2019-2020 Written Genetic PT – Answer Key

1. _Qualitative_ PCR is a DNA-based test that yields a positive or negative result for the presence of GM.

2. Seed Calc can be used to determine the _number_ of pools needed based on detection level of the test used and the GMO acceptance level.

3. Quantitative PCR yields a specific _percentage_ of GM present in a given sample.

4. DNA is made up of _base_ _pairs_ held together with _Hydrogen_ bonds.

5. The basic principle of PCR is that of an exponential _increase_ in the amount of target _DNA_.

6. Quantitative testing methods typically have software that calculates the percent _contamination_ based on the standards used in the assay.

7. True or False Quantitative lateral flow strips are an immunoassay that yields only a positive or negative result.

8. True or False ELISA and Herbicide Bioassays are not typically used in AP/LLP testing but they are an option in certain circumstances.

9. Ture or False Results from each test should be considered based on upper limits of detection, technologies assayed, and seed lot sampling.

10. True or False Quantitative PCR require the use of 4 or more known standards to enable quantification.

11. True or False A sample must be representative of the seed lot to provide an accurate result reflecting the true contamination level.

12. True or False Quantitative lateral flow strips can be less expensive and labor intensive than other DNA methods.

13. True or False When using lateral flow strips, the protein from different traits express the same in different tissue types (seed, leaf) so its not important to understand what levels can be detected in the test.

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14. When choosing technologies for AP tests, what should be considered?
    a. Size of seed lot
    b. Detection limit of the test and the acceptable limit of AP
    c. The event in question
    d. All of the Above

15. For quantitative methods to provide an accurate result which of the below is recommended:
    a. Using two controls.
    b. Testing multiple reps.
    c. Using only assays to look for promoters.
    d. All of the above.

16. The four bases in DNA are:
    a. Adenine, Ribose, Guanine, and Cytosine
    b. Adenine, Uracil, Guanine, and Cytosine
    c. Ribose, Uracil, Thymine, and Adenine
    d. Adenine, Thymine, Guanine, and Cytosine

17. Adventitious presence is the _____ presence of another seed variety or genetic material.
    a. Intended
    b. Unintended
    c. Quantitative
    d. Qualitative

18. A negative result in AP/LLP testing means the contamination:
    a. May be lower than the LOD
    b. Is zero
    c. Both A and B
    d. Neither A or B

19. What is one of the biggest issues with AP/LLP testing?
    a. Determining what technology to use
    b. Interpreting results
    c. Sampling
    d. Extraction

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20. What is the purpose of AP or LLP event testing?

To determine the presence and quantity of GMO in products where the absence is desired.

21. Name two scenarios where AP testing would be used.

- Exporting seed to certain countries
- New breeding line to confirm licensing
- To make sure unintended traits are not present

22. Name two different technologies used to AP test.

- Quantitative PCR
- Qualitative PCR
- Quantitative/Qualitative lateral flow strips
- Herbicide bioassay
- ELISA

23. Name two advantages of qualitative PCR.

- Can use sequences for promoters
- Terminators and other common Transgene component instead of gen-specific assays to detect GMO.
- DNA-based test that is often more sensitive than protein assays.
- Can typically be used on bulk seed, feed, and some processed foods.
- Recognized worldwide as the standard test method for GMO detection and standards are easily obtained for testing.
- Can be less expensive than qPCR in some cases. Electronic results can be stored (either images of gels or intensities if used fluorescent dyes) for documentation and archive.

24. What type of controls should be included in an AP test for comparisons?

Positive and Negative

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25. What is a false error rate and why do labs need them?
    A false error rate is the rate that the test provides an incorrect positive or negative. They should be calculated in your lab to ensure customers are getting accurate data.

26. Name two advantages to quantitative PCR testing.
    - Less expensive to perform than DNA methods.
    - Currently provide a quantitative estimate of commercially available GMO traits, not just the promoter and terminator.
    - Can test bulk seed and some processed seed/food products.
    - Less labor intensive and easy to perform than DNA methods.
    - Readers can save images of strip results for documentation and archiving results.

27. Name two things that a lab should consider ensuring they are obtaining expected and accurate results when AP testing.
    - Benchmark studies
    - Proficiency testing and/or ring testing from trait providers

28. In Ct Target, what does Ct stand for?

    Cycle Threshold

29. What would you do if you performed a PCR on a traited sample and had inconsistent results?

    - Use a different technology to verify your answers
    - Run additional reps to confirm presence.
    - Check the sample run around the original sample to confirm no contamination.

30. List a main source of contamination in a seed crop.

    - Volunteer plants.
    - Transfer of pollen from a nearby field.
    - Mixtures during harvest.
    - Mixtures during handling.