MASTER GARDENER
COLORADO STATE UNIVERSITY
EXTENSION

CMG GardenNotes #610

The Science of Pruning

References and Review Material

Reading/Reference Materials

CSU GardenNotes

- https://cmg.extension.colostate.edu/volunteer-information/cmg-gardennotes-class-handouts/.
- #611, *Tree Growth and Decay.*
- #612, *Pruning Cuts*.
- #613, *Structural Training of Young Shade Trees*.
- #615, *Pruning Mature Shade Trees*.
- #616, *Pruning Flowering Shrubs*.
- #617, *Pruning Evergreens*.

CSU Extension Fact Sheets

- https://extension.colostate.edu/topic-areas/yard-garden/.
- #7.003, *Training and Pruning Fruit Trees*.

Plant*talk* Colorado™

- https://planttalk.colostate.edu/.
- #1210, *Pruning Mature Fruit Trees*.
- #1713, *Pruning Shrubs*.

Other

- *An Illustrated Guide to Pruning,* Third Edition. Edward F. Gilman. 2012. Available from the International Society of Arboriculture, https://wwv.isa-arbor.com/store/product/24.
- *Best Management Practices – Pruning,* Third Edition. Sharon J. Lilly, and E. Thomas Smiley. 2019. Available from the International Society of Arboriculture, https://wwv.isa-arbor.com/store/product/58/.
- *ANSI A300 Pruning Standards, Part 1*. American National Standards Institute. 2017. Available from TCIA, https://treecareindustryassociation.org/business-support/ansi-a300-standards/.
- *Structural Pruning, A Guide for the Green Industry*. Dr. Edward F. Gilman, Brian Kempf, Nelda Matheny, and Jim Clark. 2013. Available from the International Society of Arboriculture, https://wwv.isa-arbor.com/store/product/500/.
- Find an Arborist (ISA), https://www.treesaregood.org/findanarborist.
- The Urban Tree Foundation, http://www.urbantree.org/.

Learning Objectives

At the end of this training, the student will be able to:

- Explain how trees grow, describe their tissues, and understand decay.
- Know the three different types of pruning cuts (removal cuts, reduction cuts, and heading cuts) and be able to explain their uses and how to execute them.
- Structurally prune a young shade tree.
- Describe pruning of maturing shade trees, including objectives and methods.
- Prune flowering shrubs.
- Prune evergreen shrubs.

Review Questions

Tree Growth and Decay

1. What is a branch collar?
2. Explain how a branch collar develops.
3. Explain the size relationship between the side branch and trunk/parent branch necessary for a branch collar to develop.
4. Define the following terms:
    - Phloem.
    - Xylem.
    - Sapwood.
    - Heartwood.
    - Ray cells.
    - Compartmentalization.
5. How do trees respond to decay?
6. Describe the four 'walls' of CODIT (Compartmentalization of Decay in Trees).
7. What are some visual indicators of decay?

Pruning Cuts

8. Identify/define the following:
    - Branch collar.
    - Branch bark ridge.
    - Branch defense zone.
    - Reaction zone.
    - Wound wood.
9. Answer the following questions about removal cuts:
    - In what situation would you use a removal cut?
    - What are the advantages of a removal cut?
    - When the branch bark ridge is visible, where is the removal cut made?
    - If the branch collar is not easy to identify, where is the removal cut made?
    - If the branch has no branch collar, where is the removal cut made?
    - What happens when the branch collar is injured or removed?
10. Answer the following questions about reduction cuts:
    - In what situation would you use a reduction cut?
    - What are the uses and limitations of reduction cuts?
    - What is the proper angle for a reduction cut?
    - In a reduction cut, what is the proper size relationship of the branch being removed to the branch pruned back to? Is it important?
11. Answer the following questions about heading cuts:
    - In what situation would you use a heading cut?
    - How does it influence regrowth of the plant?
    - What are the effects of using heading cuts on larger branches?
12. Explain the three-step method for pruning large branches. Why is it needed? When is it needed?
13. Ideally, what time of year should major pruning of shade trees or larger evergreens be undertaken?

