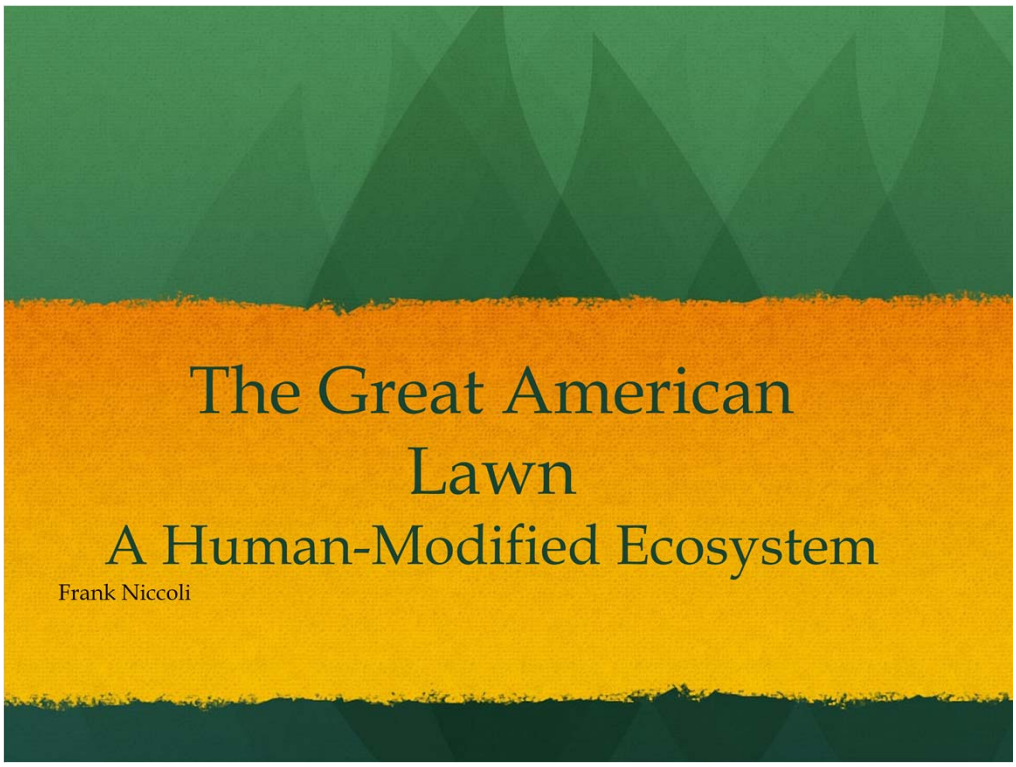
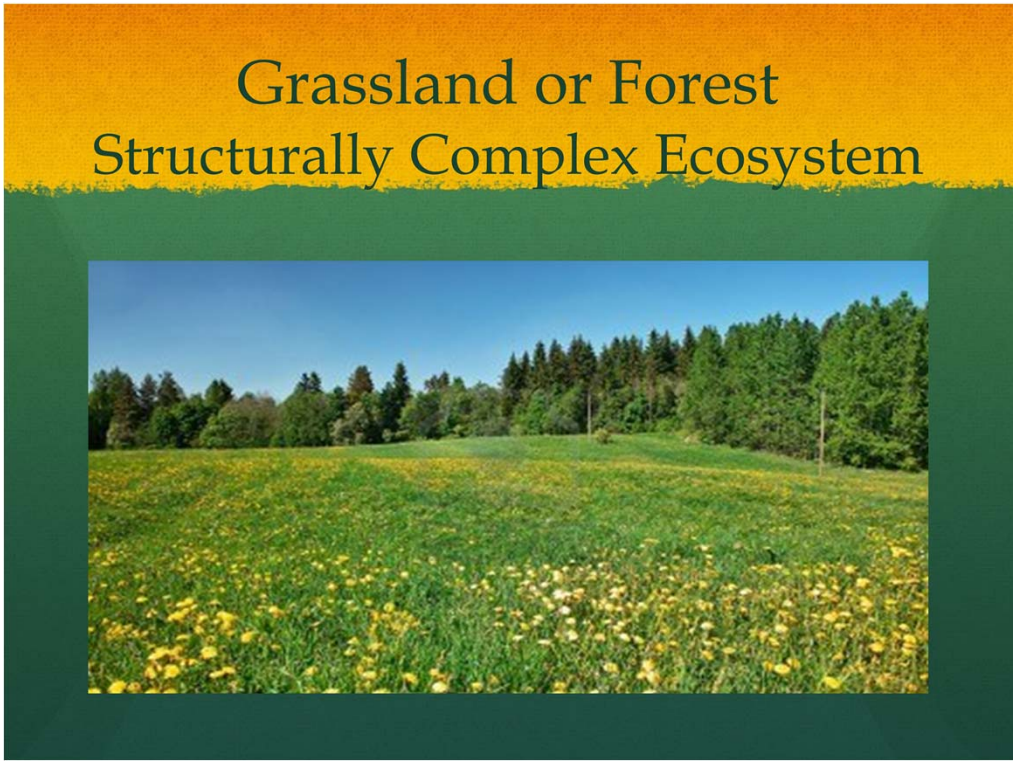


When we talk about plants and people we talk about inputs vs. outputs. In sustainability it is all about inputs.

Inputs

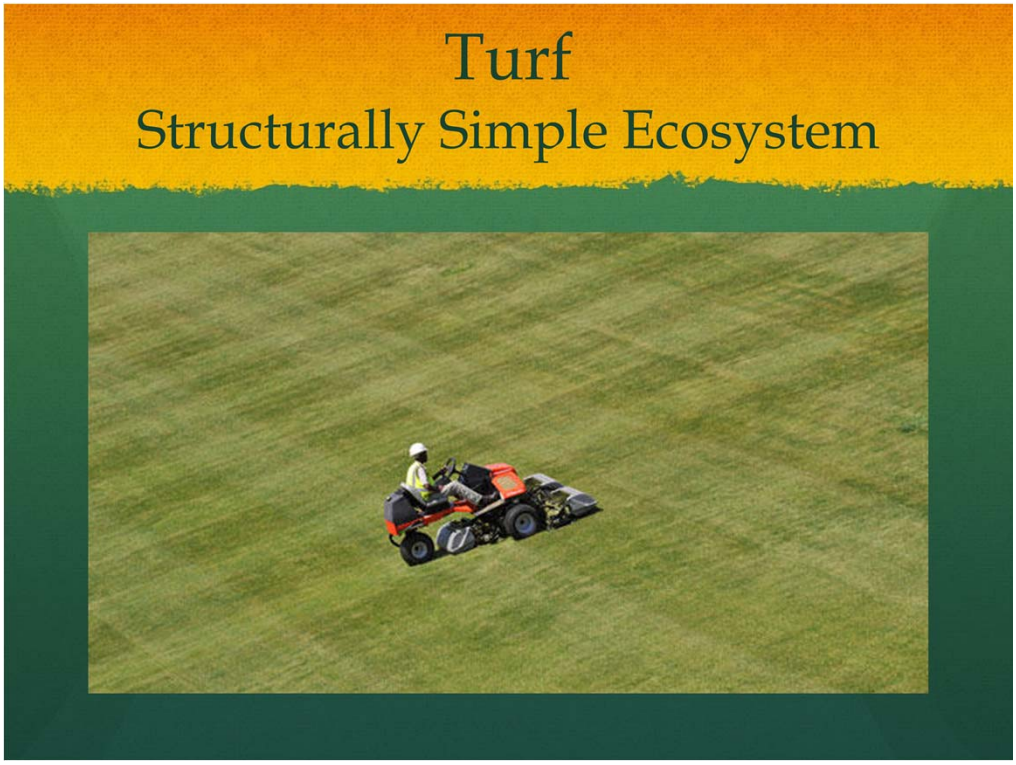
- It is all about inputs versus outputs!

Inputs: Solar energy, Precipitation, Nutrients(Nitrates, SO3) in rain and dust, Atmospheric carbon dioxide.



Inputs: Solar energy, Precipitation, Nutrients in rain and dust, Atmospheric carbon dioxide, Seeds from local regions.

Nutrients are largely retained, Net carbon accumulation in vegetation and soil, little surface runoff, (Relatively) large proportion of water evaporated to atmosphere, (Relatively) few nutrients lost in drainage water, Less carbon dioxide output than input, very little soil erosion. As a result we have Biological diversity→ provides a home form many species of plants, animals and microbes. Clean water to streams, Reduces global warming by net removal of carbon dioxide from the atmosphere. No impact on municipal landfills, no impact on fossil fuel supplies. Temperate forests on average store 17.637 pounds carbon/meter square as plant material while prairies store 6.61, but temperate prairies store 41.8 as soil organic matter while forests store only 26.4. Consequently average prairies store 48.5 and temperate forests only 44. Forests also store much carbon above ground where wildfires release it, whereas prairies store most protected underground (Schlesinger 1991).

