2016-2017 SCST Genetic Technology Written Proficiency Test

1. Three methods typically used for AP/LLP testing include (choose the one best answer)

a. Quantitative Lateral Flow Strips, Quantitative PCR, Polyacrylamide Gel Electrophoresis
b. Isoelectric Focusing, Starch Gel Electrophoresis, Polyacrylamide Gel Electrophoresis
c. Quantitative PCR, Qualitative PCR, Quantitative Lateral Flow Strips
d. PCR, Lateral Flow Strips, Electrophoresis

2. A U.S. based company produced a non-gmo seed corn variety and would like to sell it internationally to as many markets as possible. Which one test method should the company use to test for AP/LLP? (chose the one best answer)

a. Qualitative Lateral Flow Strip
b. Quantitative PCR
c. ELISA
d. Herbicide Bioassay

3. One advantage of PCR testing for AP/LLP is that it

a. uses specialized equipment and software
b. uses expensive equipment and reagents
c. requires the use of 4 or more known standards to enable quantification
d. can be used on bulk seed, feed and some processed food samples

4. One advantage of Herbicide Bioassay testing for AP/LLP is that it

a. Requires added space for growth chambers
b. Is inexpensive compared to DNA and protein based tests
c. Only detects herbicide tolerant traits
d. Requires live viable seed to test

5. One advantage of Lateral Flow Strip testing for AP/LLP is that it

a. Is less labor intensive than DNA methods
b. Has a lower level of detection than DNA based methods
c. Requires live viable seed to test
d. Only detects herbicide tolerant traits

6. Name the three components of deoxyribonucleotide

a. mRNA, tRNA, rRNA
b. DNA, RNA, protein
c. DNA ligase, RNA polymerase, RNA primase
d. 2-deoxyribose, nitrogenous base, phosphate backbone

7. The melting temperature of PCR or sequencing primers (Tm) is defined as:

a. The temperature at which 100% of oligonucleotides are in double stranded confirmation.
b. The temperature at which 50% of oligonucleotides are in double stranded confirmation and 50% are single stranded.
c. The temperature at which 100% of oligonucleotides are in single stranded confirmation.
d. The temperature at which over 50% of oligonucleotides are in double stranded confirmation.

8. "A high temperature is used to break double stranded DNA into single strands". This is the definition of:

a. Denaturation
b. Annealing
c. Elongation
d. Isolation

9. What does the acronym SNP stand for in terms of genetic testing in seed?

a. Simple Nucleotide Polymorphism
b. Single Nucleotide Polymorphism
c. Six Nucleotide Protein
d. Single Number Polynucleotide

10. When extracting genetic material for GMO detection in seed, what is the target material?

a. Plasmid DNA
b. Genomic DNA
c. Ribosonal RNA
d. cDNA

11. What versions of SeedCalc are available for download from the ISTA website

a. SeedCalc3
b. SeedCalc5
c. SeedCalc8
d. all of the above

True or False:

12. Qualitative PCR can use sequences for promotor, terminators, or other common transgene components to detect GMO.
TRUE FALSE

13. Quantitative PCR and Quantitative LFS are equivalent assay methods for detecting GMO.
TRUE FALSE

14. In testing corn for AP, a combination of bioassay and immunoassay or PCR may be necessary
TRUE FALSE

15. A negative qPCR result may mean contamination is present at a lower level than the lower limit of detection of the test.
TRUE FALSE

16. Advantages of using qPCR for AP testing are highly sensitive and recognized worldwide as the standard for GMO detection
TRUE FALSE

17. Examples of quenchers for qPCR testing include TAMRA and MGB dyes?
TRUE FALSE

18. Two probes labeled with the fluorophore FAM can be used in the same well for detection of two SNPs if using separate quenchers.
TRUE FALSE

19. Lower limits of detection with quantitative lateral flow strips can be well above pre-set AP acceptability limits
TRUE FALSE

20. One of the advantages of quantitative lateral flow strips is that protein from different traits expresses the same in different tissue types (seed or leaf).
TRUE FALSE

Using the Qual Purity Estimation tab in SeedCalc8 answer the following 5 questions.
Seedcalc8 is a free application used for statistical analysis of seed testing.
It can be downloaded from the International Seed Testing Association website at:
http://www.seedtest.org/en/statistical-tools-for-seed-testing-_content---1--1143--279.html

An 800 seed herbicide bioassay is conducted on soybeans for a glyphosate tolerance AP/LLP test.
776 seeds germinated and were able to be evaluated in the assay.
773 seeds were nontolerant, and 3 were tolerant.
At the 95% confidence level.

21. What is the % Purity in the sample?

a. 99.90%
b. 99.61%
c. 98.73%
d. 98.62%

22. What is the upper bound of the true % impurity?

a. 1.00%
b. 1.05%
c. 1.55%
d. 3.45%

23. What is the lower bound of the true % purity?

a. 99.61%
b. 95.00%
c. 1.00%
d. 99.00%

24. What is the 2-sided Cl for true % purity?

a. 3 to 776
b. 0.08 to 1.13
c. 98.87 to 99.92
d. 1.00 to 99.00

25. When the desired confidence level is changed from 95% to 99% it does NOT affect the following

a. Upper bound of true % impurity
b. 2-sided CL for true % purity
c. % purity in sample
d. desired confidence level