Crop Protection Reviewer Based On TOS

Module A: Nature & Importance of Crop Protection, and Module B: Plant Pathogens

1. When assessing the economic impact of a pest population, which parameter determines the exact point at which control measures must be initiated to prevent the pest density from reaching a level that causes economic loss?

a. Economic threshold
b. Economic injury level
c. General equilibrium position
d. Damage boundary

2. Which of the following scenarios best demonstrates the principle of exclusion in plant disease management?

a. Applying protectant fungicides before rain
b. Implementing strict domestic quarantine for planting materials
c. Removing and burning infected plants from the field
d. Planting resistant varieties of crops

3. In crop protection, the integration of multiple disciplines is essential. If a field exhibits severe root galling and nutrient deficiency symptoms despite adequate fertilization, which discipline primarily addresses the causative agent?

a. Plant Pathology
b. Weed Science
c. Entomology
d. Nematology

4. A massive historical agricultural crisis was triggered by Phytophthora infestans. Which environmental condition most heavily favored the devastating epidemiological outbreak of this specific pathogen?

a. Extended periods of hot and dry weather
b. High temperatures with low relative humidity
c. Cool and prolonged moist conditions
d. Fluctuating high temperatures with strong winds

5. To properly assess crop losses caused by biological agents in a commercial farm, an agriculturist must differentiate between disease incidence and disease severity. Which methodology specifically measures disease severity?

a. Counting the number of infected plants in a hectare
b. Calculating the percentage of field area showing yellowing
c. Estimating the proportion of leaf area covered by lesions on individual plants
d. Determining the total number of spores trapped in a field

6. A farmer reports that his rice field is showing diamond-shaped lesions with gray centers. Which organism is the confirmed causal agent of this specific pathology?

a. Xanthomonas oryzae
b. Magnaporthe oryzae
c. Rhizoctonia solani
d. Ustilaginoidea virens

AGRICULTURE REVIEW

7. Papaya ringspot is a devastating disease that limits papaya production. How is the etiological agent of this disease primarily spread in the field?

a. Through wind-blown spores
b. By mechanical transmission through pruning tools
c. By aphid vectors in a non-persistent manner
d. By whiteflies in a persistent propagative manner

8. An agriculturist is employing the practice of rogueing in a banana plantation infected with Bunchy Top. This specific action falls under which fundamental principle of plant disease control?

a. Protection
b. Eradication
c. Exclusion
d. Immunization

9. When diagnosing a bacterial plant infection, one of the most reliable preliminary field tests involves cutting the stem and observing a specific phenomenon in clear water. What is the physiological basis of this test?

a. The rapid release of bacterial masses from the xylem vessels
b. The production of gas bubbles from anaerobic respiration
c. The hypersensitive response of the plant tissue
d. The immediate browning of the vascular bundles due to oxidation

10. A symptom involving the excessive multiplication of plant cells leading to the formation of galls or tumors, such as in Plasmodiophora brassicae infection, is technically classified as what condition?

a. Hypertrophy
b. Hypoplasia
c. Hyperplasia
d. Necrosis

11. A researcher isolates a microorganism from a diseased plant. According to Koch's postulates, what must be done immediately after isolating the suspected pathogen in pure culture?

a. Re-isolate the pathogen from the inoculated plant
b. Describe the symptoms of the original diseased plant
c. Inoculate a healthy, susceptible host with the pure culture
d. Identify the microorganism under an electron microscope

12. Plant parasitic nematodes have diverse feeding strategies. Which nematode genus is known as a sedentary endoparasite that induces the formation of multinucleate giant cells in the host roots?

a. Meloidogyne
b. Globodera
c. Pratylenchus
d. Xiphinema

13. Which of the following visual cues helps an agriculturist distinguish between symptoms caused by downy mildew and powdery mildew in the field?

a. Downy mildew produces white superficial growth on the upper leaf surface, while powdery mildew produces gray growth on the lower surface
b. Powdery mildew typically appears as superficial white talcum-like growth on the upper leaf surface, while downy mildew sporulates on the underside
c. Powdery mildew causes water-soaked lesions that ooze, whereas downy mildew causes dry necrotic spots
d. Downy mildew causes systemic wilting, while powdery mildew causes local hyperplastic galls

14. The Ti plasmid is an essential component for the pathogenesis of Agrobacterium tumefaciens. What is the exact function of the T-DNA portion of this plasmid during the infection process?

- **a.** It produces enzymes that degrade the plant cell wall
- **b.** It integrates into the plant genome and directs the synthesis of opines and phytohormones
- **c.** It acts as a vector to transport viruses into the plant cell
- **d.** It synthesizes phytotoxins that cause rapid tissue necrosis

15. Tungro disease in rice requires a specific interaction between the plant, the pathogens, and the vector. Which insect is the primary vector responsible for the transmission of the viruses involved in this disease?