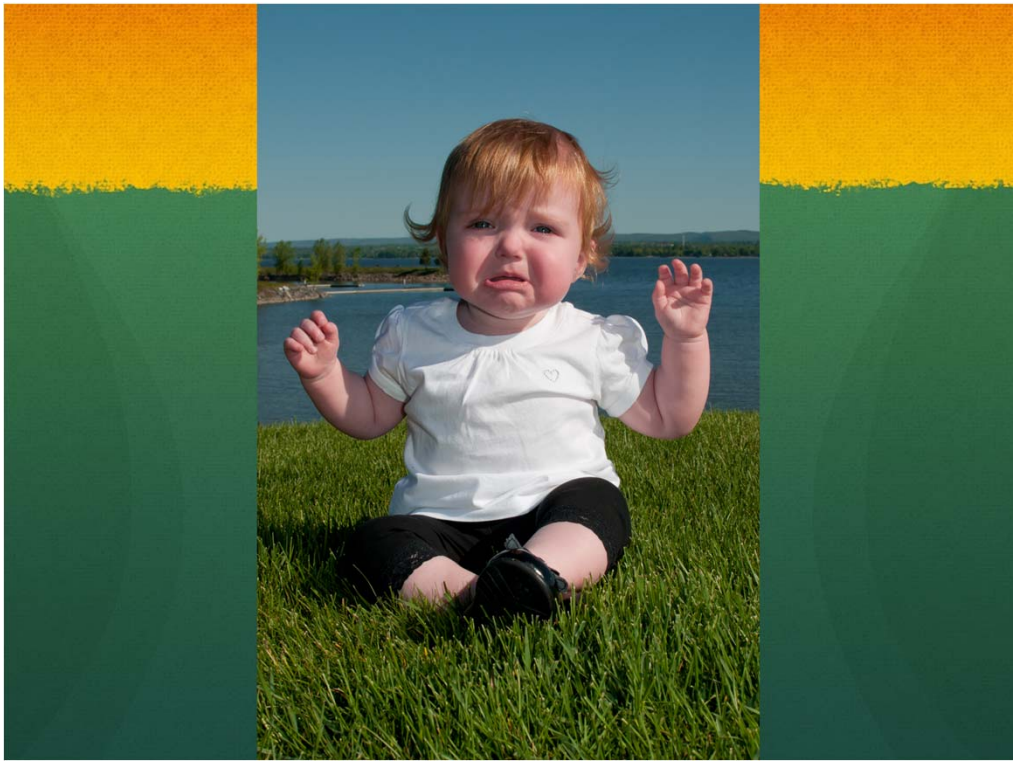


Inputs: Solar energy, Precipitation, Nutrients in rain and dust, Atmospheric carbon dioxide, Seeds from local region. Fossil fuel energy, irrigation water, Nutrients in fertilizers, pesticides, grass seed or sod.
Relatively fewer nutrients retained, nutrients lost in drainage water, pesticides and nutrients are washed into neighboring water supply, carbon dioxide output greater than input, nutrients and pesticides removed in grass clippings. The net loss is 25-1. (Yale)

Consequences→less biological diversity, local plants species are displaced by turf grasses and turf adapted animals and microbes, contributes to increased global warming, increases stress on municipal water supplies, increases municipal solid waste problems, pesticides may contaminate food chains, pesticides on lawns can threaten human health, disrupts the biology of neighboring surface waters, uses global fossil fuel supplies.

Having a lawn is not in the Constitution!

REPEAT - lawns are high maintenance
extremely high water - all other plants measured against turf grass water needs
introduce fertilizers, pesticides, herbicides
frequent mowing
expensive
disappointing



DISAPPOINTING

BORING

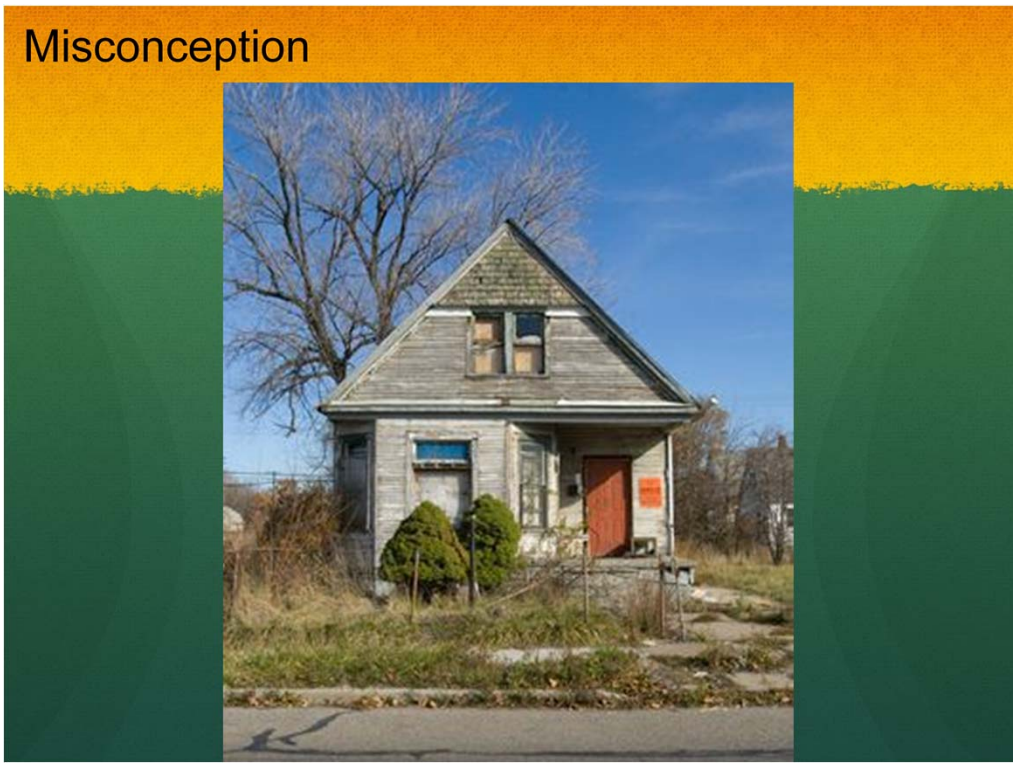
So how can we get rid of our lawn and create a low-maintenance garden?

First we’ve got to consciously change our perspectives of lawns

For many of us, lawns might evoke this kind of feeling

How many of you have a lawn?

Do any of you have this kind of relationship with your lawn?



Maintenance - we know we want something fuss free, right?

No such thing as a no maintenance garden

Actually, this is a no maintenance garden

(However this is probably a very healthy garden, ecologically speaking)

Typically we're looking for something slightly more maintained than this.

