

The number of points (out of a total of 150) that each question is worth is indicated in parentheses. For multiple choice questions, provide the BEST answer. Answer essay and short answer questions thoroughly but concisely; extraneous information may be counted against you. Also, if you are asked to list, for example, three items, listing more than three items may be counted against you. Good luck!

1. (3) Your name: _____
2. (3) Systemic herbicides are those herbicides which
 - a. exhibit contact activity
 - b. control a broad spectrum of weeds
 - c. are non-selective
 - d. are translocated within plants
3. (3) As defined by the Federal Noxious Weed Act, a noxious weed is
 - a. any plant deemed especially harmful
 - b. a plant not already present, or not widely present, in the U.S.
 - c. a plant that produces seed that may contaminate crop seed
 - d. defined separately for each state, by each state
4. (3) A herbicide with which of the following ionic charges would be most tightly bound to the soil
 - a. -1
 - b. -2
 - c. +1
 - d. +2
5. (3) Herbicides in this family are pre-plant incorporated
 - a. thiocarbamates
 - b. triketones
 - c. triazolopyrimidine sulfonanilides
 - d. pyridines
6. (3) Which of the following is a preventative weed management strategy?
 - a. using weed-free seed
 - b. installation of screens at the intake of a surface-water irrigation system
 - c. cleaning soil off a chisel plow before moving on to the next field
 - d. all of the above are preventative weed management strategies
7. (3) Herbicides in this family have foliar activity on grass weeds
 - a. benzoic acids
 - b. aryloxyphenoxypropionic acids
 - c. dinitroanilines
 - d. diphenylethers
8. (3) Which of the following resistant weeds has been identified in Illinois?
 - a. waterhemp resistant to HPPD inhibitors
 - b. Canada thistle resistant to dinitroanilines
 - c. smooth pigweed resistant to phenoxy-carboxylics
 - d. horseweed resistant to glyphosate

9. (3) A mycoherbicide
 - a. exhibits only contact activity
 - b. controls both grass and broadleaf weeds
 - c. is a form of biological weed control
 - d. is a heavy metal formulated as a herbicide
10. (3) Secondary tillage is primarily used to
 - a. break up sod
 - b. improve soil biotic characteristics
 - c. prepare the seedbed
 - d. control weeds after the crop has emerged
11. (3) Herbicide metabolism in plants is mediated to large extent by
 - a. P450s and protoporphyrinogen
 - b. P450s and GSTs
 - c. GSTs and peroxidases
 - d. benoxacor and dichlormid
12. (3) Who is responsible for designating Illinois noxious weeds?
 - a. the director of the Department of Agriculture of the State of Illinois
 - b. the Dean of the College of Agriculture at the U of I
 - c. the Director of the Agricultural Experiment Station at the U of I
 - d. all three of the above share this responsibility
13. (3) A restricted-use herbicide
 - a. can be used only in non-crop areas
 - b. can be used only in non-food crops
 - c. can be sold only to a certified applicator
 - d. can be used only until the existing supplies are exhausted
14. (3) Herbicides in this family are only xylem mobile
 - a. phenoxy-carboxylic acids
 - b. triazines
 - c. sulfonyleureas
 - d. cyclohexanediones
15. (3) The pK_a of a herbicide refers to
 - a. how strongly it is adsorbed to soil
 - b. how strongly it is adsorbed to the organic fraction of the soil
 - c. its vapor pressure
 - d. the pH at which it is half ionized
16. (3) Which of the following would be the LEAST effective herbicide resistance management strategy?
 - a. using a tank mix of a phenoxy-carboxylic acid herbicide and a cyclohexanedione
 - b. using glyphosate (with glyphosate-resistant soybean) one year and an acid amide plus a phenoxy-carboxylic acid the next year
 - c. using selective tillage to supplement chemical weed control
 - d. using a residual herbicide followed by a postemergence herbicide
17. (3) For which of the following soils would the application rate of a soil-applied herbicide be the highest?
 - a. sandy soil with high organic matter
 - b. sandy soil with low organic matter
 - c. clay soil with high organic matter
 - d. clay soil with low organic matter

