



MASTER GARDENER

COLORADO STATE UNIVERSITY
EXTENSION

The Colorado Master Gardener and The Colorado Gardener Certificate Program

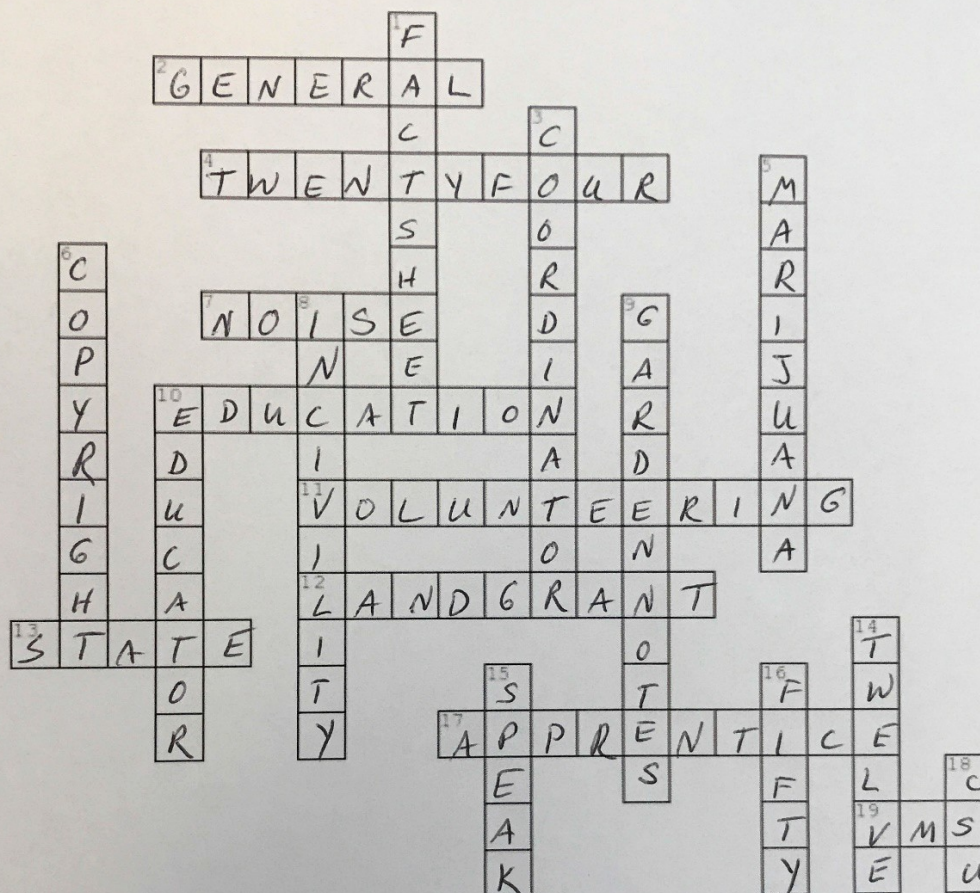
Worksheet and Homework Answers Front Range Edition

CMG/CGC Program - Homework and Worksheet Answers for Instructors

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Colorado Master Gardener Program



Created with TheTeachersCorner.net [Crossword Puzzle Generator](http://www.theteacherscorner.net/CrosswordPuzzleGenerator/)

Across

2. Pesticide CMGs can apply while volunteering
4. Volunteer hours required of CMGs
7. Interferes with listening
10. Purpose of Extension programs
11. When to use title 'Colorado Master Gardener'
12. University system founded in 1860's
13. Partner in Extension system besides federal and county
17. Title of CMG trainee
19. Initials of on-line reporting system

Down

1. CSU materials with information on a topic
3. Whom to refer legal questions
5. Cannot be handled by volunteers
6. Protects authors
8. One of the grounds for dismissal
9. Written CMG training materials
10. Master Gardener role
14. Continuing ed hours required of CMGs
15. We do this more slowly than we hear
16. Volunteer hours required for apprentices
18. Initials of Colorado's land grant university



CMGGardenNotes#103A

Reading Pesticide Labels Worksheet

Find the answers to the questions on the label provided.

1. What are the active ingredients?
Sulfur (10%) and pyrethrins (0.25%)
2. Can I apply this product to lilacs? The plant has powdery mildew and aphids.
Yes, the site and pests are on the label. Note: even if only the site was on the label ("lilacs" or "trees and shrubs") it would still be okay to apply the product.
3. I've applied this to my cabbage crop. How long do I have to wait after the application to eat it?
One day.
4. What is the mode of action for this product?
It is a "contact killer". See the green paragraph above "the "Quick Facts" bar.
5. Will this product harm freshwater clams?
Yes – they're freshwater invertebrates.
6. What action do I take if I accidentally spill this product on my shirt sleeve?
Take off contaminated clothing. If you get it on your skin, rinse it immediately with plenty of water for 15 -20 minutes. You can also call your doctor or poison control center.
7. How do I dispose of the empty container?
Label directions say to place in trash or recycle if the service is available.
8. How should I store this product?
Store at room temperature and keep from freezing.
9. Can I use this product in my greenhouse where I grow culinary herbs for sale?
No, the label states the product is only for use on home gardens and lawns. It is not to be used on commodities for resale.



CMG Garden Notes #105

Homework: IPM, Plant Health Care and the Diagnostic Process

1. Why is Integrated Pest Management (IPM) the best approach to managing pest problems?

IPM uses multiple strategies to manage pest problems, rather than just one approach, which by itself may not work.

2. Why is it important to discuss tree care issues as they relate to growth phases?

Plant care changes with the different stages of growth. Failure to relate cultural practices to the life cycle often leads to reduce growth and confusion about appropriate cultural practices.

3. What is the first step in the diagnostic process?

Identify the plant.

4. Why is it important to know what is "normal" for a given plant?

Knowing what is normal helps identify whether or not an object found on the plant or a plant's behavior is truly a problem.



CMG GardenNotes #108

The Lab Worksheet: Diagnosis Practice

The objective of this exercise is to give you practice diagnosing tree insects and diseases.

For this activity, refer to ***Insects and Diseases of Woody Plants in Colorado***. On pages 295 to 314 is a ***Diagnostic Key to... Woody Plant Disorders***. Answer the following questions by using the key and reference pages cited.