Low maintenance - 4-6 hours/month from a trained gardener

Average is 8 hours

Higher maintenance is 10+ per month

Boutchart Gardens

This is the level of maintenance we’re trying to avoid

This is a garden on life support

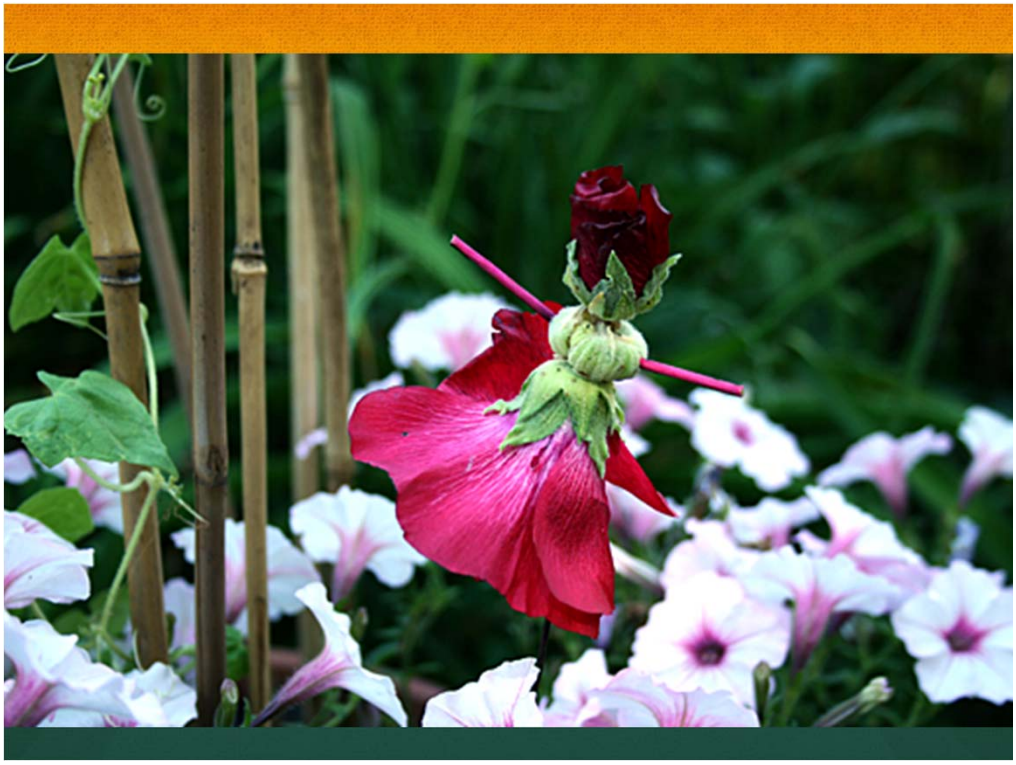
Kids don’t need a lawn

They like dirt

They are curious

And if they like touching and exploring and getting dirty, why have them play on a lawn with chemicals?

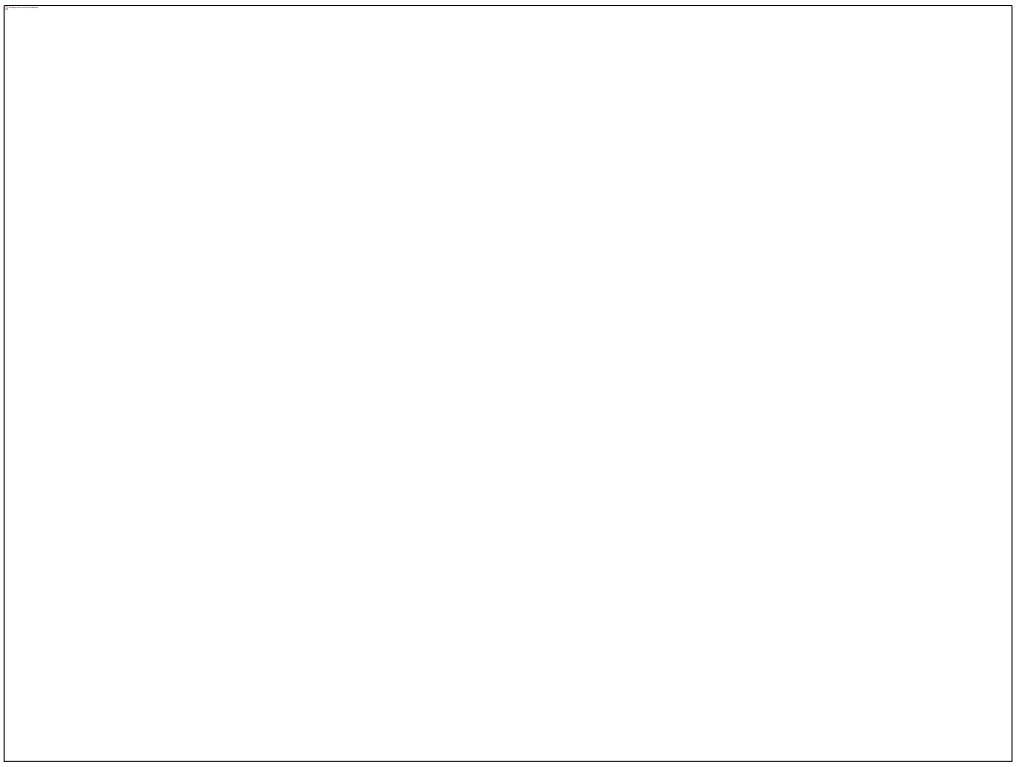
Children's favorite places are not right under our noses; they want to “see but not feel seen”



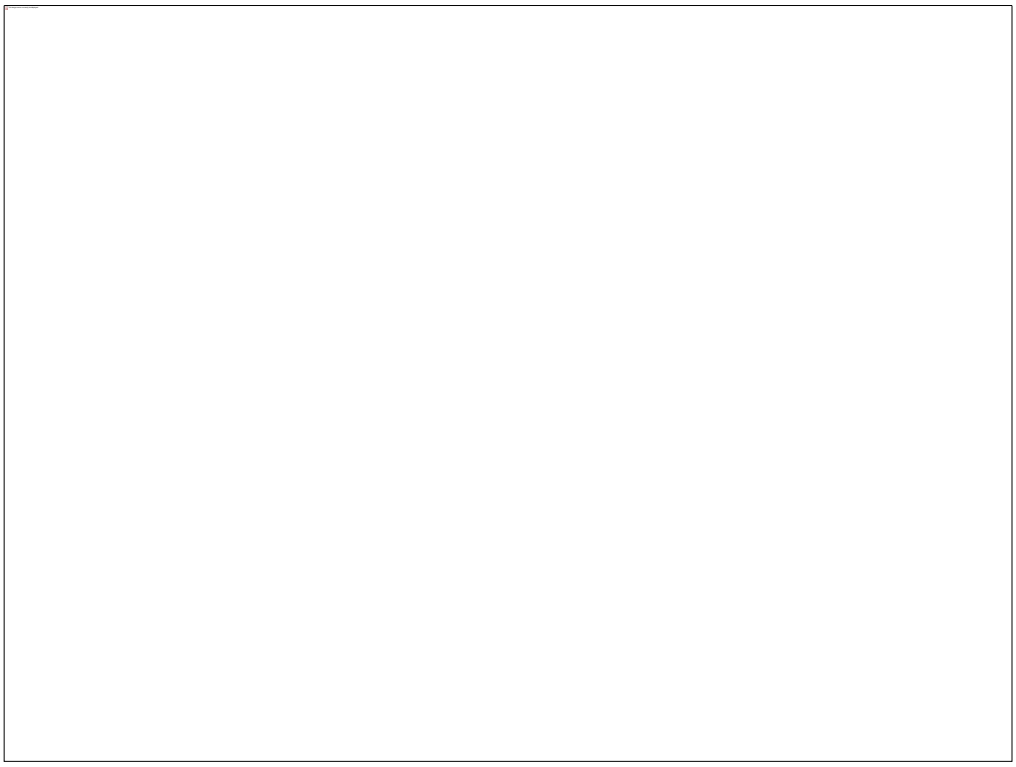
Misconception

Taking out your lawn doesn’t turn you into the weird one on the block. It’s just not that extreme. Besides, who doesn’t want to be a little interesting?

Mature landscapes are worth more when selling a home.

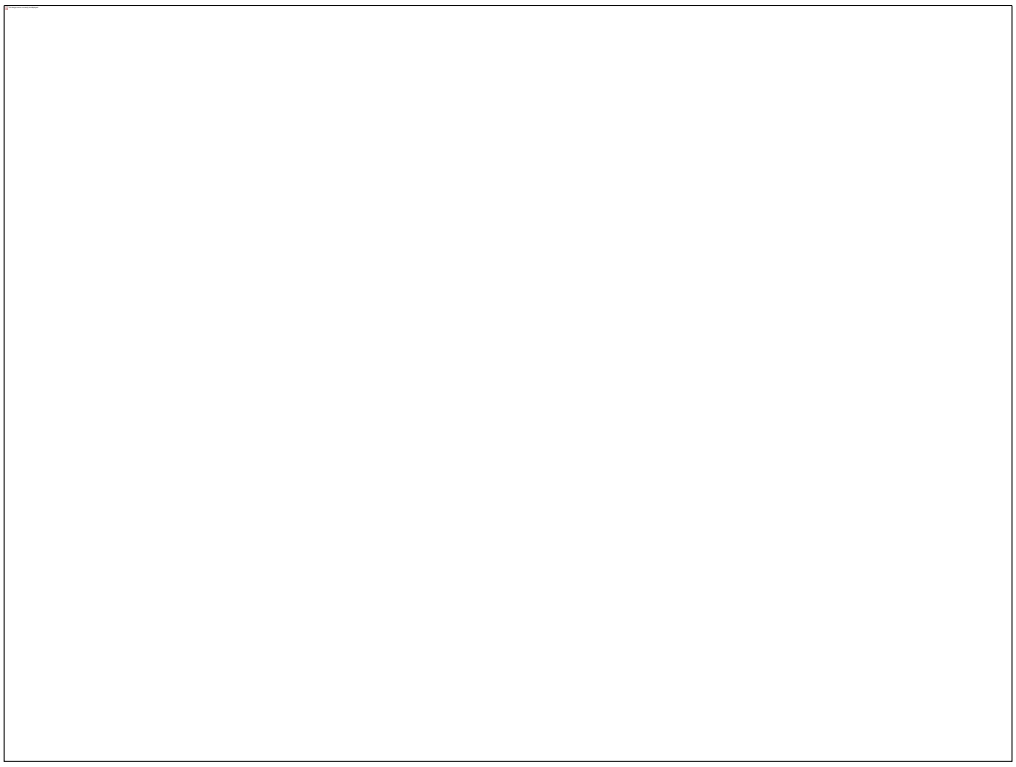


Does anyone know who’s front garden this is?