- **a.** Nilaparvata lugens
- **b.** Nephotettix virescens
- **c.** Sogatella furcifera
- **d.** Leptocorisa oratorius

16. An agricultural extension worker recommends the use of a botanical pesticide derived from the seeds of the neem tree. Which active compound in this extract acts primarily as an insect antifeedant and growth regulator?

- **a.** Pyrethrin
- **b.** Rotenone
- **c.** Azadirachtin
- **d.** Nicotine

17. A farmer applied a systemic fungicide containing a triazole compound. What is the primary biochemical mode of action of this class of fungicides against pathogenic fungi?

- **a.** Inhibition of mitochondrial respiration
- **b.** Disruption of cell membrane permeability by inhibiting ergosterol biosynthesis
- **c.** Inhibition of beta-tubulin assembly in mitosis
- **d.** Interference with chitin synthesis in the cell wall

18. Bordeaux mixture is a classic inorganic protectant fungicide. Which two chemical compounds are mixed in water to prepare this historical fungicidal formulation?

- **a.** Copper sulfate and calcium carbonate
- **b.** Copper sulfate and calcium hydroxide
- **c.** Copper chloride and sodium hydroxide
- **d.** Copper oxide and calcium hypochlorite

19. In the context of the gene-for-gene hypothesis proposed by Harold Henry Flor, a resistant reaction in the host plant occurs under which specific genetic condition?

- **a.** When the host has a recessive resistance gene and the pathogen has a recessive virulence gene
- **b.** When the host has a dominant resistance gene and the pathogen has a dominant avirulence gene
- **c.** When the host lacks resistance genes entirely
- **d.** When the pathogen produces a non-specific toxin

20. To manage soil-borne plant pathogens, an agriculturist decides to incorporate Trichoderma harzianum into the potting mix. What is the primary ecological mechanism by which this beneficial microorganism suppresses plant pathogens?

- **a.** By fixing atmospheric nitrogen to boost plant immunity
- **b.** By modifying the soil pH to become highly acidic
- **c.** By mycoparasitism, spatial competition, and production of antibiotics
- **d.** By forming a physical barrier over the plant stomata

21. During a field survey, you observe corn plants exhibiting massive, swollen, gall-like structures on the ears that are filled with dark, powdery spores. Which fungal pathogen is responsible for this condition?

- **a.** Puccinia sorghi
- **b.** Ustilago maydis
- **c.** Peronosclerospora philippinensis
- **d.** Bipolaris maydis

22. When assessing the epidemiological progression of a polycyclic disease like potato late blight, which mathematical or graphical tool is most appropriate for evaluating total disease pressure over the entire growing season?

- **a.** Economic threshold level
- **b.** Area under the disease progress curve
- **c.** Spatial distribution map
- **d.** Pathogen race frequency chart

23. Which of the following best describes the fundamental difference between a sign and a symptom in plant pathology?

- **a.** A symptom is the plant's reaction to the disease, while a sign is the physical presence of the pathogen
- **b.** A symptom is observed before infection, while a sign is observed after
- **c.** A sign refers to abiotic damage, while a symptom refers to biotic damage
- **d.** A sign is an internal physiological change, while a symptom is strictly external

24. Certain plant viruses are transmitted by insects in a circulative, non-propagative manner. What does this specific mode of transmission imply about the virus-vector relationship?

- **a.** The virus multiplies within the vector and is transmitted immediately
- **b.** The virus is carried only on the insect's stylet and is lost after molting
- **c.** The virus crosses the insect's gut wall into the hemolymph and salivary glands but does not replicate in the insect
- **d.** The virus replicates in the insect's tissues and is passed on to its offspring transovarially

25. When implementing a biological control program using Bacillus thuringiensis, the timing of application is critical. At what stage of the target lepidopteran pest is this biopesticide most effective?

- **a.** Egg stage
- **b.** Early larval instars
- **c.** Pupal stage
- **d.** Adult stage

26. A tomato crop exhibits stunting, yellowing, and severely distorted, fern-like leaves. The field has a high population of whiteflies. Which type of pathogen is most likely responsible for these specific symptoms?

- **a.** A geminivirus
- **b.** A potyvirus
- **c.** A bacterial wilt pathogen
- **d.** A fastidious vascular bacterium

27. To manage root-knot nematodes effectively without relying solely on chemical nematicides, which cultural practice is most widely recommended for annual vegetable crops?

- **a.** Deep plowing during the rainy season
- **b.** Crop rotation with non-host species like marigold or specific grasses
- **c.** Applying high rates of nitrogen fertilizer
- **d.** Increasing the irrigation frequency to drown the nematodes

28. In the epidemiological disease triangle, a disease epidemic requires a susceptible host, a virulent pathogen, and a favorable environment. Which practice modifies the 'environment' leg of the triangle to manage Sclerotium rolfsii?