Plant 1

1. Plant ID: Douglas fir
2. Describe signs and symptoms:
 - a. In severely stressed to recently killed trees, you find piles of sawdust and fiber accumulating beneath them. Wide galleries, just under the bark, are filled with fibrous material. You also find adult beetles that are about an inch long, brownish-gray with white specks and very long antennae.
 - b. What is the most likely (probable) insect causing the sawdust and fibrous material?

A: Pine Sawyer



Plant 2

1. Plant ID: Aspen
2. Describe signs and symptoms:
 - a. In the spring, leaves are being eaten by caterpillars. They have a bright blue stripe on their side and yellow, keyhole shaped spots on their back. Your neighbor thought they were tent caterpillars, but you can't find any tents.

- b. What are the possible insects that could be causing the problem?

Students might confuse this with the western tent caterpillar, but no tents are being formed.



- c. Which insect do you think is causing the damage?
Forest Tent Caterpillar

Plant 3

1. Plant ID: Crabapple
2. Describe signs and symptoms:
 - a. Four crabapple trees were lost to what a gardener believes is “fire blight”. The trees were planted in an irrigated lawn area three years ago, but never really grew well. The first spring (just after planting) the trees bloomed, but new growth was minimal. The second year, the trees looked “blighted” with smaller pale leaves and no new growth. By the third season, the trees progressively declined, having no blossoms, tiny pale leaves and no twig growth. Most leaves dropped by mid-summer. In fall as the homeowner removed the dead trees, he discovered a large discolored area on the trunks just below ground level. He would like to replace the trees with fire blight resistant cultivars so he won't have this problem again.
 - b. What are the possible causes of this problem?
 - c. What is the probable (likely) cause? *Phytophthora root and crown rot*.



Andrej Kunca, National Forest Centre – Slovakia,





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CMG Garden Notes #150

Leaf Characteristics Worksheet

Describe the following characteristics for each numbered leaf sample using GN #134

Leaf 1 Bur oak	Leaf Arrangement Simple	Leaf Margin Lobed	Leaf Base Acute
Leaf 2 Redbud	Leaf Shape Cordate	Leaf Margin Entire	Leaf Venation Palmate
Leaf 3 Norway Maple	Leaf Arrangement Simple	Leaf Margin Lobed	Leaf Venation Palmate

Leaf 4 This sample contains an entire leaf Indigo	Leaf Arrangement Pinnately compound	Leaflet shape Oval to oblong	Leaflet margin Entire, with thin, tiny bristle at tip
Leaf 5 This sample contains an entire leaf Horsechestnut	Leaf Arrangement Palmately compound	Leaflet Shape Obovate	Leaflet Margin Doubly serrate



CMG GardenNotes #151

The Work Sheet: Plant Structures

The objective of this work sheet is to give students experience systematically looking at plant parts and connecting what they see with print information.

1. Flower parts

a. Locate and draw the parts of the inflorescence (Answers will depend on flowers used.)

1. Anthers
2. Calyx
3. Corolla
4. Filament
5. Ovary
6. Pedicel
7. Petals
8. Pistil
9. Receptacle
10. Sepals
11. Stamen
12. Stigma
13. Style

2. Identify the type of flower

	Flower	Inflorescence Type		Fruit	Inflorescence Type
a	Allium	umbel	d	Achillea	corymb
b	Sunflower	composite	e	Poppy	single
c	Foxglove	spike	f	Calla Lily	spadix

3. Identify the type of fruit

	Fruit	Fruit Type		Fruit	Fruit Type
a	Apple	pome	b	Strawberry	aggregate

4. Annual Growth

Examine young branches and twigs, looking for the annual growth rings (terminal bud scars). Based on the **terminal bud scars**, measure the annual growth for the past three years to the nearest inch. Note: The annual growth rings are easy to read on some species and more difficult on other species. (Answers will depend on trees studied.)

Tree 1	Tree 2
New growth (season 1) _____	New growth (season 1) _____
Previous season (season 2) _____	Previous growth (season 2) _____
Three years back (season 3) _____	Three years back (season 3) _____



CMG GardenNotes #152

The Work Sheet: Plant Processes #1

Photosynthesis/Transpiration

Situation/Symptoms

A homeowner calls about a tree in their yard that leafed out fine this spring. By late June, however, the leaves began to wilt, dry up and are now falling. They just moved into the home last fall and don't know how the landscape was maintained prior to that. Other trees in the yard are showing similar symptoms. There has been prolonged drought in the area for the past two years.

Question 1: Why are the leaves drying? Why were they fine this spring?

Answer:

The prolonged drought and lack of watering in the last few years caused damage to the root system which reduced the amount of water and nutrients that the roots could absorb. The tree leafed out this spring because there was sufficient soil moisture and rain in the spring. There were also stored nutrients from the previous year that allowed the tree to leaf out. When the temperatures rose in late June, however, the reduced root system was no longer able to bring up sufficient water and nutrients to sustain the tree's needs.

Question 2: What plant process has been interrupted?

Answer:

Photosynthesis and transpiration have been interrupted.

Photosynthesis requires water which was not in sufficient amount due to a reduced root system. In addition, the stomates had closed to reduce evaporation of moisture from the leaf surface. This decreased water moving through the plant and also reduced the amount of carbon dioxide coming into the stomates, which is also needed for photosynthesis.

Transpiration uses approximately 90% of the plants' water. Open stomates pull water from the roots through the plant. Since the stomates were closed, transpiration was decreased.



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CMG GardenNotes #153

Work Sheet: Plant Processes #2

Respiration

Situation/Symptoms

A homeowner planted a shade tree two years ago in a landscape with heavy clay soils. The tree has never thrived and is now showing dieback mostly in the lower canopy. They asked the advice of their neighbor, a Colorado Master Gardener, who noticed that the tree had been planted about 6 inches too deep and the homeowner has been overwatering trying to bring the tree back.

Question: What is causing the dieback and what plant process is being interrupted?

Answer:

Because the tree was planted too deeply in heavy clay soils, the roots are not getting sufficient oxygen. The overwatering is making the situation worse by filling up any available pore spaces with water displacing the oxygen. The tree is suffering from lack of oxygen to the roots.

The plant process being interrupted is mostly respiration. Plants need oxygen for respiration which converts photosynthates into plant energy.



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CMG GardenNotes #154

The Work Sheet: Plant Processes #3

Growth Regulators/Hormones

Situation/Symptoms

A homeowner planted a 2 inch caliper shade tree three years ago but it still hasn't really taken off the way it should. They believe that they did everything right when planting the tree including pruning some of the top of the tree to balance out the compromised root system. Does the tree need more fertilizer?