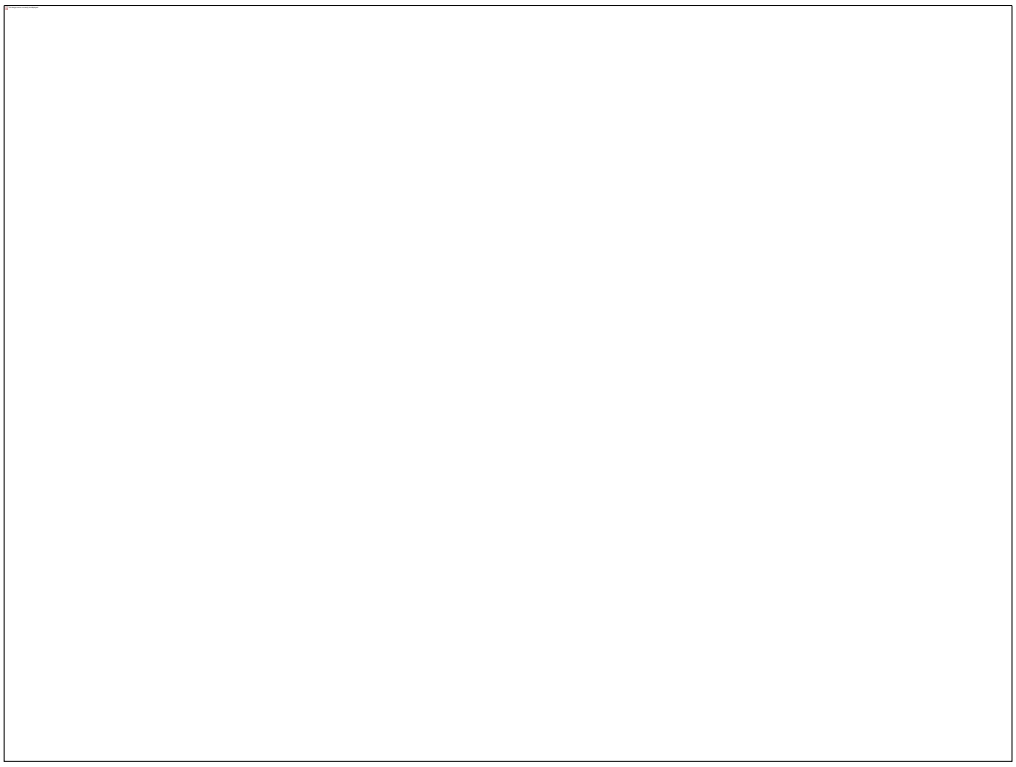


Turf denote turf grasses that are kept pure by the regular use of pesticides; appropriate for sports turf and golf courses. Lawn is a broader term that describes mowed vegetation containing broadleaf plants as well as grass. The standards are lower for Lawns.

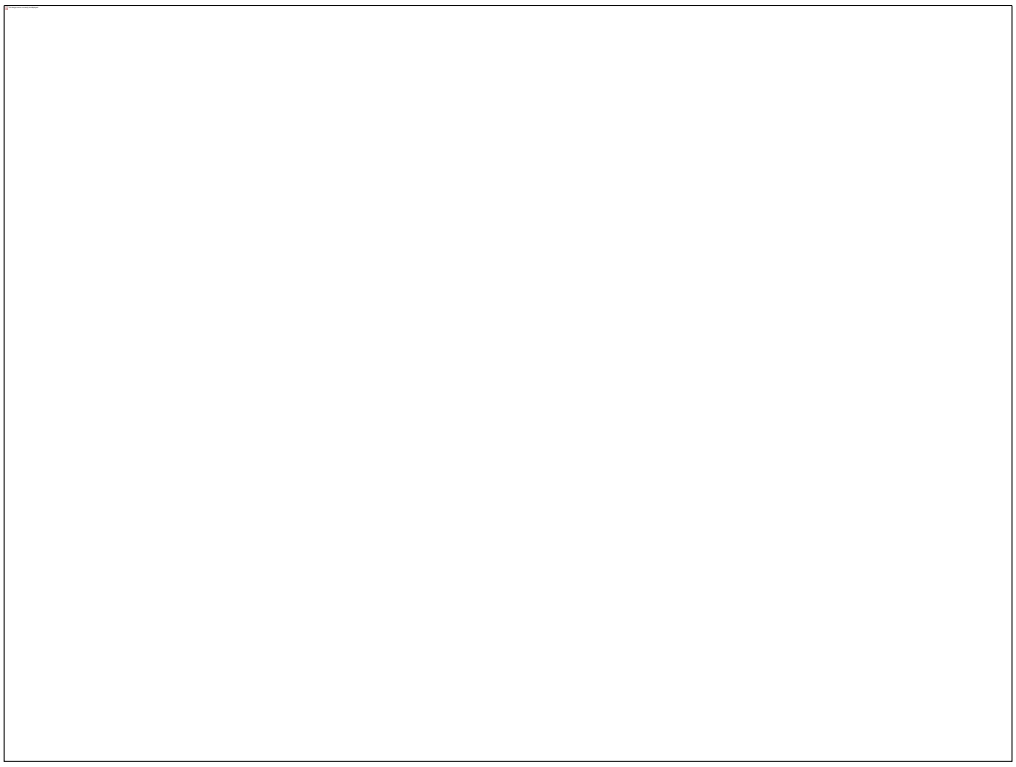
Sustainable lawns need to be built around species with a specific set of characteristics: Have the ability to persist over time.



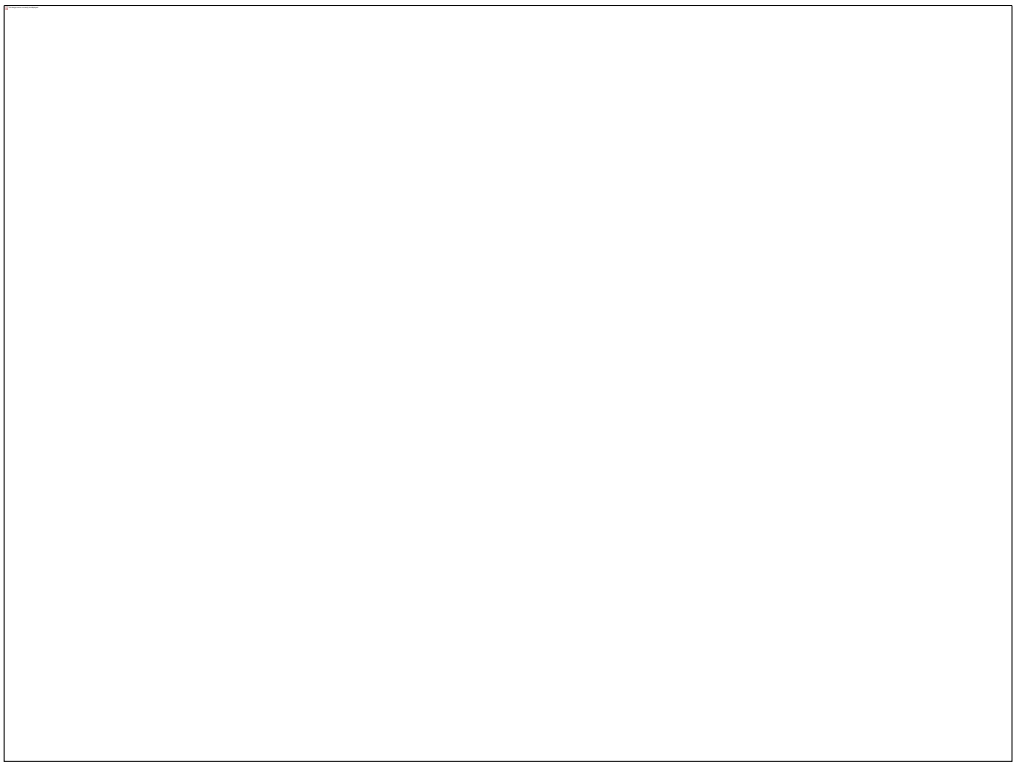
Sustainable lawns need to be built around species with a specific set of characteristics: Maintain adequate densities with modest inputs of water and fertilizer..