Structural Training of Young Shade Trees

14. In structural training of young shade trees, give the rule-of-thumb for dosage (i.e., the maximum amount of live wood/foliage removed per season)? How is the dosage range adjusted for the specific tree?
15. What are the pruning objectives for young trees.
16. Define codominant trunks. Why do arborists have zero tolerance for codominant trunks?
17. What is the standard height for the lowest permanent branch of sidewalk trees? Street tree? Trees in forest areas (fire management)?
18. What is the proper size relationship between the trunk and side branch? Why is it important? What are the options if a side branch is growing too large?
19. Define scaffold branch. What is the rule of thumb for minimum spacing of scaffold branches?
20. How do multiple branches arising at one site influence the branch collar and thus structural integrity?
21. What is the role of temporary branches on young trees?
22. Describe the management of temporary branches.

Pruning Mature Trees

23. List the objectives for pruning a mature tree.
24. List the methods of pruning to achieve purposes.
25. Describe key elements in writing specifications for general pruning of maturing trees.
26. What is the overall objective in structural pruning of medium-aged and mature trees? Why will it generally require work over a period of years? How does larger branch size influence the potential for structural pruning?
27. Describe subordinate pruning. What factors should be considered when deciding where to make a subordinate pruning cut?
28. Describe how to subordinate prune a medium-aged tree with the following situations:
    - Codominant trunks.
    - Rounded off.
    - Choked-out central leader.
    - Too many upright-growing branches.
29. Describe key elements in writing specifications for structural pruning of medium-aged trees.
30. Define cleaning. In cleaning, how much of the live wood should be removed? Why?
31. When is it important to remove dead branches? At what size and height does dead branch removal become an important management issue?
32. When removing a dead branch, where is the final cut made?
33. Describe key elements in writing specifications for cleaning.
34. Describe thinning.
    - What are the purposes of thinning the crown?
    - In thinning the crown, what types of cuts are made?
    - What is the general maximum size of branches to be removed?
    - What is the long-term effectiveness in overall crown thinning to reduce storm damage potential? What pruning method would be more effective?
35. Describe the key elements in writing specifications for thinning.
36. What is lion-tailing? How does it differ from thinning the crown? What are the problems associated with lion-tailing?
37. What is the rule of thumb on dealing with excessive sucker growth?
38. In raising, what is the minimum live crown ratio?
39. In raising, what options may be workable other than removal of lower branches? Why may removal of lower branches cause problems?
40. Describe the key elements in writing specifications for crown raising.
41. Describe the reasons for crown reduction. Describe the limitations of crown reduction.
42. List pointers on crown reduction, as given in chapter.
43. What is the long-term effectiveness in overall crown reduction to reduce storm damage potential? What pruning method would be more effective?

44. How does topping a tree impact its structural integrity and internal decay potential?
45. Describe the key elements in writing specifications for crown reduction.

Flowering Shrubs

46. What is the difference between spring-flowering shrubs and summer-flowering shrubs? How does this affect pruning?
47. Many gardeners prune flowering shrubs by topping or shearing them. Describe the impact on growth and flowering.
48. Explain the pros of, and limitations for, shrub pruning by:
    - Shearing to shape.
    - Thinning old wood.
    - Pruning to the ground.
    - Replacement.
49. What types of shrubs are successfully renewed by pruning to the ground? List situations where this approach may not work.

Evergreens

50. Why should you avoid pruning the evergreen tree back further than where it has foliage?
51. A large evergreen tree is overgrowing the space. Explain options to prune back the bottom branches for spruce, fir, and Douglas-fir and pines.
52. Explain what happens when a gardener shears a pine shrub. What is another technique to keep a young pine shorter and bushier?
53. On junipers and arborvitae, explain the pros and cons of:
    - Shearing.
    - Thinning.
54. Explain the problems associated with trying to prune back a severely overgrown juniper or arborvitae.