Question: Why hasn't the tree come out of transplant shock and put on more top growth and how are hormones affecting the tree's growth?

Answer:

When the homeowner pruned the tree at transplant they also reduced the amount of auxin present in the top of the tree. Since auxin stimulates root growth, the root system did not grow quickly. With less root growth, fewer gibberellins are being produced which stimulate tip growth. As a result, less top growth was occurring.

No, they should not apply fertilizer as fertilizer encourages top growing and what the plant needs most, is root growth.



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CMG GardenNotes #155

Homework: Botany

Answer the following questions

1. Why is it important to use scientific names for plants rather than just common names?

Plants may go by multiple common names and various plants may share the same common name. So common name alone may not correctly identify the plant. The scientific name is unique (in spelling but not pronunciation) for a plant, worldwide.

2. Why is it important for the gardener to understand the importance of plant families?

Plant families share comparable cultural requirements and similar pest problems.

3. How can high temperatures affect the flavor of a melon?

Respiration increases when temperatures are hot. Respiration uses sugars for plant energy and in various processes. Melon sweetness may be reduced or non-existent as a result.

4. How can late spring frosts affect plant growth and development?

Late spring frosts can damage or kill plants or plant tissue, depending on temperatures and the plant involved. Tender plants can be killed outright. Hardy plants will expend additional energy to re-leaf. This can delay the normal time line of plant growth by a couple of weeks. Late spring frosts can eliminate fruit production if flowers are killed.

5. How do the seven degrees of shade relate to plant placement in the landscape? Is *Impatiens walleriana* a good choice for a site with morning shade with afternoon sun? Why or why not?

The seven degrees of shade provide guidelines for locating plants where they will perform best according to light (and sometimes heat) needs. The seven degrees can also tell us why others may not be performing well in their current location. For example, some degrees of shade are much hotter than certain plants will tolerate; some degrees of shade don't have enough sun for others.

Impatiens walleriana would not be a good choice for a site with morning shade and afternoon sun. These plants do not perform well in direct sun. The foliage may bleach out and wilt in this type of location.



CMG Garden Notes #318

Homework: Entomology

1. How do you know if a creature in your garden is an insect?
It should have 3 body parts, 6 jointed legs, 1 pair of antennae and usually 1-2 pair of wings.
2. What makes an insect “beneficial”?
Beneficial insects may supply pollinator services. Beneficial insects may be parasitic or predatory at some point in their life cycle.
3. Why can aphid populations increase so rapidly?
During the growing season, female aphids are born pregnant. No male is needed during the growing season for reproduction services. The life cycle can last as short as a week.
4. It is July. You have correctly diagnosed a large spider mite infestation on a customer’s raspberry plants. What is the most important management strategy you can recommend to the customer? The customer should apply water to the raspberries, as they are drought stressed.
5. Why do gardeners often report that ladybugs “disappear” shortly after releasing them in the garden?
Ladybugs for sale are often collected from overwintering populations. They disperse, rarely remaining where released.

6. List three factors contributing to honeybee decline. (Here are a number of possible

answers) Varroa and tracheal mites, diseases

Pesticides applied by beekeepers to control these mites

Colony collapse disorder

Honeybees are often hired out for long distances and may be stressed/die/weakened Honeybees may intermingle with other bees “hired out” and pick up harmful pests Loss of plants providing pollen and nectar due to development

Loss of places for bees to nest

Isolation and fragmentation of bee habitat

Monoculture plantings vs. plant communities (some agriculture)

Pesticide misuse

7. Why is fall garden cleanup valuable to insect pest management?

Insects and/or their eggs can overwinter on garden debris and be in place when new crops are planted.

8. You are working in your county Master Gardener call center. A customer calls about her two year old crabapple tree. There are “a lot of” holes in the leaves and she wants to know what could be chewing on them. She can’t find any insects. How will you answer this question?

You might ask when she first noticed the problem. Has there been any weather event (wind, hail) that could have created the holes? Can she send pictures – have her send them of a couple individual leaves as well as a branch with leaves and the entire tree. Sometimes seeing the “big picture” can provide more help.

Generally in these situations, the insect has fed and gone or the problem is caused by wind and/or hail. If the problem is early in the year, also consider cold temperatures while the leaves were partially emerged from the bud.



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CMG Garden Notes #332

Homework: Plant Pathology

1. What 4 components must be present for biotic disease to develop?

Susceptible Plant, Organism that causes the disease, correct environment and time.

2. Another name for the living cause of disease _____ biotic _____
3. Another name for the non-living cause of disease _____ abiotic _____
4. List 3 ways to manage powdery mildew on a shrub.

(4 answers given as options)

- Thin/prune properly for good air circulation.
 - Site where there is good air movement.
 - Collect leaves in the fall and dispose.
 - Use appropriate fungicides at the appropriate time.
5. A customer brings you a foot-long branch of an aspen tree. The leaves on the branch tips are dark brown and wilted; the branch tip is bent over. Could this be fire blight? Why or why not?

This cannot be fireblight, as the plant is an aspen which is not a pome fruit of the rose family.

6. List 2 general management strategies for Cytospora canker disease on an aspen.
 1. Prune out the affected tissue.
 2. Grow a healthy plant.
7. How are leaf scorch and winter desiccation similar in terms of how they develop? In symptom expression?

Both are caused by loss of water through the leaves and/or lack of available water. Both appear as necrotic damage; on deciduous plants leaves turn brown from the outside inward and on conifers, needles turn brown from the tip inward.

8. Give 2 characteristics of healthy roots.

(3 answers given)

- Firm
- White or creamy in color
- Appropriate amount of roots for size of rootball.

9. A ten foot row of low growing junipers is planted between the west facing side of a building and a sidewalk on a college campus. By mid-winter the sidewalk side of the junipers begins to turn completely brown. What symptom supports an abiotic diagnosis? State a possible cause of the juniper symptoms.

The biggest clue is that the **entire** sidewalk side of the junipers is brown (uniform appearance). The most likely cause of damage is salt injury from deicer use on the sidewalk.



CMG GardenNotes #570

Homework: Turf Management

1. The following could be an email or phone conversation that you are likely to have with a client when serving your volunteer time in your respective Extension offices. How would you engage this client? What questions might you ask her? What kind of recommendations/suggestions would you make to answer this client's questions about her lawn?