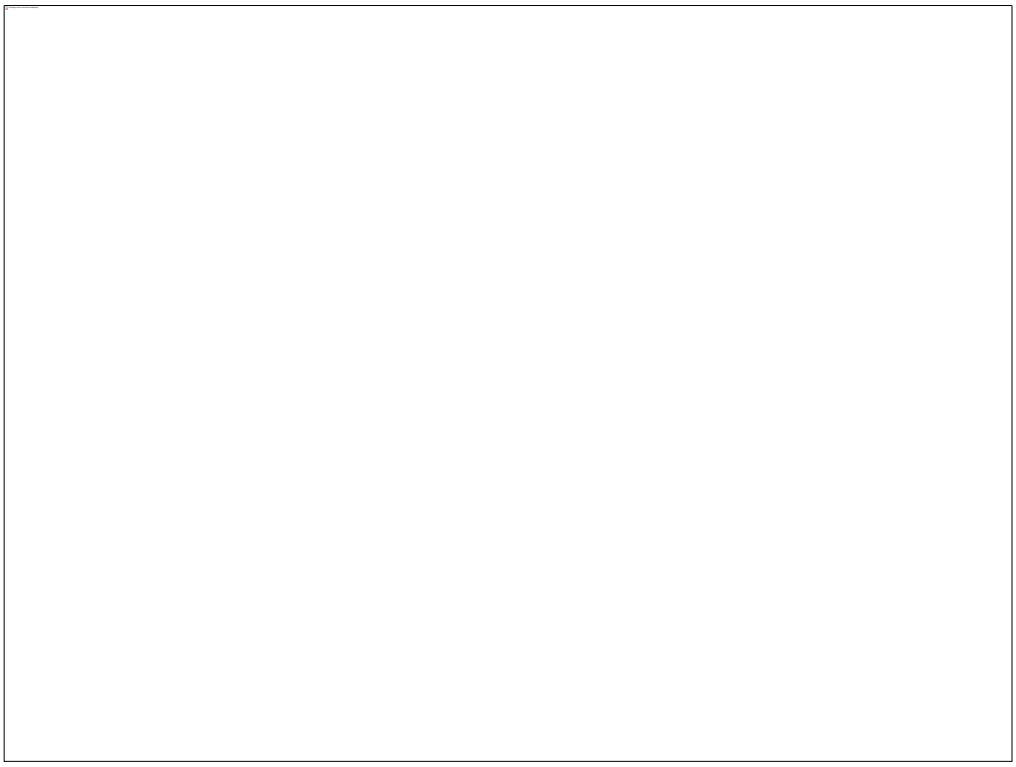
Sustainable lawns need to be built around species with a specific set of characteristics: Survive significant drought stress



Sustainable lawns need to be built around species with a specific set of characteristics: have a minimum of insect and disease problems



a Sustainable lawns need to be built around species with a specific set of characteristics: Produce manageable amount of thatch



Sustainable lawns need to be built around species with a specific set of characteristics: blend well with other grasses and dicot plants.
Have the ability to persist over time.
Maintain adequate densities with modest inputs of water and fertilizer..
Survive significant drought stress
Produce manageable amount of
have a minimum of insect and disease problems

Sustainable lawns need to

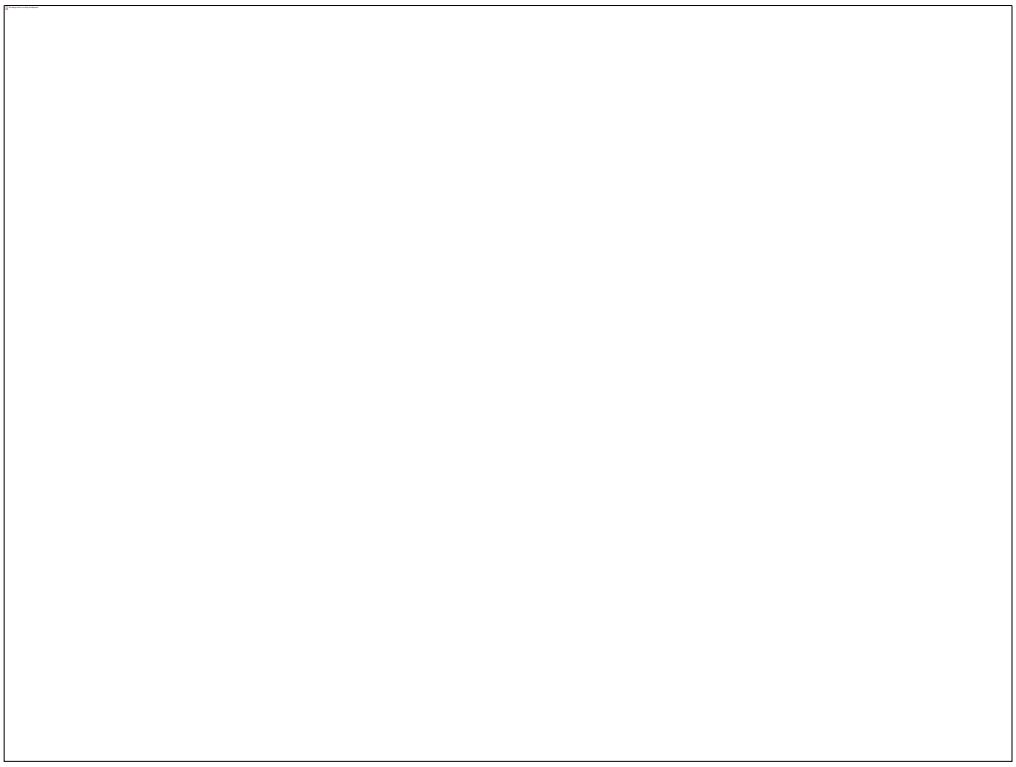
Blend well with other grasses and dicot plants.

Have the ability to persist over time.

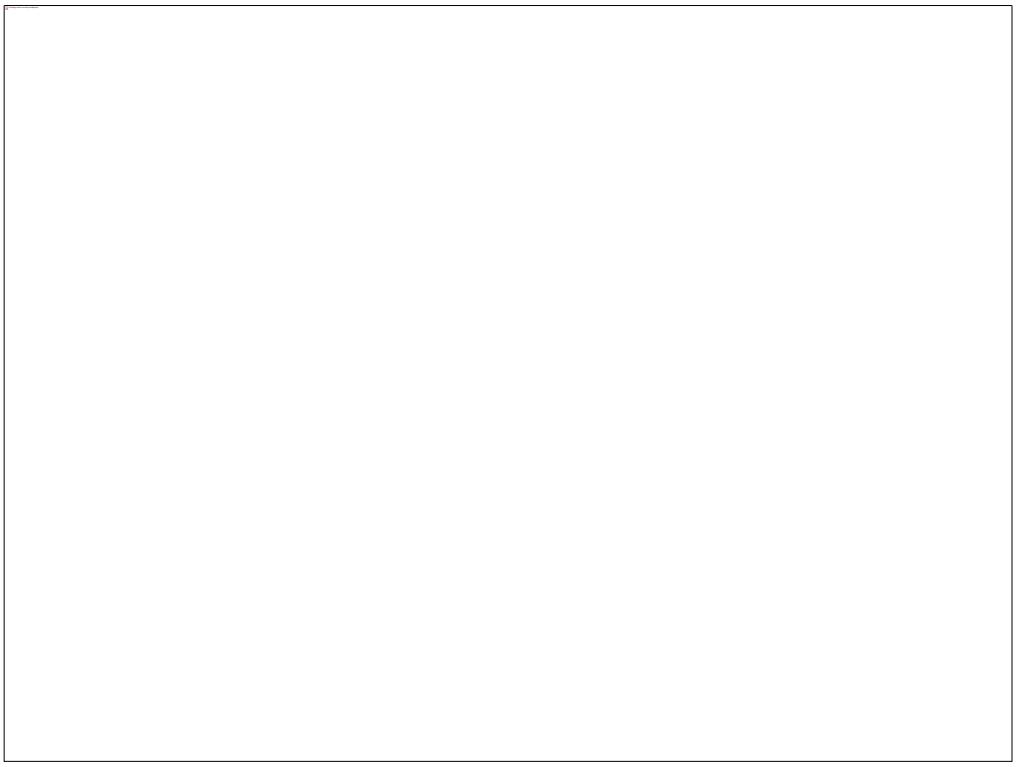
Maintain adequate densities with modest inputs of water and fertilizer.