- **a.** Planting resistant cultivars
- **b.** Applying a seed treatment fungicide
- **c.** Adjusting plant spacing to increase aeration and lower canopy humidity
- **d.** Using a biofumigant cover crop

29. Phytoalexins are compounds associated with plant defense mechanisms. Which statement accurately describes their nature and timing of production?

- **a.** They are constitutive structural barriers present before pathogen attack
- **b.** They are pre-formed antimicrobial chemicals stored in the vacuole
- **c.** They are low molecular weight antimicrobial compounds synthesized de novo in response to pathogen infection
- **d.** They are systemic proteins that degrade fungal cell walls

30. In assessing pest populations, an agriculturist employs a sequential sampling method. What is the primary advantage of this sampling technique compared to fixed-sample-size methods?

- **a.** It guarantees the detection of pathogens at zero-tolerance levels
- **b.** It reduces the average number of samples needed to make a pest management decision when populations are very high or very low
- **c.** It provides a highly accurate map of spatial distribution across the entire farm
- **d.** It eliminates the need for calculating economic thresholds

31. A citrus grower notices asymmetrical mottling on leaves, greening of the fruit peel, and bitter-tasting juice. The presence of the Asian citrus psyllid is also confirmed. What is the etiological agent of this devastating disease?

- **a.** Citrus tristeza virus
- **b.** Xanthomonas citri
- **c.** Candidatus Liberibacter asiaticus
- **d.** Phytophthora parasitica

32. Protectant fungicides are designed to form a chemical barrier on the plant surface. For maximum efficacy, when must these chemicals be applied relative to the disease cycle?

- **a.** During the pathogen's incubation period
- **b.** After the appearance of initial symptoms
- **c.** Prior to the arrival and germination of pathogen spores
- **d.** During the secondary spread of the pathogen

33. Which group of plant-parasitic nematodes is known to vector Nepoviruses (such as Tomato ringspot virus) while feeding on host plant roots?

- **a.** Root-knot nematodes
- **b.** Dagger nematodes
- **c.** Cyst nematodes
- **d.** Lesion nematodes

34. Crop rotation is a fundamental cultural control strategy. However, it is generally ineffective against pathogens that possess which characteristic?

- **a.** Host specificity
- **b.** Short soil persistence
- **c.** Wind-borne foliar dispersal mechanisms
- **d.** Obligate parasitic behavior

35. The widespread agricultural use of identical genetic lines over large geographical areas increases vulnerability to specific pathogens. This phenomenon was the primary cause of which major epidemic?

- **a.** The Southern corn leaf blight epidemic due to Texas male-sterile cytoplasm
- **b.** The Bengal famine caused by brown spot of rice
- **c.** The coffee rust epidemic in Sri Lanka
- **d.** The sudden oak death outbreak in California

36. Plant diseases caused by viroids, such as the Potato spindle tuber disease, are unique because the pathogen consists entirely of what material?

- **a.** A protein coat without nucleic acid
- **b.** Single-stranded, circular, unencapsidated RNA
- **c.** Double-stranded DNA enclosed in a lipid membrane
- **d.** A complex of carbohydrates and lipids

37. When an agriculturist recommends solarization to manage soil-borne plant pathogens, what specific action is being performed?

- **a.** Exposing the soil to direct UV radiation by deep plowing
- **b.** Covering moist soil with clear polyethylene sheets during the hottest months to trap solar heat
- **c.** Applying light-reflective mulch to repel insect vectors
- **d.** Using intense artificial grow lights to sterilize the soil surface

38. A bacterial pathogen commonly uses a Type III secretion system to establish infection. What is the specific function of this cellular machinery?

- **a.** To secrete extracellular polysaccharides that block xylem vessels
- **b.** To inject effector proteins directly into the host plant cell cytoplasm
- **c.** To pump out antibiotics and heavy metals from the bacterial cell
- **d.** To exchange genetic material with other bacteria via conjugation

39. Which structural defense mechanism involves the deposition of callose and lignin in response to fungal penetration, forming a localized plug that halts further hyphal growth?

- **a.** Tyloses formation
- **b.** Abscission layer formation
- **c.** Papillae formation
- **d.** Gum secretion

40. An integrated pest management plan incorporates the use of entomopathogenic fungi. Which fungus is widely commercialized for the biological control of various insect pests, including whiteflies and thrips?

- **a.** Beauveria bassiana
- **b.** Mycosphaerella fijiensis
- **c.** Colletotrichum gloeosporioides
- **d.** Sclerotinia sclerotiorum

41. Understanding pathogen variability is critical for breeding resistant crops. Which mechanism is primarily responsible for the rapid development of new physiological races in asexual fungal populations?

