



MASTER GARDENER
COLORADO STATE UNIVERSITY
EXTENSION

The Colorado Master Gardener Program
The Colorado Gardener Certificate
Program

Worksheet and Homework
Front Range Edition

CMG/CGC Program

Homework and Worksheets

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CMGGardenNotes#103A

Reading Pesticide Labels Worksheet

Find the answers to the questions on the label provided.

1. What are the active ingredients?
2. Can I apply this product to lilacs? The plant has powdery mildew and aphids.
3. I've applied this to my cabbage crop. How long do I have to wait after the application to eat it?
4. What is the mode of action for this product?
5. Will this product harm freshwater clams?
6. What action do I take if I accidentally spill this product on my shirt sleeve?
7. How do I dispose of the empty container?
8. How should I store this product?
9. Can I use this product in my greenhouse where I grow culinary herbs for sale?



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?
2. Why is it important to discuss tree care issues as they relate to growth phases?
3. What is the first step in the diagnostic process?
4. Why is it important to know what is "normal" for a given plant?



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CMG GardenNotes #108

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?



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



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?



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 Note: leaf shape is variable Bur oak	Leaf Arrangement	Leaf Margin	Leaf Base	Intentionally blank
Leaf 2 Redbud	Leaf Shape	Leaf Margin	Leaf Venation	Intentionally blank
Leaf 3 Norway Maple	Leaf Arrangement	Leaf Margin	Leaf Venation	Intentionally blank

<p>Leaf 4 This sample contains an entire leaf Note: minute sharp tip on each leaflet</p> <p>Indigo</p>	<p>Leaf Arrangement</p>	<p>Leaflet Shape</p>	<p>Leaflet Margin</p>	<p>Intentionally blank</p>
<p>Leaf 5 This sample contains an entire leaf</p> <p>Horsechestnut</p>	<p>Leaf Arrangement</p>	<p>Leaflet Shape</p>	<p>Leaflet Margin</p>	<p>Intentionally blank</p>



CMG GardenNotes #151

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

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		d	Achillea	
b	Sunflower		e	Poppy	
c	Foxglove		f	Calla Lily	

3. Identify the type of fruit

	Fruit	Fruit Type		Fruit	Fruit Type
a	Apple		b	Strawberry	

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.

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) _____



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CMG GardenNotes #152

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?

Question 2: What plant process has been interrupted?



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?



CMG GardenNotes #154

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?



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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?
2. Why is it important for the gardener to understand the importance of plant families?
3. How can high temperatures affect the flavor of a melon?
4. How can late spring frosts affect plant growth and development?
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?



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CMG Garden Notes #318

Homework: Entomology

1. How do you know if a creature in your garden is an insect?
2. What makes an insect “beneficial”?
3. Why can aphid populations increase so rapidly?
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?
5. Why do gardeners often report that ladybugs “disappear” shortly after releasing them in the garden?
6. List three factors contributing to honeybee decline.

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

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?



CMG Garden Notes #332

Homework: Plant Pathology

1. What 4 components must be present for biotic disease to develop?
.
2. Another name for the living cause of disease_____
3. Another name for the non-living cause of disease_____
4. List 3 ways to manage powdery mildew on a shrub.
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?
6. List 2 general management strategies for Cytospora canker disease on an aspen.
7. How are leaf scorch and winter desiccation similar in terms of how they develop? In symptom expression?



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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

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?

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"?



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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



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.



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.
- Browned 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.





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 if 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.		



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: <ul style="list-style-type: none">○ Gritty = sand○ Silk smooth = silt○ Sticky = clay	How long will it ribbon out?	What is the soil texture? <ul style="list-style-type: none">○ Ribbons <1",<ul style="list-style-type: none">▪ Feels gritty = coarse texture (sandy soil)▪ Not gritty = medium texture (high in silt)○ Ribbons 1-2 inches<ul style="list-style-type: none">▪ Feels gritty = medium texture▪ Not gritty = fine texture○ 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]

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

Sand _____ Silt _____ Clay _____

- Determine the soil texture for the following sample:

		Depth of layer	Percent	Soil Textural Class <i>(from Soil Textural Triangle, page 87)</i>	Will this soil behave as a sandy or clayey soil?
Sample 1	Sand	3.0"			
	Silt	0.5"			
	Clay	1.5"			
	Total	5.0"			
Sample 2	Sand	3.5"			
	Silt	1"			
	Clay	0.5"			
	Total	5"			

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]

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



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).

3. 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.



