

Fayetteville-Manlius Invitational
Forestry Test Packet

December 2022



Exploring the World of Science

Team Name: _____ Team Number: _____

Olympian 1: _____

Olympian 2: _____

Do *not* open the test packet until you are told to do so. You are allowed one 2" binder and one commercially produced field guide. Raise your hand if you need an unedited copy of the 2023 National Tree List, a writing utensil, or have a question.

Section 1 (13pt)

1. Consider Figures A-D. Place letters A-D to the right of each figure's correct description.
 - 1.1 Monocot stem cross-section
 - 1.2 Monocot root cross-section
 - 1.3 Dicot stem cross-section
 - 1.4 Dicot root cross-section
2. In the center of Figure A there is a formation in the shape of the letter "X". What is this formation made of?
3. The "X" formation is surrounded by a small circle. What is this circle made of?
4. What is the structure of the collective "X" and circle called?
5. Circle the correct terms in the following sentence: Figure E depicts a (Taproot/Fibrous Root) system and Figure F depicts a (Taproot/Fibrous Root) system.
6. Name an advantage for the root system shown in Figure E.
7. Which root system typically occurs in monocots? What about Dicots?
8. Where does the majority of root growth occur?
 - (a) Root cap
 - (b) Meristem
 - (c) Pericycle
 - (d) Exodermis

Section 2 (16pt)

9. Which of the following is the best definition of silviculture?
 - (a) The study of tree physiology
 - (b) The practice of controlling the growth and composition of forests
 - (c) The practice of burning forests in a controlled manner
 - (d) The study of tree hybridization and speciation
10. Silviculture applies to **forest stands** instead of forests. What is a forest stand?
11. Which of the following is not a type of prescribed fire?
 - (a) Edge burning
 - (b) Pile burning
 - (c) Jackpot burning
 - (d) Broadcast burning
 - (e) Understory burning
12. Give one example of how a prescribed fire may benefit a forest.
13. Coppicing is a type of forest regeneration based on the ability of cut trees to sprout. Name a tree species on the 2023 National Tree List that this regeneration method can be successfully used on.
14. Refer to Figures G-H. Which forest depicts uneven-aged silviculture?
15. Refer to Figures G-H. Label the following silviculture systems with the forest that they are likely to be used on. Answer with G or H next to each system.
 - 15.1 Clear cutting:
 - 15.2 Coppicing:
 - 15.3 Selection forest:
 - 15.4 Shelterwood cutting:
16. Refer to Figure I. Place each tree labeled with a letter A-J next to one of the following crown classes (classes will be used more than once):
 - 16.1 Suppressed:
 - 16.2 Intermediate:
 - 16.3 Codominant:
 - 16.4 Dominant:

Section 3 (10pt)

17. Give the scientific name of the tree in Figure J.

18. The caption of this photo reads “Mature tree about 50 cm dbh and 25 m tall.” What does dbh stand for?

19. **TB3:** This tree has excellent pulping properties. What is extracted from wood through the process of chemical wood pulping?

20. Name a common pest of this tree.

21. T/F: This tree is the largest of the eight in its genus that are native to the western United States.

22. Finish the statement: The leaves of this tree have a vascular cambium that produces new
 - (a) Secondary xylem and secondary phloem every year
 - (b) Primary xylem every two years
 - (c) Secondary xylem every year
 - (d) Secondary phloem every year

23. T/F: The sap of this tree prevents fires from spreading through the crown.

24. What other tree on the National Forestry list are you most likely to see accompanying this tree?

25. The year is 3022. Global warming has progressed significantly, the temperature during winter outside FM is 77 degrees Celsius. A preserved seed of this tree is removed from a seed bank and planted outside. Will this seed germinate? Why or why not?