18. (3) Herbicides in this family are foliar applied to control broadleaf weeds
- chloroacetamides
 - diphenylethers
 - dinitroanilines
 - cyclohexanediones
19. (3) The Casparian strip
- is a barrier to herbicide uptake via roots
 - is a barrier to herbicide uptake via leaves
 - provides a conduit for herbicide movement through the xylem
 - provides a conduit for herbicide movement through the phloem
20. (3) The fitness cost of resistance apparently is quite small for
- the triazines
 - the ALS inhibitors
 - glyphosate
21. (3) A herbicide with a half-life of 4 weeks is applied at 1lb/acre. How much will remain after 12 weeks?
- 1/2 lb/acre
 - 1/4 lb/acre
 - 1/8 lb/acre
 - 0 lb/acre
22. (3) A xylem-mobile herbicide will accumulate in
- mature leaves
 - meristems
 - roots
 - all of the above
23. (3) Herbicide safeners work by
- increasing herbicide metabolism
 - reducing herbicide uptake
 - altering the herbicide site of action
 - reducing herbicide translocation
24. (3) Crop-weed selectivity to this group of herbicides is mediated by differences at the site of action
- ALS inhibitors
 - ACCase inhibitors
 - HPPD inhibitors
 - PPO inhibitors
25. (3) According to Ian Heap's web pages, how many weed species have evolved resistance to glyphosate?
- 0
 - 2
 - 8
 - 16
26. (3) A perennial weed would most likely be killed if it received a
- systemic herbicide just before flowering
 - contact herbicide just before flowering
 - systemic herbicide during seed fill
 - contact herbicide during seed fill

27. (3) Herbicides in this family are foliar applied and non-selective
- imidazolinones
 - thiocarbamates
 - bipyridyliums
 - triketones
28. (3) The most common mechanism of evolved herbicide resistance in weeds is
- altered site of action
 - decreased uptake
 - increased metabolism
 - decreased translocation
29. (3) Which of the following is NOT designated by Illinois as a noxious weed?
- kudzu
 - Canada thistle
 - johnsongrass
 - waterhemp
30. (3) A primary advantage of soil-applied herbicides is
- residual activity will continue to provide weed control after the application
 - they are much cheaper than foliar-applied herbicides
 - their binding to the soil limits environmental contamination
 - they provide more consistent weed control
31. (3) Eradication usually is not a practical weed management goal because
- weeds exhibit such high developmental plasticity
 - elimination of weeds would adversely affect nitrogen cycling
 - seed dormancy of weeds makes it extremely difficult
 - biological agents rarely are 100% effective
32. (3) Different mutations within the ALS gene confer different patterns of
- multiple resistance
 - multiple tolerance
 - cross resistance
 - cross tolerance
33. (3) Herbicides in this family are slow-acting
- bipyridyliums
 - diphenylethers
 - N-phenylphthalimides
 - sulfonylureas
34. (6) Match the following:
- | | |
|-------------------|--------------------------------|
| ___ trade name | a. Roundup |
| ___ chemical name | b. N-(phosphonomethyl)-glycine |
| ___ common name | c. glyphosate |
35. (8) List the four general types of weed control.

36. (4) What are the two benefits of crop rotation in terms of weed management?

37. (6) List the three general ways by which a herbicide may be degraded in the soil.

38. (24) For each herbicide or herbicide family, write the letter of the correct site of action. (Some letters may be used more than once or not at all.)

- | | |
|---|-------------------------|
| i. ____ cyclohexanediones | a. ALS |
| ii. ____ glyphosate | b. ACCase |
| iii. ____ sulfonyleureas | c. D1 protein |
| iv. ____ triketones | d. tubulin |
| v. ____ pyrimidinylthiobenzoates | e. glutamine synthetase |
| vi. ____ N-phenylphthalimides | f. HPPD |
| vii. ____ glufosinate | g. cellulose synthase |
| viii. ____ dinitroanilines | h. PPO |
| ix. ____ imidazolinones | i. EPSP synthase |
| x. ____ diphenylethers | |
| xi. ____ triazines | |
| xii. ____ aryloxyphenoxypropionic acids | |

Using the list of herbicide families in question 40, write the appropriate Roman numeral on the blank next to each structure.

39. (2) ____

40. (2) ____

41. (2) ____