From: Tara [REDACTED]
Sent: Tuesday, August 04, 2012 9:35 PM
To: Koski,Anthony
Subject:

turf Dear

Tony,

Hi, I got your name from one of my friends, Wes. He has the most beautiful lawn that I have ever seen. I have been trying for 5 years to get my lawn beautiful, to no avail. I don't think actually I know, that I have no idea what to do and when. Would you be able to assist me or put me in contact with someone who could? I live in Highlands Ranch. Thank you so much,

Tara [REDACTED]
[REDACTED]@yahoo.com

Start off by asking questions regarding her current lawn care practices: how old is the lawn? What are the normal maintenance practices (mowing, fertilization, weed control, irrigation)? Does she have a sprinkler system? What does she expect the lawn to look like (golf course perfection or "just green"). Then cover the basics of turf management:

Timing of fertilization: if cool season species, most fertilizer applied in fall; if warm season, apply in

spring (2-3 pounds total of nitrogen/1000 square feet/year)

Mowing: obey the 1/3 rule and only remove 1/3 of the total leaf blade at each mowing; this means mowing perhaps every 4-5 days

Irrigation: water as deeply, but infrequently as possible. Ask about types of heads –pop-up sprays only need to run for short times (10-15 minutes); rotors or spray rotors must run 40-50 minutes; encourage her to do a simple irrigation audit to look for irrigation gaps and get an idea of how much water she is applying

Weed control: the best defense against weeds is to have a healthy lawn that is well-maintained with proper irrigation, fertilizer and mowing; spot spray or pull weeds as they appear

2. Understanding that the recommended height for mowing most lawns in Colorado (bluegrass, fescue, buffalograss) is 2.5- 3.5 inches, that you should never remove more than 1/3 of the grass height in a single mowing, and that it is recommended that clippings be returned to the lawn - here is a common question on mowing:

I went on vacation (or it has been raining... or my mower needed repairing) and my lawn hasn't been mowed for 2 weeks. The grass is very tall and even falling over. What should I do?

Set your mower on its highest setting and mow the lawn. If the clippings are too much, then consider bagging it to reduce the amount of strewn grass on the lawn. Then, a couple days later, mow it again, dropping the mower deck slightly. Continue in this pattern until the lawn is back at the height of 2.5-3.5 inches.

Mowing it off will likely lead to scalping and stress on the lawn. It may reduce growth and encourage weeds. It is best to mow it back to the ideal height over a period of time.

3. You often read and hear that lawns should be watered "deeply and infrequently". What does this mean? Explain this concept to someone who has moved to Colorado from a part of the country where lawns are rarely, if ever, irrigated- understanding that people want something a little more concrete than "deeply and infrequently" (like...How many days every week? How long to run the sprinklers each time the lawn needs watering?).

- What does "deep, infrequent" watering accomplish?
- Can a lawn be watered TOO "deeply"?
- Can a lawn be watered TOO "infrequently"?

Watering deeply and infrequently is applying water between periods of time, but applying more irrigation during the run time. Instead of watering every day for 10 minutes, you may water for 30 minutes every three days. Generally, irrigation would only be applied when the turf is showing early signs of stress, like footprinting or a dull green color.

The amount and days to run the irrigation system depend on the soil, weather (and time of year), the sprinkler heads, uniformity and exposure of the lawn. Lawns on the north side of the

home will need to be watered less than lawns on the south side.

Deep, infrequent watering will encourage turf roots to grow deeper....shallow, frequent irrigation encourages roots to be more at the surface of the turf, which can lead to stress when the summer temperatures increase.

In typical clay soils, you probably can't water turf too "deeply", but the roots will have a limit on how deep they will grow (and this is species dependent). It should not be a concern that you're watering too deeply. (But the use of deep root watering devices are rarely effective and not recommended for lawns...or trees!)

Yes, lawns that are watered too infrequently or are not watered at all, will be subject to drought stress. Some species, like Kentucky bluegrass, will go dormant. Other species, like tall fescue, can die if no water is available. Again, look for the signs that your lawn needs watering (footprinting, dull color, etc.)



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CMG Garden Notes #571

Homework: Turf Diagnostics

1. When diagnosing over the phone or by email, it is essential to get photos (including wide-angle of as much of the lawn as possible) and all information on how the lawn is being managed (how they are watering, mowing, fertilizing). The potential cause of the problem is often related in some way to how the lawn is being managed. What might be happening with this lawn? Read the email carefully – there are valuable clues here! Do you need more information from the client?

From: [REDACTED]

Date: Tue, Oct 20, 2015 at 2:40 PM

Subject: RE: Grass Samples

Here are pictures of the yellow grass. We water nearly every day for about 50 minutes. I have 5 zones spread across .8 of an acre with 5 heads per zone that spray some 20 feet in 355 degree circles. I keep the grass 3 inches or better most of the time.

I added some Poudre Valley Co-op's Green-N-Grow fertilizer on the grass in late spring & it started to yellow up. When it turned yellowish I thought I may have added too much but it never really got better. Any ideas?

Thanks, Lindsey



Answer: Iron Chlorosis

2. An email with some photos from the resident of an HOA.

This is in [REDACTED] HOA at 17th and Francis. Our contract service provider says it is blight aggravated by the wheels of the mowing machine which caused the strips. What is your analysis? Is the grass dead? Should we ask the lawn contractor to replace the sod? And what can we do differently next time to prevent? It has been very dry and hot, a record early so early in the year. What will July and August hold? Why should it be just in certain places. There are about 4 bad places similar to this. I'll appreciate your help.



Answer: Ascochyta leaf blight and mowing injury on drought/heat stressed turf.

3. This is an email from a colleague who was stumped. A number of potential causes had been eliminated. There are some good, useful clues here. Are there any other questions to ask the client? What else could be looked at to ascertain the cause of the mysterious brown spots?

From: [REDACTED]
Sent: Friday, September 18, 2015 6:09 PM
To: Koski,Anthony <Tony.Koski@ColoState.EDU>
Subject: Lawn Brown spots

Hi Tony

Attached photo shows a pattern of recent browning ("the last 3 weeks") in KBG front lawn; unfenced. There is well over 1000 sq ft of turf area affected in this same pattern.

When I looked at it, I was able to eliminate grubs, NRS, dog urine, and cranberry girdlers as possible causes. This "looks like" dog urine injury but there would have to be 150 dogs that use this front lawn to the exclusion of all neighboring lawns.

