

The number of points 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) Crop-weed selectivity of diphenylether herbicides is usually due to
 - a. a different site of action in the crop
 - b. enhanced herbicide metabolism by the crop
 - c. reduced herbicide translocation by the crop
 - d. placement of the herbicide above the crop rooting zone
3. (3) Evolved herbicide resistance in a weed population is usually due to
 - a. a mutation in the gene encoding the herbicide's site of action
 - b. enhanced ability to metabolize the herbicide
 - c. sequestration of the herbicide
 - d. reduced translocation of the herbicide
4. (3) To determine how strongly a particular herbicide is adsorbed to the soil, one should look up its
 - a. pKa
 - b. half life
 - c. K_d
 - d. molecular weight
5. (3) Most herbicides move across cell membranes by
 - a. active transport through specialized protein carries
 - b. simple diffusion, with the concentration gradient as the driving force
 - c. biochemical disruption of the membrane
 - d. physical disruption of the membrane
6. (3) Resistance to which herbicide group has NOT yet been confirmed in an Illinois weed?
 - a. ALS inhibitors
 - b. dinitroanilines
 - c. triazines
 - d. PPO inhibitors
7. (3) Benzoic acid herbicides are
 - a. contact herbicides
 - b. phloem and xylem mobile
 - c. move only in the xylem
 - d. are not translocated

8. (3) As defined by the Federal Noxious Weed Act, noxious weeds
 - a. are all plants deemed especially harmful
 - b. are all plants capable of vegetative reproduction
 - c. are restricted to those plants that are not already present or widely distributed in the U.S.
 - d. are restricted to aquatic plants

9. (3) Crop-weed herbicide selectivity is most often mediated by differences between the crop and the weed in herbicide
 - a. uptake rates
 - b. translocation rates
 - c. metabolism rates
 - d. sensitivities of the site of action

10. (3) Branched-chain amino acids are synthesized by
 - a. ALS
 - b. EPSPS
 - c. ACCase
 - d. HPPD

11. (3) Dinitroaniline herbicides are
 - a. foliar applied and control grass weeds only
 - b. foliar applied and control grass weeds and small-seeded broadleaf weeds
 - c. soil applied and control grass weeds only
 - d. soil applied and control grass weeds and small-seeded broadleaf weeds

12. (3) The best advice for killing a patch of perennial weeds with a herbicide is to
 - a. apply a contact herbicide during seed set
 - b. apply a contact herbicide just before flowering
 - c. apply a systemic herbicide during seed set
 - d. apply a systemic herbicide just before flowering

13. (3) Crops resistant to glufosinate were obtained by
 - a. selection from natural variation
 - b. introduction of a gene encoding a modified target site
 - c. introduction of a gene encoding an enzyme that sequesters glufosinate
 - d. introduction of a gene encoding an enzyme that metabolizes glufosinate

14. (3) Sulfonylurea herbicides
 - a. have both foliar and soil activity
 - b. have only foliar activity
 - c. have only soil activity

15. (3) With classical biocontrol
- the biocontrol agent has a wide host range
 - the biocontrol agent is an insect
 - the biocontrol agent is self-sustaining once introduced
 - the biocontrol agent has to be regularly re-introduced
16. (3) A preplant herbicide is applied
- anytime from several weeks before planting to right before planting
 - within a week before planting
 - one to two days before planting
 - as the crop is being planted
17. (3) Bipyrindinium herbicides
- have soil activity and control both broadleaf and grass weeds
 - have soil activity and control just broadleaf weeds
 - have soil activity and control just grass weeds
 - do not have soil activity
18. (3) Systemic herbicides
- have contact activity
 - are nonselective
 - control only perennial weeds
 - are translocated through the plant
19. (3) On which type of soil would the labeled application rate of a soil-applied herbicide be the highest?
- clay soil with high organic matter
 - clay soil with low organic matter
 - sandy soil with high organic matter
 - sandy soil with low organic matter
20. (3) The direction of herbicide movement in the phloem is
- from roots to leaves
 - from source tissue to sink tissue
 - acropetally
 - basipetally
21. (3) In terms of their activity (soil vs. foliar) and the weeds they control, acid amide herbicides are most like
- cyclohexanediones
 - thiocarbamates
 - imidazolinones
 - triazines