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CMG GardenNotes #618

Homework: Pruning

1. Describe the following terms:

a) Branch bark ridge -

b) Branch collar -

c) Reaction zone -

d) Branch defense zone –

2. Define and draw the following pruning methods:

a. Structural / subordinate pruning -

b. Cleaning –

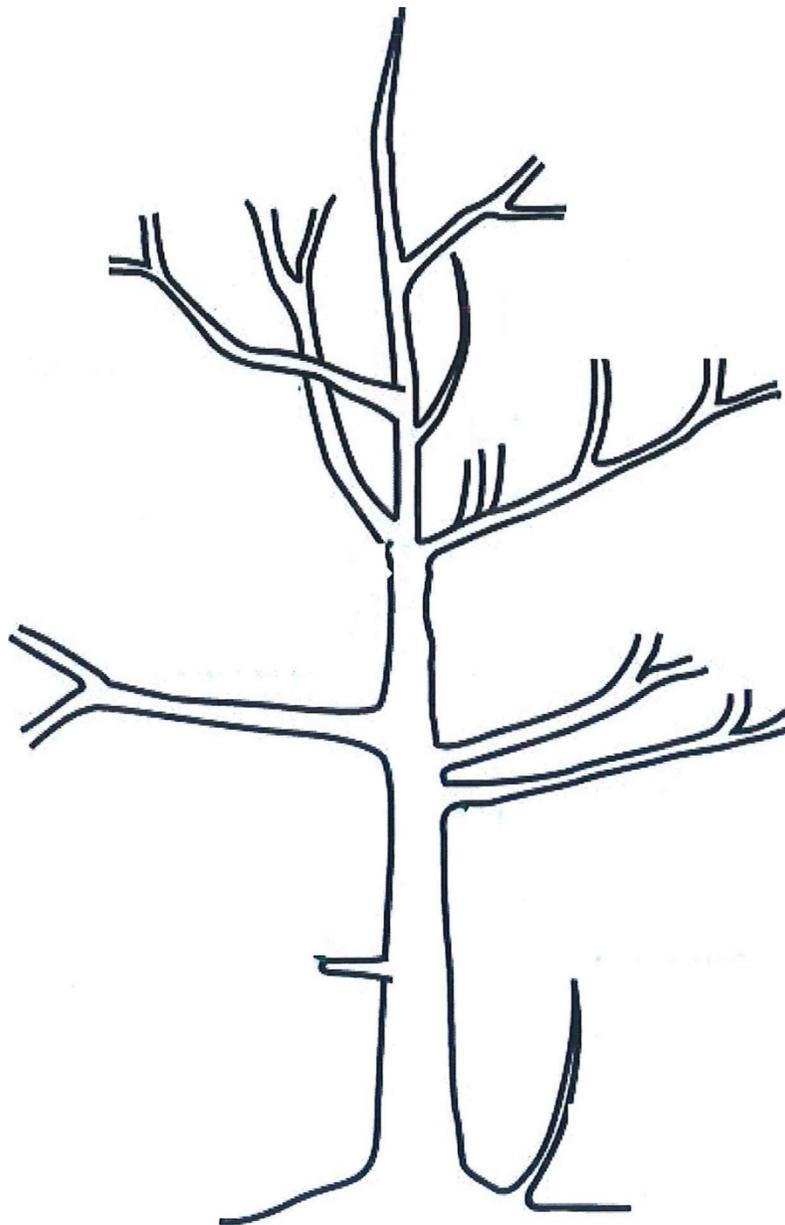
c. Thinning –

d. Raising -

e. Reduction -

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

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





CMG GardenNotes #175WS

Worksheet: Identifying Broadleaf Shrubs

#	Primary characteristics	Draw picture of foliage	Characteristics (Steps in Key)	Common Name
Shrub 1	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed <input type="checkbox"/> Compound			
Shrub 2	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed <input type="checkbox"/> Compound			
Shrub 3	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed Compound			

#		Draw Picture of foliage	Characteristics (Steps in Key)	Common Name
Shrub 4	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed Compound			
Shrub 5	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed Compound			
Shrub 6	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed Compound			



CMG GardenNotes #176WS

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	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed <input type="checkbox"/> Compound			
Tree 2	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed <input type="checkbox"/> Compound			
Tree 3	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed <input type="checkbox"/> Compound			

Tree 4	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed <input type="checkbox"/> Compound			
Tree 5	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed <input type="checkbox"/> Compound			
Tree 6	<input type="checkbox"/> Leaves alternate <input type="checkbox"/> Leaves opposite <input type="checkbox"/> Leaves Whorled <input type="checkbox"/> Simple, unlobed <input type="checkbox"/> Simple, lobed <input type="checkbox"/> Compound			