- The soil is a clay loam, moist at an inch under brown spots but dry at soil surface
- Irrigation 3X/week, early morning hours
- Exposure is full day-long sun , on a hot SSW-facing slope.
- Browened blades pull up/off easily, leaving roots behind in the soil.
- Thatch layer is no more than ¼ inch anywhere checked.

- Rooting depth seems limited to about 1.5 inches.
- Core cultivation is “every September” but not yet done this year.
- Some blade shredding from dull mower blade.

Can you help me with some ideas on possible causes? Their HOA is pressuring them to “fix” this.

Answer:

Rough bluegrass (*Poa trivialis*) that has gone dormant in a Kentucky bluegrass





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CMG GardenNotes #253

Optional Homework Exercise 1

1. Web Soil Survey

1. Log onto the **Web Soil Survey** at websoilsurvey.nrcs.usda.gov (or Google Web Soil Survey).
2. Click on the green button **Start WWS**.
3. Under the **Area of Interest (AOI)** tab, click on **Address**.
4. Enter Address
 - a) Enter your home street address, city, state in the box.
 - b) Make sure the **Show location marker** box is checked
 - c) Click on **View**
5. The Area of Interest Interactive Map will open.
 - With the mouse, **draw a box** around the general area of the property (marked on the map with a red +). The map will refresh with a closer view
6. Select Area of Interest
 - a) **Click** on the **AOI** button near the top of the window.
 - b) With the mouse **drag a box** around the property of interest. The map will refresh with a slash filled box of the property of interest.
7. Soils
 - a) **Click** on the **Soil Map** tab. This will open a listing of the **soil map unit names** on the property
 - b) **Click** on the **Map Unit Name** in blue in the box. This will open the description of the soils.



Note: If the address you entered is not found on the Web Soil Survey, please start over with the address of a friend or relative.

8. Answer the following questions about one of the soils on the property.

Address		
What is the name of the soil(s) at this address?		
What is the generic slope at this address?		
From Map Unit Setting	Elevation	
	Mean annual precipitation	
	Mean annual air temperature	
	Frost-free period	
From Properties and Qualities	Depth to restrictive feature	
	Drainage class	
	Depth of water table	
	Frequency of flooding	
	Frequency of ponding	
	Calcium carbonate content	
	Maximum salinity	
	Available water capacity	

From Typical profile , give depths of various soil textures.	
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2. Properties and challenges with your soil

- a. Describe the properties of your soil. What are the good properties supporting plant growth? What are the properties limiting plant growth?

- b. What would you advise a neighbor moving into your neighborhood (same basic soil) about soil management when their yard is a new landscape (nothing currently on the property)?

- c. What would you advise a neighbor (same basic soil) about soil management for an existing landscape with lawns, trees, perennial flower and shrub beds, annual flower and vegetable beds?



CMG GardenNotes #252

Worksheet: Soil Texture and Free Lime Lab

1. Soil texture by feel

Identifying the soil samples to coarse (sandy), medium or fine (clayey).

[Reference: *The Science of Gardening*, page 89]

Soil Sample	Describe the feel: - o Gritty = sand - o Silk smooth = silt - o Sticky = clay	How long will it ribbon out?	What is the soil texture? - o Ribbons <1", ▪ Feels gritty = coarse texture (sandy soil) ▪ Not gritty = medium texture (high in silt) - o Ribbons 1-2 inches ▪ Feels gritty = medium texture ▪ Not gritty = fine texture - o Ribbons >2" = fine texture clayey soil
1			
2			
3			
Your soil			

2. Soil Texture by Measurement

Using the jar method, what is the soil textural class for a sample with the following amounts of sand, silt, and clay? [Reference: *The Science of Gardening*, page 87-88]

- a. How long do you shake the bottle of soil?
- b. When do you measure the sand, silt and clay levels?

Sand _____ Silt _____ Clay _____

- c. Determine the soil texture for the following sample:

		Depth of layer	Percent	Soil Textural Class (from <i>Soil Textural Triangle</i> , page 87)	Will this soil behave as a sandy or clayey soil?
Sample 1	Sand	3.0"	60%	Sandy clay loam	Clayey
	Silt	0.5"	10%		
	Clay	1.5"	30%		
	Total	5.0"	100%		
Sample 2	Sand	3.5"	70%	Sandy loam	Sandy
	Silt	1"	20%		
	Clay	0.5"	10%		
	Total	5"	100%		

3. Free Lime Test

On your soil sample, do a vinegar test for free lime (calcium carbonate). [Reference: *The Science of Gardening*, page 159 and 166-167]

- a. Did it fizz (have high calcium carbonate)? Yes No
- b. What does this indicate about your soil being prone to iron chlorosis? Can you lower the pH?



MASTER GARDENER

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CMG Garden Notes #356

Homework: Weed Management in the Home Landscape

1. You get a call from a client who just moved to Colorado late last fall. Their new home comes with a couple of large raised bed vegetable gardens. They noticed last fall that the beds had become overgrown with weeds. One of them they recognize as bindweed – but they aren't sure what the others are? Being new to veggie gardening, they are looking for advice on how best to manage the weeds in these beds come spring when they begin learning about vegetable gardening in Colorado. Provide them some SCIENCE-BASED recommendation on how to effectively manage the weeds in these raised beds – providing all options (chemical, as well as non-chemical).

Nothing can be done at this time of the year (winter) – except planning a strategy for spring when the weeds begin growing again.

1. Proper ID is important. Annuals can be PREVENTED with mulch and/or cultivation (hoeing) and pulling. Perennials like bindweed can be DISCOURAGED by mulch, pulling, and cultivation – but will keep returning.
2. They may have some WINTER ANNUALS in the beds in late winter/early spring – cheatgrass/downy brome, henbit, chickweed. If the weeds are GREEN in winter, they are winter annuals. These could be hoed, pulled – or, on a sunny, warm (60 F+) day, sprayed with 20% acetic acid (horticultural vinegar). Glyphosate is unlikely to work in late winter/early spring because temperatures are too cool for uptake and systemic movement in the plant.
3. As an alternative to spraying glyphosate or horticultural vinegar, they could begin solarization of the beds in spring (understanding that solarization is much less effective in the spring than during the summer) using CLEAR 2-4 mil plastic to cover and seal the beds. Do one layer of plastic pressed to the soil surface, then add another to cover the bed – creating an air space above the first layer of plastic (this will increase temperatures and result in quicker and more effective weed kill). Because of cool temperatures, spring solarization is less effective and slower than doing this in the months of June-August. Note that the heat may actually encourage (initially) the growth of the bindweed – but the bindweed will begin to die as temperatures increase in the spring. The plastic may be left on until it is time to garden in the spring. Another advantage (besides controlling some weeds) is that the soil in the beds will be warmer than if they hadn't been covered – creating good conditions for seed germination and seedling transplant.
4. If they don't mind using traditional/synthetic herbicides, glyphosate can be used to control the bindweed and other weeds in later spring as weather warms. Use a glyphosate brand and formulation

labeled for use in vegetable gardens – and make sure it only contains glyphosate and no long-term soil herbicides. Bindweed will require 3-4 applications to control it effectively.