Survive significant drought stress.

Produce manageable amount of thatch.

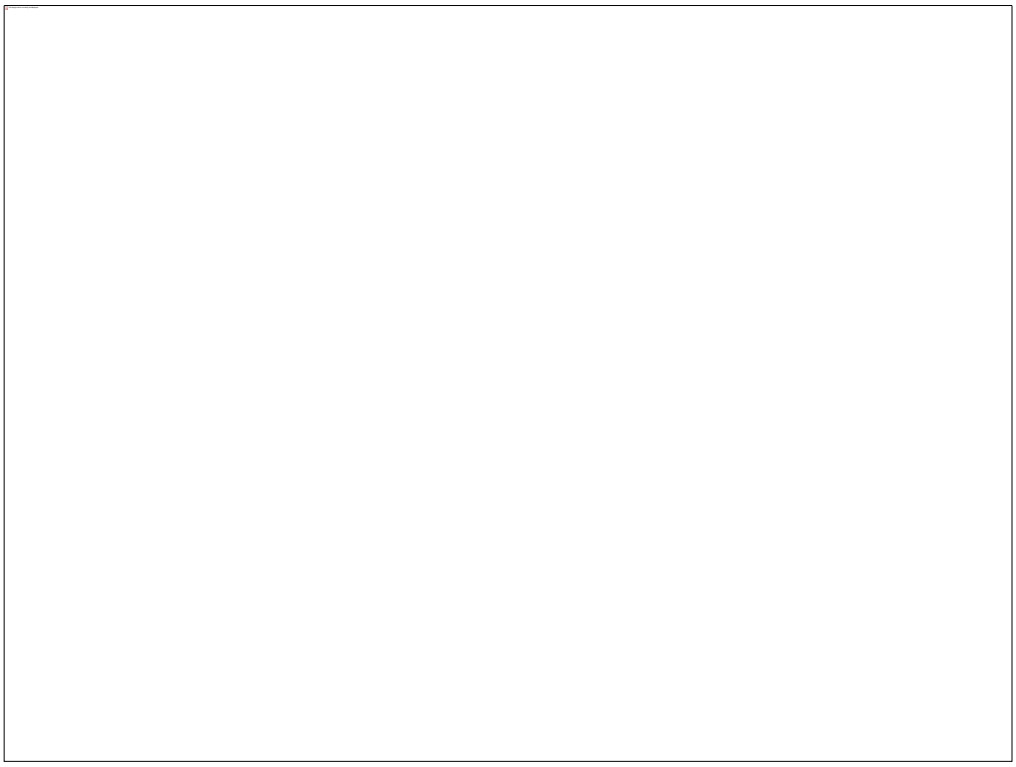


Agrostis castellena survive drought stress by going dormant (meaning they turn brown) under summer water stress, recovering during milder wetter weather associated with fall, winter, and spring.

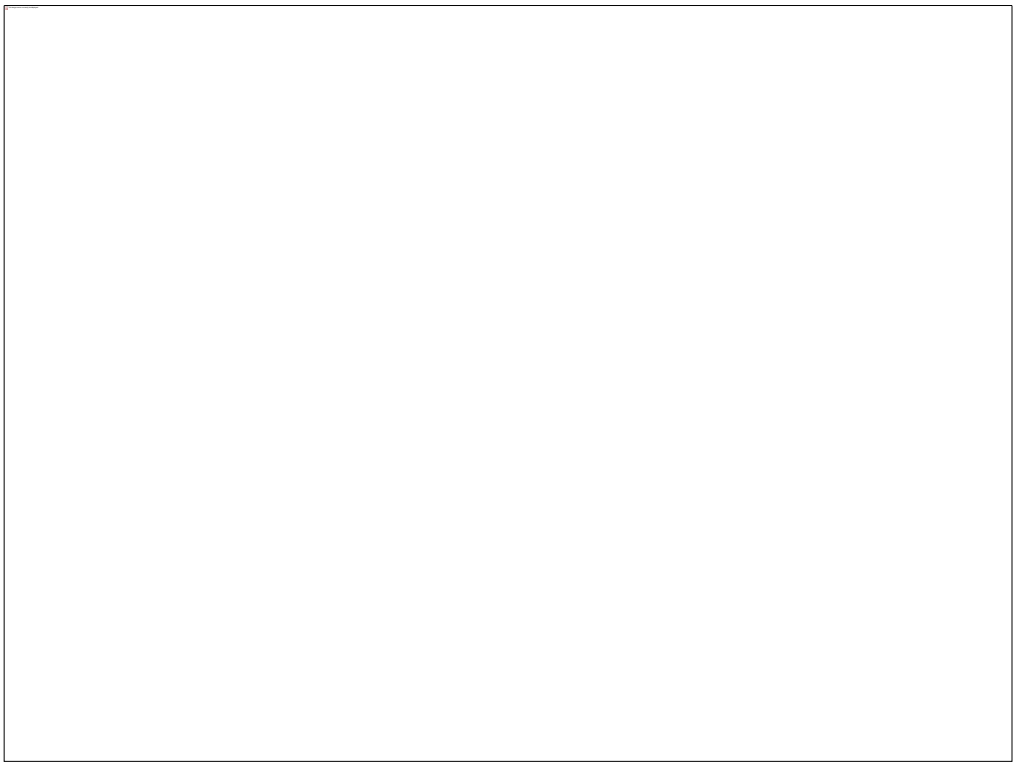


Fine fescues are all cool temperate marine climate varieties. With the addition of endophytic fungi into the mixtures which increases drought tolerance and disease resistance.

