brown spots and lesions that stunt plant growth.
- (c) This condition occurs frequently in calcareous, waterlogged, or sandy soils where zinc availability is chemically restricted.
- (d) Applying 25 kg/ha of zinc sulfate to the soil during field preparation, or spraying a 0.5

Final Answer: Zinc sulfate

Answer: (B)

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Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	C	3	C	4	A	5	B
6	C	7	C	8	A	9	C	10	C
11	A	12	B	13	B	14	B	15	C
16	B	17	C	18	B	19	B	20	A
21	C	22	C	23	A	24	B	25	B