2. A client brings you a sample of this weed growing in their lawn. Their questions are simple:

- Why do I have it...where did it come from?
- Why does it keep coming back when I pull it?
- How do I get rid of it?



Remember: provide them with science-based information and options for management of this weed.

This is Canada thistle (*Cirsium arvense*), a perennial, non-native, invasive weed. It grows and spreads by an extensive underground system of roots and rhizomes (underground stems) that allows it to quickly spread and invade lawns and gardens. Simply pulling this weed is an **INEFFECTIVE** control measure - unless you are persistent in your pulling and do it **EVERY TIME** you see some of the weed growing in your lawn. Even with persistent pulling, it may take years to eliminate it from a lawn using this (pulling) strategy.

This weed is often introduced into lawns and gardens with imported soil, which can contain seeds, roots, and rhizome pieces – all of which can quickly become actively growing plants. It can also invade lawns and gardens from adjacent greenbelts and native areas, agricultural fields, ditchbanks along roads, and from neighboring lawns that are weedy. If allowed to flower, large amounts of seed can be produced by a single flower – seed which travels easily on a windy day.

While persistent pulling over a number of years may eventually “wear out” the plant by depleting reserve energy stored in roots and rhizomes, people generally grow weary of the pulling after a short period of time – and the weed quickly returns. A more effective and efficient method of control is to use a selective (safe for use in lawns), systemic weed control product. Any of the lawn weed herbicides sold in garden centers and “big box stores” that are ready-to-use (RTUs) will provide good control – but only with multiple applications. Using these products a single time will **NOT** control Canada thistle. Spot spraying of the weeds is recommended. Follow all label instructions for using the product. One trick to getting better control is to **NOT** mow for 2-3 days prior to spraying the weeds (to ensure maximum leaf area for absorbing the herbicide), and don’t mow for 2-3 days following application (to allow for maximum uptake and translocation down into the plant roots). While late summer/fall applications are most effective, you can have good success using the broadleaf weed RTU products in spring and summer.

Remember that herbicides used for weed control in lawns are **NOT** safe (or legal!) for use in flower and vegetable gardens, in mulched areas (because they are **NOT** lawns), or in gravel driveways (because a driveway is not a lawn).

3. A client calls to complain about a neighbor whose weeds in their lawn and garden are tall and unmowed and noxious and going to seed. They want to know what CSU and the Extension office can do about this problem. What kind of help can you provide them?

When these type of calls occur, here are some important points to remember:

- a. CSU Extension provides science-based education and solutions to problems; we do not provide enforcement of codes and laws (like weed laws, mowing violations, etc). Remember what our role is with clients: education!
 - b. We are not arbitrators of disputes between neighbors/clients; the extent of our involvement begins and ends with education (for example, assisting with weed ID and suggesting how to manage the weed problem – IF our assistance is requested).
 - c. We can provide contact information (names, phone numbers) for appropriate individuals and offices (local or state government) whose job is to assist people in these kinds of situations (county weed office, or city property code enforcement).
4. **A client wants to turn part of their lawn into a vegetable garden or flower bed- but doesn't want to use herbicides to do so. What are some effective, SCIENCE-BASED options for this homeowner to use to convert a bluegrass, fescue or bermudagrass lawn into a vegetable or flower garden?**

- a. The goal is to **eradicate the perennial grass** so that it doesn't become a weed when the garden is later planted.
 - i. Remove sod by hand, or with a sod cutter
 - 1. Will be unsuccessful with bluegrass and (especially) bermudagrass
 - 2. Might work with fescue lawns (tall or fine)
 - 3. Won't be successful if there are perennial weedy grasses like brome grass, quackgrass, etc. in the area
 - 4. You remove the BEST soil when you cut out sod – which doesn't make sense when you want to develop a garden in this space
 - ii. Solarize the area
 - 1. To do successfully, will require a few months during the late spring through late fall period; solarization of perennial grasses doesn't work well early or late in the year when it is cool and there are fewer hours of sunlight
 - 2. Done in late spring/summer, will take about 4-6 weeks to kill bluegrass and bermudagrass
 - 3. Use clear, 2-4 mil plastic (clear works better than black plastic)
 - 4. Get turf and soil VERY moist before placing the plastic down
 - 5. Seal edges completely to maintain heat and moisture
 - 6. After removal of plastic, tillage can be performed to prepare the soil for planting – but know that tillage is LIKELY to disturb the soil weed seed bank and encourage the growth of annual weeds in the tilled soil
 - 7. Long-term solarization (4-8 weeks) still may not provide total kill of bermudagrass or bindweed

- iii. Use horticultural grade (20%) acetic acid (HGAA)
 - 1. Potentially very hazardous to eyes and skin to use – be extremely careful when applying HGAA (even though it's “organic”)
 - 2. HGAA is very expensive
 - 3. Apply to green, actively growing grass and weeds (dormant/brown grass will not be affected); works best on hot, sunny days
 - 4. Must be reapplied a NUMBER OF TIMES, because it is not a systemic product (not translocated into roots, stolons, rhizomes)
 - 5. HGAA works by burning green tissue upon contact; multiple applications (multiple burndowns) are required to control well-established perennial weeds and grasses
 - 6. Apply the HGAA (NO dilution!) to green grass/weeds; wait 7-14 days for regrowth of new leaves before spraying again
 - 7. The goal is to reapply HGAA until there is no longer any regrowth – which might require applying HGAA for as long as 2 months
 - 8. Use of culinary vinegar (5% acetic acid) is ineffective
 - 9. Do NOT mix salt into the HGAA to increase effectiveness, as the salt can cause problems with the soil
- iv. Bury with topsoil
 - 1. Perennial grasses (especially bermudagrass) and weeds (bindweed, thistle) will survive burial and grow through as much as 6-8 inches of soil
- v. Cover with cardboard, newspaper, etc. and a layer of soil (or multiple layers of cardboard and soil)
 - 1. Can be more effective than burying with only soil
 - 2. Goal is to prevent photosynthesis of grass/weeds for long enough time that the plants are killed and unable to grow back
 - 3. Must stay in place for 6-8 weeks to kill underlying grass/weeds
 - 4. Layers must be broken up to allow for drainage and water infiltration
 - 5. The soil used for layering is highly likely to contain weed seeds