Germination Rate: 21 days

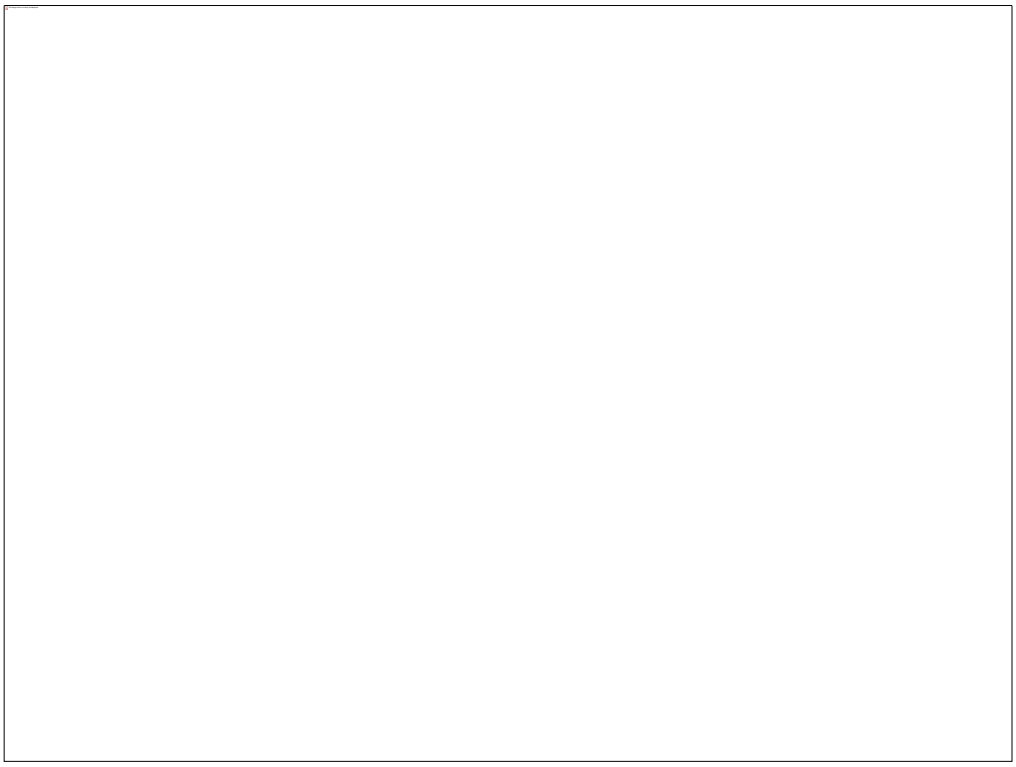


Red Fescue

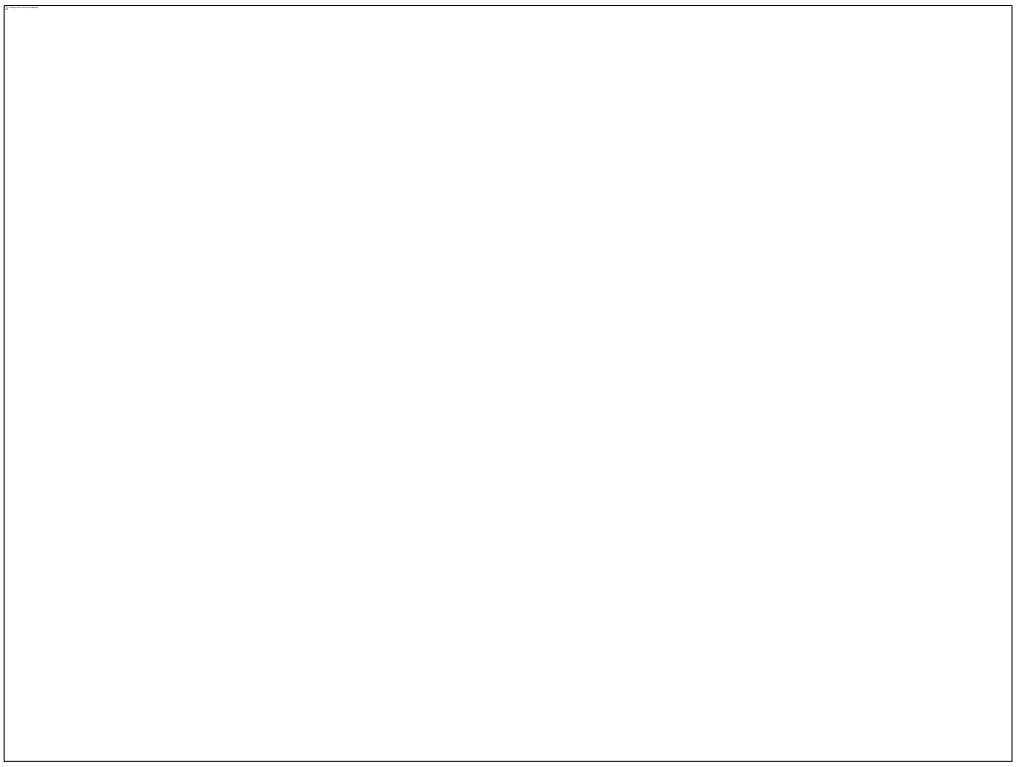


Buchloe dactyloides (Buffalo Grass) is a diocious stoloniferous warm-seasom grass. Newer cultivars have improved density and dark color. This plant works well in drier regions of of cool temperate and warm temperate continental and marine environments. It has exceptional cold tolerance, slow vertical growth rates and low fertility requirements.. This plant has excellent drought tolerance. Licensed to Todd Valley Farms in 2003.

Combined with Bouteloua (Blue Grama Grass) = UC Verde Mix

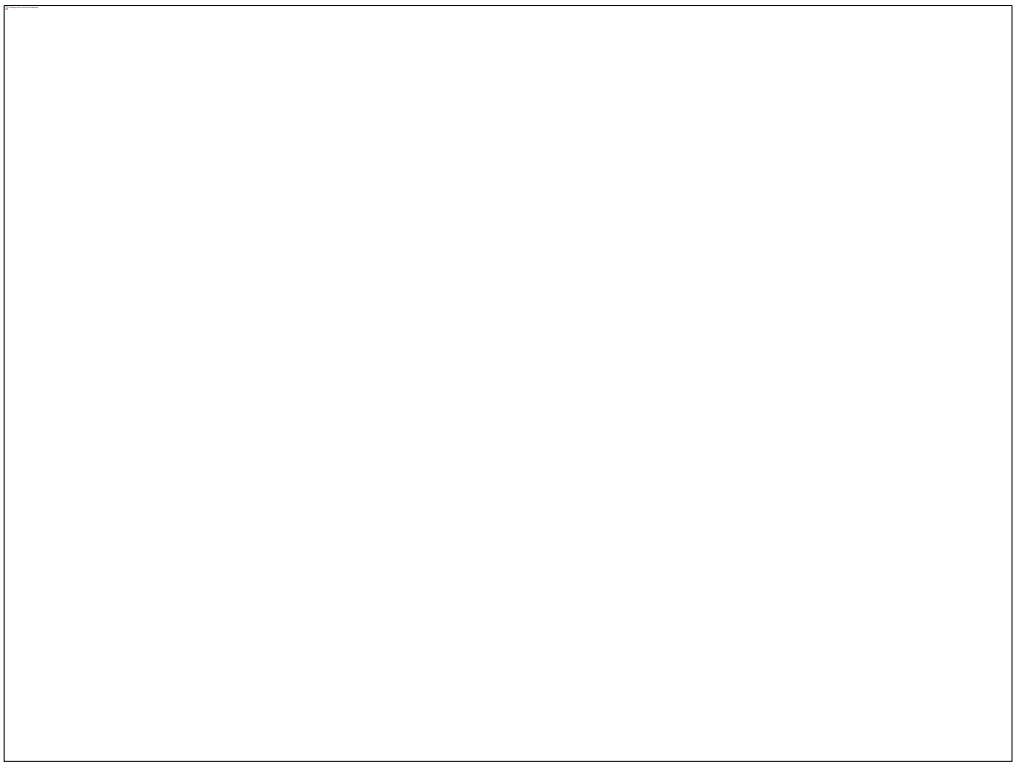


Perennial Ryegrass has the highest fertility rate and highest water use rate of any of the cool-season grass,
Very competitive, seed rate 20% by dry weight→ will overwhelm other seeded varieties
Germination Rate is 3-7 days



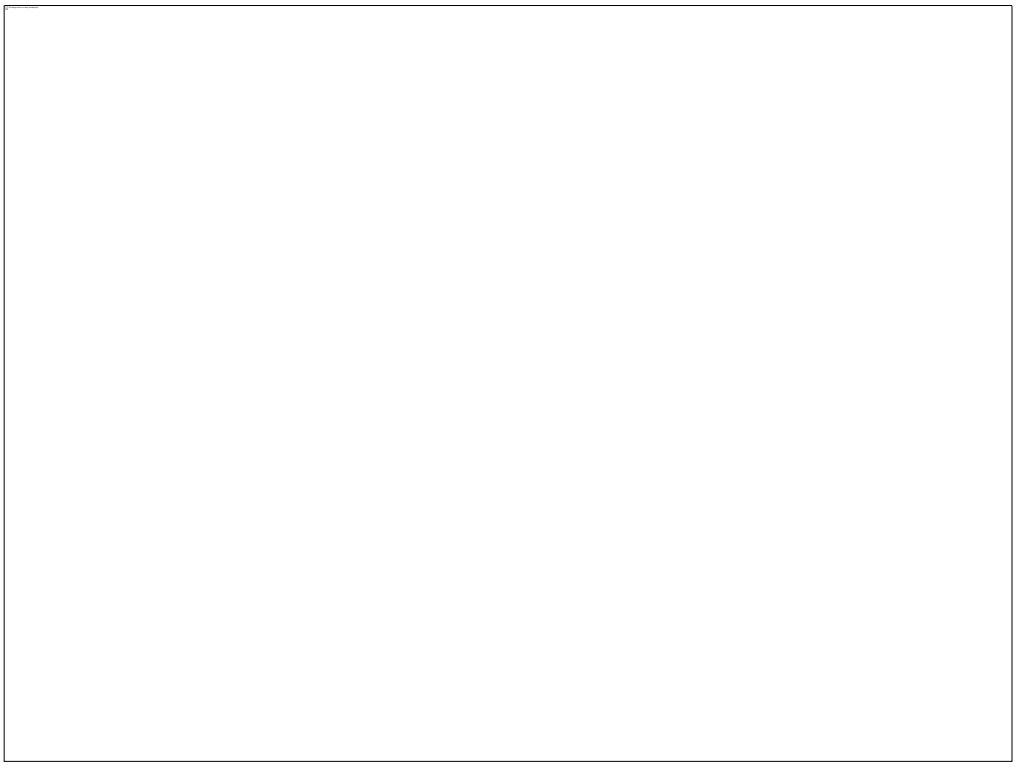
Bermuda Grass is very drought tolerant but has a high fertility requirement and when growing vigorously produces excessive clippings; prone to thatch; high maintenance.

Public Perception of what it SHOULD look like! It does not have to be a perfect monoculture of single species free of contaminants. There is a place in landscapes for a variety of levels of lawn quality.



The industry's 1st choice for native lawn areas. Native Bentgrass™ delivers excellent durability, exceptional recovery and a dark green turf mat.

