# Genetic 2021-2022 Proficiency Test – Answer Key

**Fill in the Blank**

1. Adventitious presence as the _unintended_ or _unintentional_ presence of another seed variety or genetic material, and/or trait(s) from another variety as a result of natural, mechanical or human means.

2. Lateral Flow Strips are a __immunoassay__ test.

3. Non-herbicide tolerance traits such as insect resistance are often tested via an immunoassay utilizing either __ELISA__ and/or __lateral flow strip__ methods.

4. Molecular methods, including SNPs, may be used to test for trait purity for all defined traits including _herbicide_ tolerance, _insect_ resistance, and _drought_ tolerance.

5. Herbicide tolerance traits can be categorized as __genetically__ modified or __naturally__ occurring.

6. Herbicide concentrations are typically expressed in parts per million (ppm) in lab test applications. Parts per million is __"unitless"__ and is similar to a __percent__.

7. The use of check (or control) seed for each sample tested is essential to assure test accuracy and limit laboratory liability. Both __negative__ and __positive__ trait check samples should be included.

8. Immunoglobin is another name for __antibody__.

9. Element Specific AP testing could target the __promoter__ and __terminator__ sequences associated with many GMO events.

10. A typical ELISA kit purchased from a vendor contains the plate, _enzymes_, _substrate_ and _detergent_.

11. SNPs are powerful genomic markers that assess a line's _identity_ and __purity__.

**True/False**

12. True False Trait testing is regulated by the Federal Seed Act

13. True False The main advantage to herbicide bioassay is cost.

14. True False Lateral Flow Strips can be used to measure both AP and Trait Confirmation.

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**Short Answer**

15. What four technologies can be used for trait detection?

a. herbicide bioassay
b. ELISA
c. Lateral Flow Strips
d. PCR

16. What is the difference between Quantitative PCR and Qualitative PCR?

- Quantitative DNA-based testing methods yield a specific percentage of GM present in a given sample, while qualitative PCR is a DNA-based testing method that yields a positive or negative result for the presence of GM.

17. Please name two advantages of using Quantitative PCR for trait testing.

- Highly sensitive (some assays detect as low as 0.01% GMO in a given sample).
- Can typically be used on bulk seed, feed, and some processed food samples.
- Recognized worldwide as the standard test method for GMO detection, and standards are easily obtained for testing.
- Results are stored electronically (no gels or images to save).
- Results are typically calculated automatically with software tools.
- Can test for all GMO events with an all-purpose promoter/terminator assay.

18. Name two reasons why Lateral Flow strips are advantageous.

- Less expensive to perform than DNA methods.
- Currently provide a quantitative estimate of commercially available GMO traits, not just promoter and terminator. Useful if additional knowledge of trait is needed. (must use a quantitative strip reader).
- Can test bulk seed and some processed seed/food products.
- Less labor intensive and easier to perform than DNA methods.
- Readers can save images of strip results for documentation and archiving results.

19. Trait impurities are often due to contaminations, caused by (name two)

- Trait impurities are often due to contaminations of the seed source.
- Contamination during production (outcrossing and selfing).
- A seed mix of the seed lot.
- Contamination during sampling or non-uniform sampling.

# Genetic 2021-2022 Proficiency Test – Answer Key

20. What is the difference between Polyclonal Anitbodies and Monoclonal Antibodies?

The two types of antibodies utilized in ELISA tests are polyclonal antibodies and monoclonal antibodies (Figure I.14.4). Polyclonal antibodies are produced by injecting animals, usually rabbits, with the target antigen. The animal's immune system responds to the introduction of foreign material by producing antibodies. After time, circulating antibodies are collected in the blood of the animal and subsequently purified. This antiserum contains many different antibodies for the target antigen, thus the term "poly". Monoclonal antibodies are produced by selecting antibody-producing cells from an immunized mouse and hybridizing them with cells derived from melanomas, creating "hybridoma" cells. The antibodies produced from individual hybrid cell clones are identical to one another, thus the term "mono".

21. In an ELISA test what would be three reasons that there is no color present in the wells at the end of the test?

- Wrong antibodies or enzyme conjugate used.
- Substrate was not added or the wrong substrate was used.
- The wrong buffers were used.
- Enzyme conjugate was not added.
- Incorrect concentrations were used.
- The antibodies or enzyme conjugate were inactive due to improper handling or exceeding the storage time.
- Color development.

22. Name the three methods used for Herbicide Bioassay tests.

a. Seed Soak
b. Seedling Spray Test
c. Substrate Imbibition

23. Non-Trait Monocot seedling will commonly express what symptoms?

- Inhibition of root growth
- Inhibition of secondary root growth
- Shortened shoot and root growth
- Browning of mesocotyl tissue
- Lack of chlorophyll development
- Clear coleoptiles with stunted plumule leaf growth

24. In a greenhouse spray test the plant affected by the herbicide show what symptoms?

- Reduced seedling development (roots and shoot/hypocotyl)
- Discoloration
- Tissue or plant death

# Genetic 2021-2022 Proficiency Test – Answer Key

25. If your negative control shows no sensitivity to herbicide at the end of a test what would be the reason? Please name 3.