- **a.** Meiotic recombination
- **b.** Horizontal gene transfer via plasmids
- **c.** Mutation and parasexual recombination
- **d.** Hybridization between different species

42. Certain plant pathogens survive unfavorable environmental conditions by forming highly resilient resting structures composed of compact masses of hardened fungal mycelium. What are these structures called?

- **a.** Conidia
- **b.** Sclerotia
- **c.** Appressoria
- **d.** Haustoria

43. Which of the following is a classic example of using the principle of cross-protection for viral disease management in agricultural crops?

- **a.** Applying a systemic insecticide to kill the viral vector
- **b.** Infecting the plant with a mild strain of a virus to prevent infection by a severe strain
- **c.** Breeding plants with dominant resistance genes against the virus
- **d.** Rogueing plants at the first sign of viral mosaic symptoms

44. A systemic insecticide application fails to control an outbreak of stem borers in a rice field. A subsequent analysis reveals the insects possess elevated levels of mixed-function oxidase enzymes. What does this indicate?

- **a.** The insect population has developed metabolic resistance to the chemical
- **b.** The chemical formulation was expired and degraded
- **c.** The insects avoided the chemical through behavioral resistance
- **d.** The chemical failed to penetrate the plant cuticle

45. Plant parasitic nematodes use a specialized anatomical structure to pierce plant cell walls and extract nutrients. What is this specialized feeding structure called?

- **a.** Radula
- **b.** Proboscis
- **c.** Stylet
- **d.** Mandible

46. When assessing agricultural fields for disease, remote sensing via drones has become increasingly valuable. What specific plant physiological change is most commonly detected by multispectral cameras before visible symptoms appear?

- **a.** Decreased leaf surface temperature
- **b.** Increased near-infrared reflectance
- **c.** Changes in chlorophyll fluorescence and reduced near-infrared reflectance
- **d.** Increased emission of volatile organic compounds

47. Pathogen infection often induces hormonal imbalances in plants. The 'foolish seedling' disease of rice, which causes extreme stem elongation, led to the discovery of which major class of plant hormones?

- **a.** Auxins
- **b.** Cytokinins
- **c.** Gibberellins
- **d.** Abscisic acid

48. An extension agent advises farmers to implement a 'closed season' where no susceptible crops are grown in a specific region for several months. What is the primary epidemiological goal of this regulatory strategy?

- **a.** To increase the organic matter content of the soil
- **b.** To break the continuous cycle of pest and pathogen generations by removing the host
- **c.** To allow the accumulation of soil moisture for the next planting
- **d.** To facilitate the large-scale application of pre-emergent herbicides

49. Pseudomonas fluorescens is heavily utilized as a biological control agent against soil-borne plant pathogens. What is one of its most critical mechanisms of antagonism?

- **a.** Production of volatile organic compounds that attract predatory nematodes
- **b.** Synthesis of siderophores that outcompete pathogens for available iron in the soil
- **c.** Direct parasitism of fungal resting structures via specialized hyphae
- **d.** Fixation of atmospheric nitrogen to rapidly accelerate plant growth

50. A diagnostic laboratory receives a sample of wilted solanaceous plants. To differentiate between bacterial wilt (Ralstonia) and fungal wilt (Fusarium), a cross-section of the lower stem is examined. Which finding definitively indicates a fungal etiology rather than bacterial?

- **a.** Profuse milky exudate streaming from the vascular bundles in water
- **b.** Vascular discoloration accompanied by the complete absence of bacterial oozing
- **c.** Rapid soft rot of the pith tissue with a foul odor
- **d.** The presence of localized hyperplastic galls on the stem base

Detailed Answer Key

Quick reference guide for all 50 questions from Modules A and B.

Q1: **a**	Q2: **b**	Q3: **d**	Q4: **c**	Q5: **c**
Q6: **b**	Q7: **c**	Q8: **b**	Q9: **a**	Q10: **c**
Q11: **c**	Q12: **a**	Q13: **b**	Q14: **b**	Q15: **b**
Q16: **c**	Q17: **b**	Q18: **b**	Q19: **b**	Q20: **c**
Q21: **b**	Q22: **b**	Q23: **a**	Q24: **c**	Q25: **b**
Q26: **a**	Q27: **b**	Q28: **c**	Q29: **c**	Q30: **b**
Q31: **c**	Q32: **c**	Q33: **b**	Q34: **c**	Q35: **a**
Q36: **b**	Q37: **b**	Q38: **b**	Q39: **c**	Q40: **a**
Q41: **c**	Q42: **b**	Q43: **b**	Q44: **a**	Q45: **c**
Q46: **c**	Q47: **c**	Q48: **b**	Q49: **b**	Q50: **b**