Section 4 (9pt)

26. Give the common name of the tree in Figure K.

27. When during the year does the fruit of this tree ripen?

28. Which of these stressors does this tree have the best resistance for?
 - (a) Fire
 - (b) Ice
 - (c) Woodpecker damage
 - (d) Leaf diseases

29. T/F: Most of the disease-causing agents that affect this plant are bacteria.

30. Which of these has the highest concentration within the nuts of this species?
 - (a) Protein
 - (b) Fiber
 - (c) Fat
 - (d) Water

31. The seeds of this plant experience embryo dormancy. What is embryo dormancy?

32. How does this plant overcome seed dormancy?

33. What type of inflorescence does this plant exhibit?

34. Why is this tree not often used ornamentally?

Section 5 (9pt)

35. Give the common name of the tree in Figure L.
36. What is the origin of this tree's common name?
37. Why does fire not typically occur in areas where this tree grows?
38. What part of the tree is the substance in Figure M made from?
39. Name a medicinal use for the substance in Figure M.
40. The flowers of this tree are wind-pollinated. What is the term that refers to this method of pollination? *HINT*: It is one word.
41. A new arboreal disease spreads throughout the US. Botanists find that it is effective at causing heartwood to rot in this species only. How will this disease affect the US lumber industry? Why?
42. Why is deer population management in mixed-hardwood stands an important factor in managing the population of this species?

Section 6 (8pt)

43. Give the scientific name of the tree in Figure N.
44. Which best describes the fruit of this tree?
- (a) Cone
 - (b) Berry
 - (c) Drupe
 - (d) Samara
 - (e) Pod
45. Give the common name of the tree on the 2023 National Tree List that is most closely related to this tree.
46. Most of this tree's native range is in which US state?
47. The name of this tree is two words. Which of the following cannot be swapped with the first word to form an alternate name for this tree?
- (a) Modesto
 - (b) Southwest
 - (c) Leather Leaf
 - (d) Toumey
48. In areas where this tree cannot grow a full canopy to block light, it often develops what condition?
49. What color does this tree typically turn in fall?
50. What leaf margin type does this tree have?

Section 7 (10pt)

51. Give the common name of the tree in Figure O.

52. The common name of this is named after which 19th century explorer?

53. This species is native to riparian zones. What is a riparian zone?

54. During which two months does the inflorescence of this tree bloom?

55. Through which vector is the fruit of this tree dispersed?
 - (a) Gravitational
 - (b) Wind
 - (c) Animals
 - (d) Water
 - (e) Ballistic

56. Through which vector are the flowers of this tree pollinated?
 - (a) Gravitational
 - (b) Wind
 - (c) Animals
 - (d) Water
 - (e) Ballistic

57. Describe the difference in bark texture between a young and mature tree of this species.

58. **TB1:** Why is coppicing not a logical regeneration method for this species after a fire has taken place?

Section 8 (9pt)

59. Give the common name of the tree in Figure P.
60. This species was recently moved into a monotypic genus through multiple lines of evidence. What is that new genus?
61. What physical feature separates this tree's nuts from those of genus *Quercus*?
62. **TB2:** What changes in this species' growth when it is planted on serpentine soils?
63. Which of these states can this tree be found in? Select all that apply.
- (a) Alaska
 - (b) Washington
 - (c) Oregon
 - (d) California
 - (e) Arizona
64. What aspect of this tree's young growths discourage herbivores from eating it?
65. Which of these are characteristics of this tree's ideal climate? Select all that apply.
- (a) Dry summers
 - (b) Wet winters
 - (c) Humid
 - (d) Cold
66. Does this tree have a low or high percentage of seeds that establish as seedlings?
67. Give reasoning for your answer to the above question.

Section 9 (11pt)

68. Give the scientific name of the tree in Figure Q.
69. This species produces unisexual catkins. What is a catkin?
70. T/F: This species can produce male catkins and female catkins on a single tree.
71. Which of the following microhabitats would this tree thrive in the most?
- (a) Mesic temperate forest canopy
 - (b) Xeric coniferous forest floor
 - (c) Mesic taiga forest understory
 - (d) Hydric temperate forest understory
72. Name two uses for the wood of this tree.
73. T/F: This species is the only one in its genus that is native to North America.
74. Describe the change in foliage color of this tree from spring to fall.
75. Which of the following successional communities would this tree typically be found in? Select all that apply.
- (a) Early Seral
 - (b) Late Seral
 - (c) Pioneer Community
 - (d) Climax Community

Section 10 (9pt)