- Incorrect herbicide may have been used.
- Wrong formulation/amount of herbicide used
- Herbicide stocks may be expired
- Herbicide may be contaminated
- May have needed an adjuvant
- Herbicide may have been improperly mixed or prepared
- Wrong check sample may have been used
- Growth conditions for test may not have been appropriate

26. Name the four nitrogenous bases for deoxyribonucleotide triphosphates.

a. Adenine

b. Guanine

c. Cytosine

d. Thymine

**Multiple Choice**

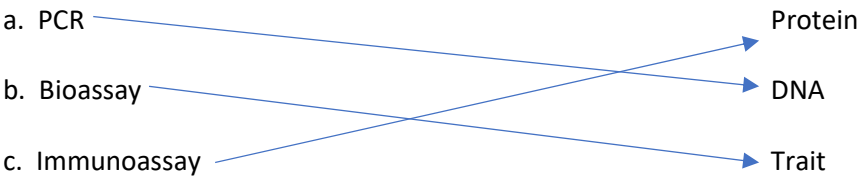
27. False positive or negative for lateral flow strips can be caused by?

a. wrong sample buffer
b. Strips submerged too deep in the samples extract
c. A and B
d. None of the above.

28. Edge Effect on ELISA plates is cause by?

a. Stacking of plates.
b. Strong light
c. Cold plates or reagents
d. All of the above.

29. Match the technology on the left with what it detects on the right side.



# Genetic 2021-2022 Proficiency Test – Answer Key

**Calculations**

30. Use Seedcalc8 to calculate the % contamination and upper bound true % purity in a sample using the information below.

# of seed pools - 30
# of seeds per pool- 1000
# of deviant pools 15
Desired confidence level 95%

__0.07__ % contamination __0.11__ upper bound true % purity

31. Use Seedcalc8 to calculate the % contamination and lower bound true % purity in a sample using the information below.

# of seed pools- 20
# of seeds per pool- 500
# of deviant pools- 8
Desired confidence level 95%

__0.10__ % contamination __99.81__ lower bound true % purity

32. Calculate the ppm for the Herbicide Concentration of Roundup Ultra 41%.

410,000 ppm

# Genetic 2021-2022 Proficiency Test – Answer Key

33. In this picture of the 2,4,D Soybeans rate each plant as normal or abnormal and tolerant versus non tolerant.


1. ___ normal __X__ abnormal ___ tolerant __X__ nontolerant
2. __X__ normal ___ abnormal __X__ tolerant _____nontolerant
3. __X__ normal ___ abnormal __X__ tolerant _____nontolerant
4. __X__ normal ___ abnormal __X__ tolerant _____nontolerant
5. ___ normal __X__ abnormal __X__ tolerant _____nontolerant

# Genetic 2021-2022 Proficiency Test – Answer Key

34. In this picture of Liberty Corn rate each plant as normal or abnormal and tolerant versus non tolerant.


1. _X_ normal ____abnormal _X_ tolerant ___ nontolerant
2. _X_ normal ____abnormal _X_ tolerant ___ nontolerant
3. _X_ normal ____abnormal ___ tolerant _X_ nontolerant
4. _X_ normal ____abnormal _X_ tolerant ___ nontolerant
5. _X_ normal ____abnormal _X_ tolerant ___ nontolerant

# Genetic 2021-2022 Proficiency Test – Answer Key

35. In this picture of Liberty Soybeans rate each plant as normal or abnormal and tolerant versus non tolerant.


1. ___ normal _X_ abnormal _X_ tolerant ___ nontolerant
2. _X_ normal ___ abnormal _X_ tolerant ___ nontolerant
3. _X_ normal _X_ abnormal _X_ tolerant ___ nontolerant
4. _X_ normal ___ abnormal ___ tolerant _X_ nontolerant
5. _X_ normal ___ abnormal _X_ tolerant ___ nontolerant