Homework: Pruning



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Describe the following terms:

- a) Branch bark ridge – Line on the bark where the trunk bark meets the side branch bark. Used to identify correct angle for a removal cut.
- b) Branch collar - Area in branch union where trunk annual growth rings lap the side branch annual growth rings like a deck of cards shuffled together. For the branch collar to develop the side branch must be less than $\frac{1}{2}$ the diameter of the trunk/parent branch.
- c) Reaction zone - Cells that undergo a chemical change in the event of an injury to suppress the spread of decay.
- d) Branch defense zone – Cone of cells within branch collar. They activate the growth of woundwood.

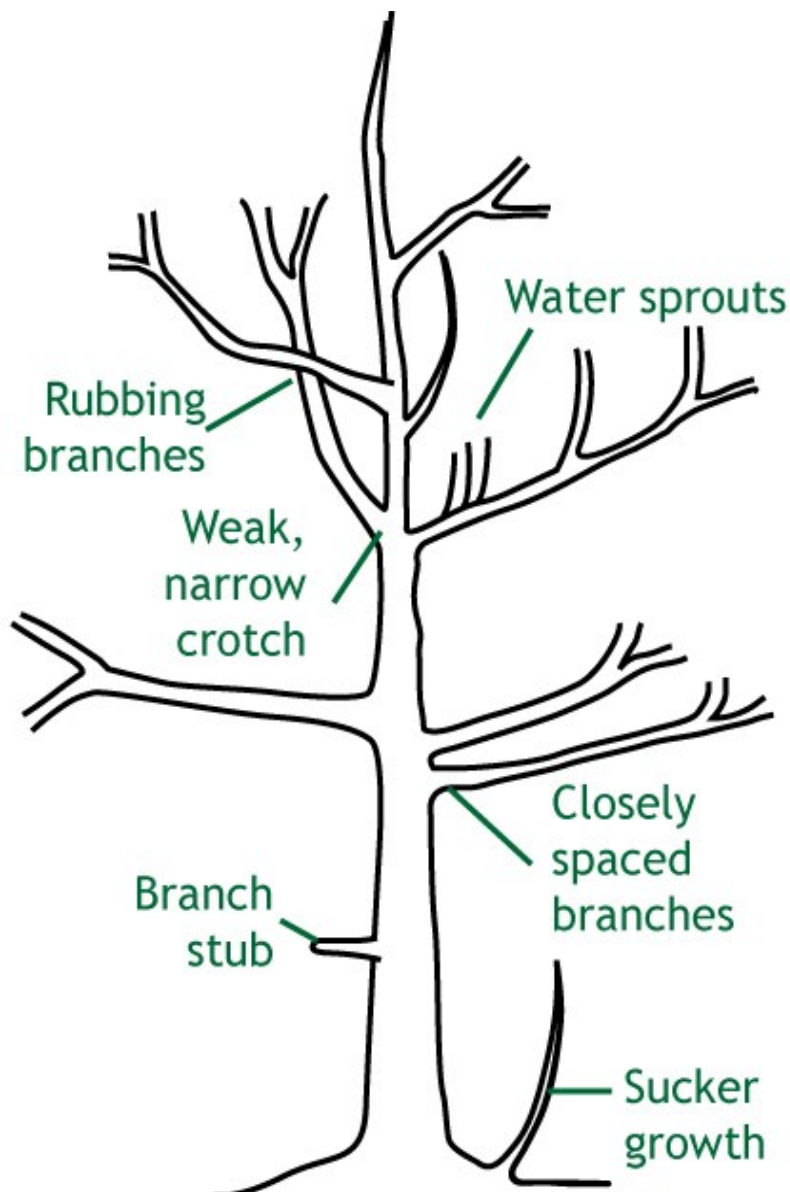
2. Define and draw the following pruning methods:

- a. Structural / subordinate pruning - Subordinating secondary side trunks and branches to a dominant trunk, reducing the risk of failure.
- b. Cleaning - Removal of dead wood
- b. Thinning - Selective removal of small branches to reduce crown density.
- d. Raising - Removal of lower branches to provide higher clearance beneath the tree.
- e. Reduction - Using reduction cuts, the selective removal of branches to decrease a tree's height and spread

3. Describe, in your own words, the three-cut pruning technique. Why is this important?

1) Make an undercut 12-15 inches outward from the branch union that is about 1/3 to half way through the branch. 2) Move a couple of inches outward from the first cut and cut from above, removing the branch. 3) Cut at the correct pruning point. The purpose of this type of cut is to prevent the weight of the branch from tearing the bark below the collar.

4. Evaluate the tree below and draw where you would make your pruning cuts.



Worksheet: Identifying Broadleaf Shrubs

#	Primary characteristics	Draw picture of foliage	Characteristics (Steps in Key)	Common Name
Shrub 1	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Foliage is leaf like 2. All leaves and buds are opposite 3. Leaves are simple 4. Leaves are unlobed 5. Pith is solid 6. Branches are winged	Winged Euonymus <i>Euonymus alata</i>
Shrub 2	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Foliage is leaf-like 2. All leaves and buds opposite 3. Leaves are simple 4. Leaves are unlobed 5. Pith is solid 6. Branches not winged 7. Leaf margin medium to coarsely toothed 8. Some margins smooth, others coarsely toothed, almost lobed	Blue Mist Spiraea <i>Cryopteris</i>
Shrub 3	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Foliage is leaf like 2. All leaves and buds are alternate 3. Leaves are compound 4. Stems are thornless 5. Leaves have 3 leaflets	Skunkbush sumac <i>Rhus trilobata</i>