22. (3) Aryloxyphenoxypropionic acid herbicides are primarily
- soil applied to control broadleaf weeds
 - soil applied to control grass weeds
 - foliar applied to control broadleaf weeds
 - foliar applied to control grass weeds
23. (3) Which of the following is a herbicide trade name?
- N-(phosphonomethyl)-glycine
 - glyphosate
 - Roundup
 - Imidazolinone
24. (3) Tubulin is necessary for
- the initial step in fatty acid biosynthesis
 - biosynthesis of long-chain fatty acids
 - photosynthetic electron transport
 - formation of the mitotic spindle
25. (3) Regarding cultural weed control, which of the following statements is FALSE?
- Crop rotations change the available niches and thereby can reduce the severity of weed infestations.
 - Planting soybean in narrow rows is an example of cultural weed control.
 - Using a rotational grazing system is an example of cultural weed control for pastures.
 - Cultural weed control strategies are generally not practiced in Illinois cropping systems.
26. (3) Inhibition of glutamine synthase results in
- inhibition of lipid biosynthesis
 - inhibition of carotenoid biosynthesis
 - a buildup of toxic levels of auxin
 - a buildup of toxic levels of ammonia
27. (3) There are now more weed species resistant to this group of herbicides than to any other group.
- ALS-inhibiting herbicides
 - PSII-inhibiting herbicides
 - ACCase-inhibiting herbicides
 - HPPD-inhibiting herbicides
28. (3) Compared to herbicides with only foliar activity, an advantage of herbicides with soil activity is
- selective weed control
 - non-selective weed control
 - broad-spectrum activity
 - residual activity

29. (3) One reason why target-site resistance to ALS inhibitors occurs frequently is that
- ALS enzyme function is not a vital function for the plant
 - plants have multiple gene copies for the ALS enzyme
 - herbicides bind the ALS enzyme very loosely
 - multiple point mutations in the ALS gene can confer a resistant enzyme
30. (3) Triazine herbicides
- move in the xylem and have activity on both broadleaf and grass weeds
 - move in the xylem and have activity on just grass weeds
 - move in the xylem and have activity on just broadleaf weeds
 - move in the phloem
31. (3) Phase I herbicide metabolism reactions are mediated in large part by plant
- cytochrome P450s
 - GSTs
 - glucosyl transferases
 - glutathiones
32. (3) Which of the following is NOT a noxious weed of Illinois, as defined by the Illinois Noxious Weed Law?
- Canada thistle
 - johnsongrass
 - marijuana
 - waterhemp
33. (3) The best advice for killing a patch of perennial weeds by tillage is to
- perform the tillage operation just after a killing frost
 - repeat the tillage operation every two weeks
 - perform the tillage operation just before flowering
 - use shallow tillage so as not to sever the rhizomes or roots
34. (3) Which of the following is used for secondary tillage?
- rotary hoe
 - moldboard plow
 - tandem disk
 - chisel plow
35. (3) Under which of the following soil conditions will herbicide degradation be the fastest?
- warm and moist
 - warm and dry
 - cool and moist
 - cool and dry

36. (8) Besides using preventative strategies, the four basic types of weed control are _____ control, _____ control, _____ control, and _____ control.
37. (4) List the four types of herbicide movement that can occur when a herbicide is applied to the soil.
38. (5) What is the difference between a herbicide's "mode of action" and its "site of action"?
39. (5) What is a mycoherbicide

For questions 40 through 53, choose from the following list of herbicides/herbicide families.

- | | |
|----------------------------------|----------------------|
| a. thiocarbamates | i. glyphosate |
| b. acid amides | j. imidazolinones |
| c. aryloxyphenoxypropionic acids | k. triazines |
| d. isoxaben | l. glufosinate |
| e. bipyridyliums | m. diphenylethers |
| f. dinitroanilines | n. cyclohexanediones |
| g. isoxazoles | o. triketones |
| h. phenoxy-carboxylic acids | p. benzoic acids |

Place the letter of the appropriate herbicide or herbicide family on the blank next to each mode/site of action (questions 40 through 49) or chemical structure (questions 50 through 53). There may be more than one equally acceptable answer for some questions. PROVIDE ONLY ONE ANSWER TO EACH QUESTION. Some letters may be used more than once; some may not be used at all. (Each matching question is worth 2 points.)

- 40. _____ D1 protein
- 41. _____ PSII
- 42. _____ glutamine synthesis
- 43. _____ ACCase
- 44. _____ auxin mimic
- 45. _____ EPSP synthase
- 46. _____ HPPD
- 47. _____ PSI
- 48. _____ protox
- 49. _____ tubulin

50. _____

52. _____

51. _____

53. _____