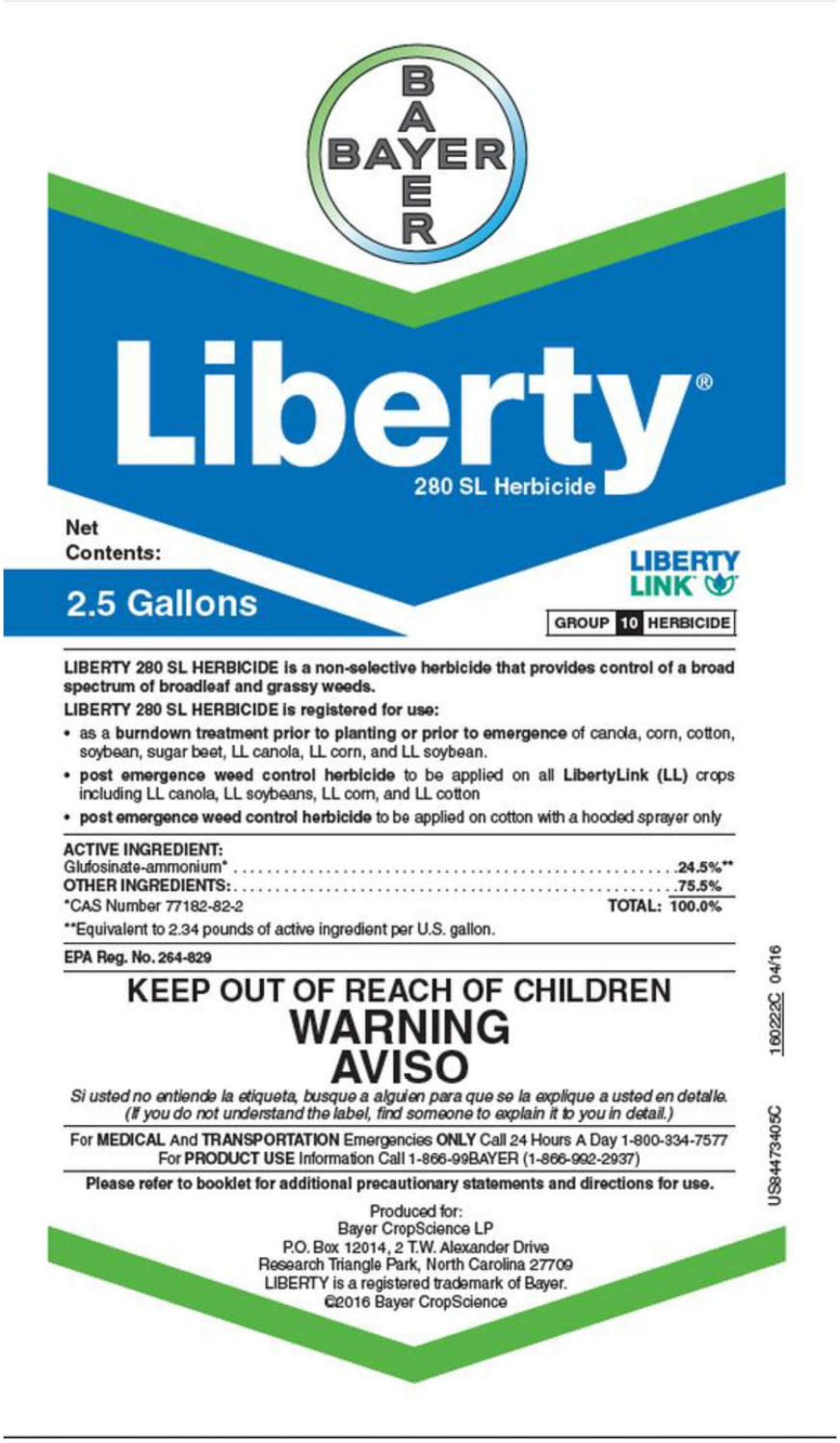
# Genetic 2021-2022 Proficiency Test – Answer Key

36. In this picture of Round Up Corn rate each plant as normal or abnormal and tolerant versus non tolerant.


| | | | | |
|---|---|---|---|---|
| 1. | _X_ normal | ___ abnormal | _X_ tolerant | ___ nontolerant |
| 2. | ___ normal | _X_ abnormal | ____ tolerant | _X_ nontolerant |
| 3. | _X_ normal | ___ abnormal | _X_ tolerant | ___ nontolerant |
| 4. | _X_ normal | ___ abnormal | ____ tolerant | _X_ nontolerant |
| 5. | _X_ normal | ___ abnormal | _X_ tolerant | ___ nontolerant |

37. What is the parts per million of the AI on the herbicide listed below?

__281,000__ ppm_



BAYER

# Liberty®

280 SL Herbicide

Net Contents:

2.5 Gallons

LIBERTY LINK®

GROUP 10 HERBICIDE

**LIBERTY 280 SL HERBICIDE is a non-selective herbicide that provides control of a broad spectrum of broadleaf and grassy weeds.**

**LIBERTY 280 SL HERBICIDE is registered for use:**

- as a **burndown treatment prior to planting or prior to emergence** of canola, corn, cotton, soybean, sugar beet, LL canola, LL corn, and LL soybean.
- **post emergence weed control herbicide** to be applied on all **LibertyLink (LL)** crops including LL canola, LL soybeans, LL corn, and LL cotton
- **post emergence weed control herbicide** to be applied on cotton with a hooded sprayer only

**ACTIVE INGREDIENT:**
Glufosinate-ammonium* ..... **24.5%****
**OTHER INGREDIENTS:** ..... **75.5%**
*CAS Number 77182-82-2 **TOTAL: 100.0%**

**Equivalent to 2.34 pounds of active ingredient per U.S. gallon.

**EPA Reg. No. 264-829**

## KEEP OUT OF REACH OF CHILDREN

## WARNING

## AVISO

*Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.*
*(If you do not understand the label, find someone to explain it to you in detail.)*

For **MEDICAL** And **TRANSPORTATION** Emergencies **ONLY** Call 24 Hours A Day 1-800-334-7577
For **PRODUCT USE** Information Call 1-866-99BAYER (1-866-992-2937)

**Please refer to booklet for additional precautionary statements and directions for use.**

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