#	Draw Picture of foliage	Characteristics (Steps in Key)	Common Name
Shrub 4	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound	1. Foliage is leaf-like 2. All leaves and buds are opposite 3. Leaves are simple 4. Leaves are unlobed 5. Pith is solid 6. Branches not winged 7. Leaf margin smooth 8. New stems red/purple or yellow	Red Osier Dogwood <i>Cornus sericea</i>
Shrub 5	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound	1. Foliage is leaf like 2. All leaves and buds are opposite 3. Leaves are simple 4. Leaves are unlobed 5. Pith is solid 6. Branches not winged 7. Leaf margin smooth 8. New stems green brown or gray 9. Leaf medium 2"-5" long	Common Lilac <i>Syringia vulgaris</i>
Shrub 6	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound	1. Foliage is leaf like 2. All leaves and buds are opposite 3. Leaves are simple 4. Leaves are unlobed 5. Pith is solid 6. Leaf margin toothed 7. Leaf oval or egg shaped, tip pointed 8. Leaf margin very finely toothed all the way around 9. Leaf tip is short-pointed and blunt 10. Long granular buds 11. Leaf hairy above and below 12. Leaf margins bristle-tipped	Korean spice viburnum <i>Viburnum carlesii</i>

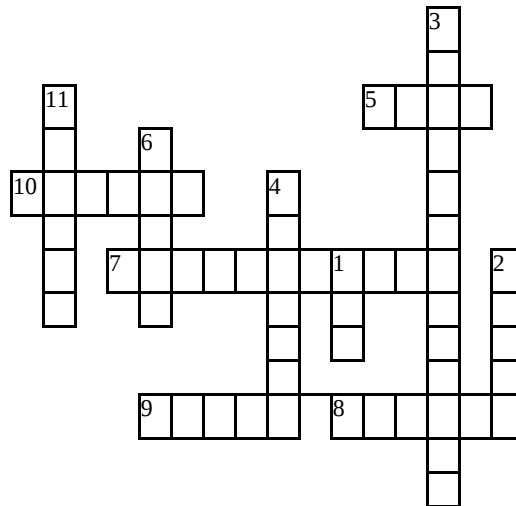
Lab Worksheet: Identifying Deciduous Trees

The objective of this lab activity is to practice correlating what you observe about plants with reading and lecture information. Using *Key to Identifying Common Landscape Trees of Colorado*, CMG GardenNotes #156 (online at www.cmg.colostate.edu/TreeID/156.html) identify the plant samples to common name.

#	Primary characteristics	Draw picture of foliage	Characteristics (Steps in Key)	Common Name
Tree 1	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Opposite leaves 2. Simple leaves 3. Lobed leaves 4. Usually has 3 main lobes 5. Central lobe much longer than two short side lobes	Amur Maple
Tree 2	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Alternate leaves 2. Simple leaves 3. Thornless 4. Leaves lobed 5. Leaves clustered at end of branch 6. Lobes are rounded, not bristle at tip 7. Plant is single trunked 8. Leaves clustered at end of branch 9. Plant is single trunked	Bur Oak
Tree 3	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Alternate leaves 2. Simple leaves 3. Leaf shape is round or heart shaped 4. Petiole is round Leaf margin medium toothed, leaf base usually uneven	Linden

Tree 4	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Alternate 2. Simple 3. Thornless 4. Unlobed 5. Leaf oval/oblong 6. Blasé of leaf unven 7. Pith solid 8. 3" long leaf, uneven base	Siberian Elm
Tree 5	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Alternate 2. Simple 3. Thornless 4. Unlobed leaves 5. Leaf is oval/oblong 6. Base of leaf uneven 7. Pith chambered	Hackberry
Tree 6	☐ Leaves alternate ☐ Leaves opposite ☐ Leaves Whorled ☐ Simple, unlobed ☐ Simple, lobed ☐ Compound		1. Opposite 2. Compound leaves 3. Palmately compound 4. Usually 5-5 smaller leaflets, broadest at or below midpoint	Ohio Buckeye

The Science of Planting Trees



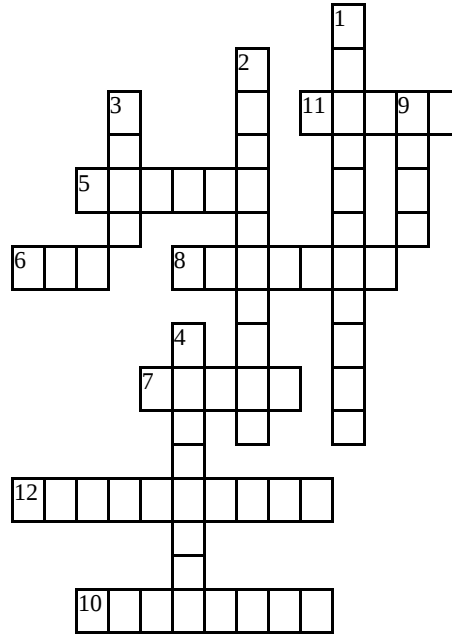
Across

- 5 Soil under the root ball should be this **FIRM**
- 7 Potential problem if tree is planted too shallow **DEHYDRATION**
- 8 Do this to girdling roots compressing against the trunk **REMOVE**
- 9 Remove this to avoid girdling problems **TWINE**
- 10 Remove this because it decomposes very slowly **BURLAP**

Down

- 1 Minimum number of structural roots that should be found in the top 1-3 inches of a rootball **TWO**
- 2 Planting hole should be this much times the rootball diameter **THREE**
- 3 Major problem caused by planting trees too deep **GIRDLINGROOTS**
- 4 In a planting hole, the top of the root ball must be at the **SURFACE**
- 6 Helps settle soil in planting hole **WATER**
- 11 Ideal shape of a planting hole **SAUCER**

Tree Care Worksheet



Across

5 The best staking strap is made from:

CANVAS

6 Tree stakes are removed after this many growing seasons **ONE**

7 Helps retain soil moisture under trees **MULCH**

8 Adventitious shoots rising from roots are known as: **SUCKERS**

10 Roots wrapped around other parts of a tree are called _ roots **GIRDLING**

11 Hot or windy weather can cause herbicides to: **DRIFT**

12 Soil _ can lead to low soil oxygen levels **COMPACTION**

Down

1 Tool to help you determine when to water **SCREWDRIVER**

2 Vertical crack in trunk or stem of a tree **FROSTCRACK**

3 Done to young thin- barked trees to protect them in winter **WRAP**

4 Also known as southwest injury **SUNSCALD**

9 These roots are the primary sites of water/mineral absorption **ABSORPTIVE**