76. Give the common name of the tree in Figure R.

77. T/F: The berries of this tree are edible.

78. During the summertime, this tree will occasionally form galls. What is a gall?

79. What type of organism forms galls on this tree?

80. Native Americans would chew the seeds of this tree for what purpose?

81. Which of these statements is false?
 - (a) This tree's flowers have 6 petals
 - (b) This species is the only tree native to all 48 contiguous states
 - (c) The leaves of this tree are pinnately compound
 - (d) This tree prefers open habitats

82. What leaf shape does this tree have?

83. What does circumneutral mean when referring to soils?

84. T/F: This tree prefers circumneutral soils.

Section 11 (11pt)

85. Give the scientific name of the tree in Figure S.
86. The fruit of this species is classified as a pome. What does that imply about this species' taxonomic family? Briefly explain your answer.
87. Name four US states that this tree can be found in.
88. Which tree(s) commonly dominates sites that this tree is found in? Select all that apply.
- (a) *Pinus ponderosa*
 - (b) *Populus tremuloides*
 - (c) *Populus trichocarpa*
 - (d) *Larix laricina*
 - (e) *Taxus brevifolia*
 - (f) *Quercus rubra*
 - (g) *Populus deltoides*
89. In the image above, spinose apical processes can be observed. What is the purpose of these processes?
90. Give the scientific name of the other tree on the National Forestry List that shares a genus with this species.
91. What structural characteristic of this species makes its crown particularly vulnerable to fire?
92. What is the difference between a tree and a shrub? Which fits this specimen better?

Section 12 (9pt)

93. Give the common name of the tree in Figure T.

94. USFS named this species as the second most common tree in the United States. What was the first?

95. This is an extremely important tree to genomics. Between 2014 and 2018, what distinction in genomics did this tree hold?

96. What feature of this tree makes it susceptible to inbreeding depression?

97. Due to fire suppression, this tree has been able to outcompete what relative (on the list) in its range throughout the south?

98. In the South, what does this tree's common name refer to?
 - (a) A medicinal product obtained from this tree
 - (b) The shape of its fruit/cones
 - (c) The texture of its bark
 - (d) The habitat of this tree

99. How many leaves/needles comprise a bundle for this tree?

100. T/F: This tree's fragrance resembles that of rosemary.

101. What soil characteristics does this tree grow best on?

Section 13 (13pt)

102. Which of these North American biomes do not support trees? Select all that apply.
- (a) Tundra
 - (b) Taiga
 - (c) Prairie
 - (d) Cool Desert
 - (e) Hot Desert
103. Consider Figure U. Label each forest type with the section in which you would expect it to be found on a North American Mountain. Each letter will be used once.
- 103.1 Ponderosa Pine Forests:
 - 103.2 Mixed Conifer Forests:
 - 103.3 Juniper Woodlands:
 - 103.4 Spruce-fir Forests:
104. Consider Figure U. Notice how the images of trees in each section get smaller with the elevation. Typically, animals get larger at colder environments, but this rule does not generally apply to plants. Explain why that is.
105. T/F: Most of the world's oxygen production comes from forests.
106. In a forest, where is the majority of potential energy stored?
107. Name one natural event that can convert this stored potential energy into kinetic energy.
108. Name one chemical reason that wood decays slower than other organic materials.
109. Do trees decay faster in forests with high or low amounts of moisture? Why?

Section 14 (10pt)

The following trees are found on a nature walk through your local wildlife park:

- *Quercus rubra*
- *Fraxinus americana*
- *Picea glauca*
- *Juniperus osteosperma*
- *Pinus resinosa*
- *Acer saccharum*
- *Sorbus americana*

110. You were tasked with creating a dichotomous key to help hikers identify each of these trees. **The one you made is shown at the end of the image packet**, but you seem to have lost the numbers that are associated with each tree. No matter! You are an expert in forestry and can fix this quickly. Write the scientific name of the correct tree next to each tree number.

110.1 Tree 1:

110.2 Tree 2:

110.3 Tree 3:

110.4 Tree 4:

110.5 Tree 5:

110.6 Tree 6:

110.7 Tree 7:

111. Name one advantage and disadvantage that dichotomous keys have for identification.

112. Most tree identification websites use a multi-access key for identification. Explain how these differ from dichotomous keys.