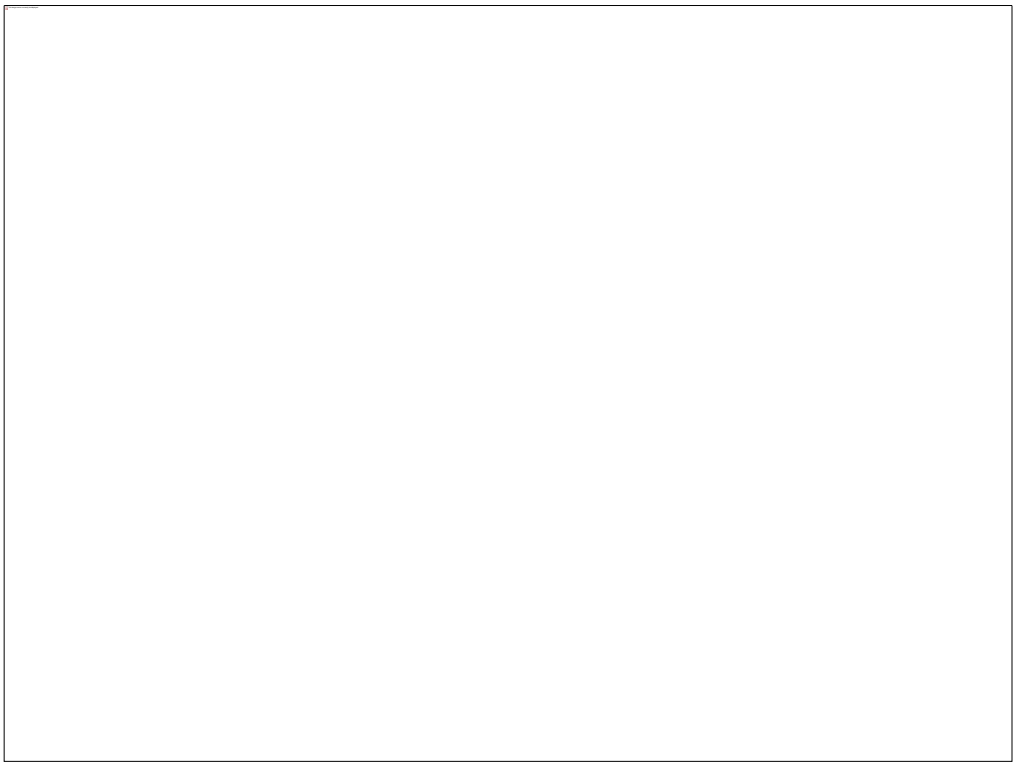
- Medium leaf texture
- Thrives in full sun and partial shade
- Withstands low mowing heights
- Strong sod mat provides effective weed barrier
- Extremely drought tolerant
- Uniform growth habit
- Excellent wear recovery due to self repairing rhizomes



Delta Grassland Mix™

A premium soft grass with botanical emerald green color. Provides a unique contrast when planted in ornamental settings.

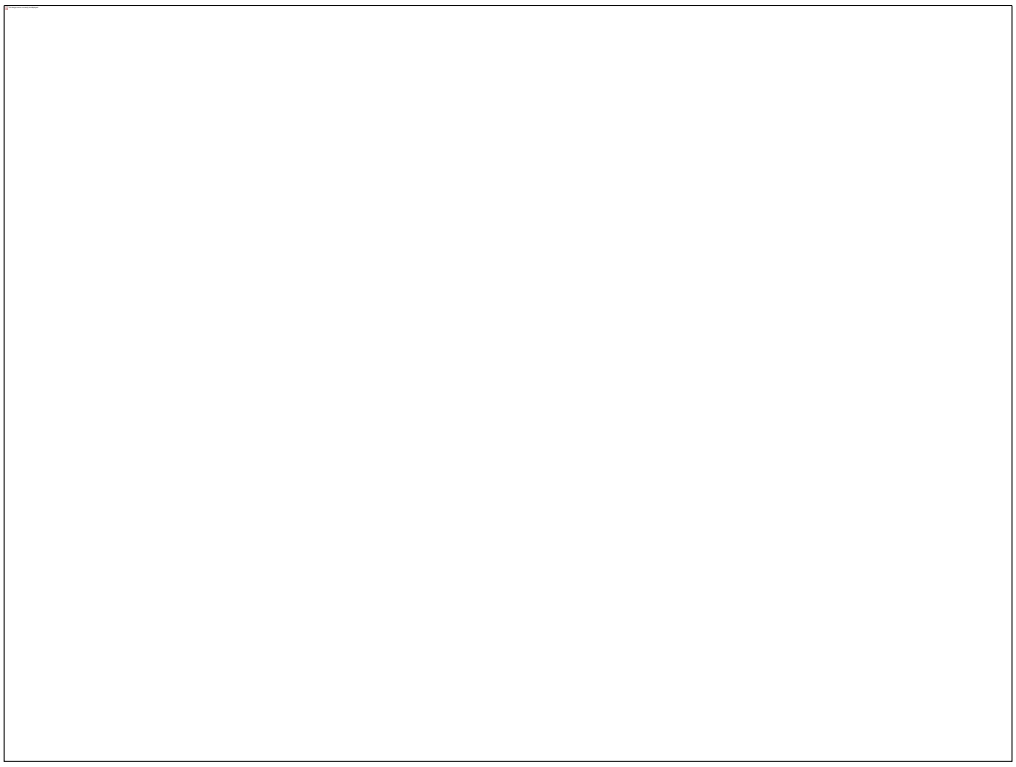
•Narrow fine leafed texture.
•Moderate wear resistance.
•Slow growing, tuft forming, clumping grass.
•Persists under drought conditions.
•Prefers to grow in partial shade and tolerates full sun.



Native Mow Free™

A low maintenance compliment to natural landscapes. This versatile grass can be maintained as a turf lawn or left unmowed.

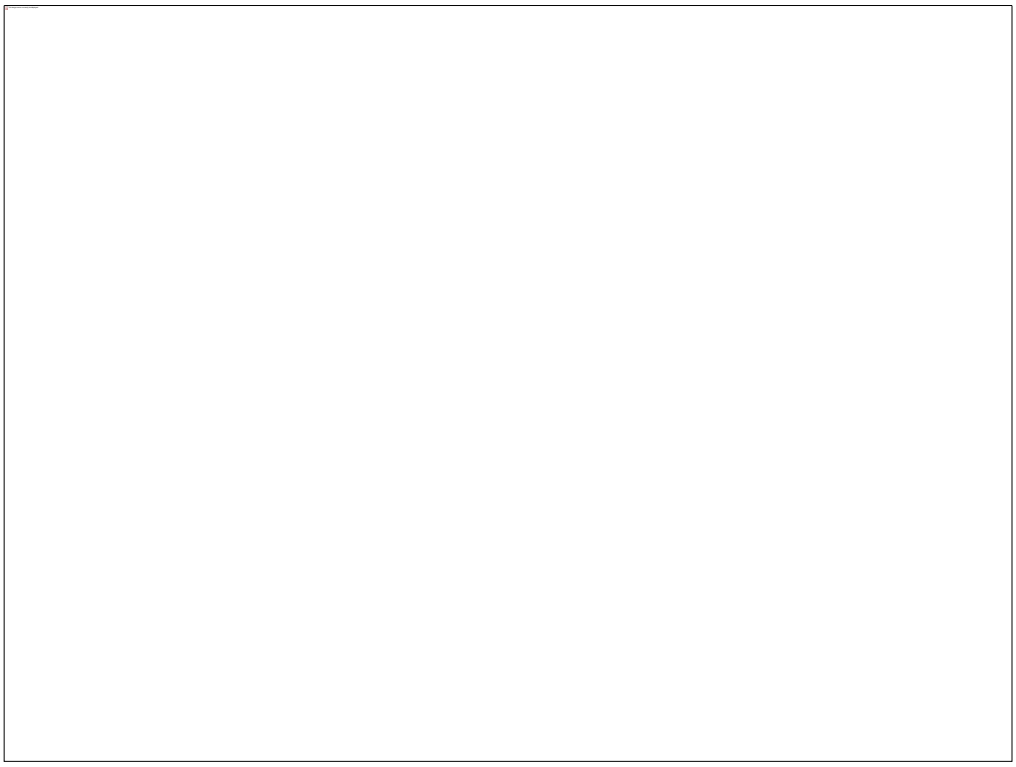
•Contains two native fine fescues and one highly naturalized variety.
•Excellent shade and cold tolerance.
•Deep green glossy leaves.
•Slow growing, narrow leafed grass with blades that are very lax and flexuous.
•Provides soil stabilization for sloped areas.



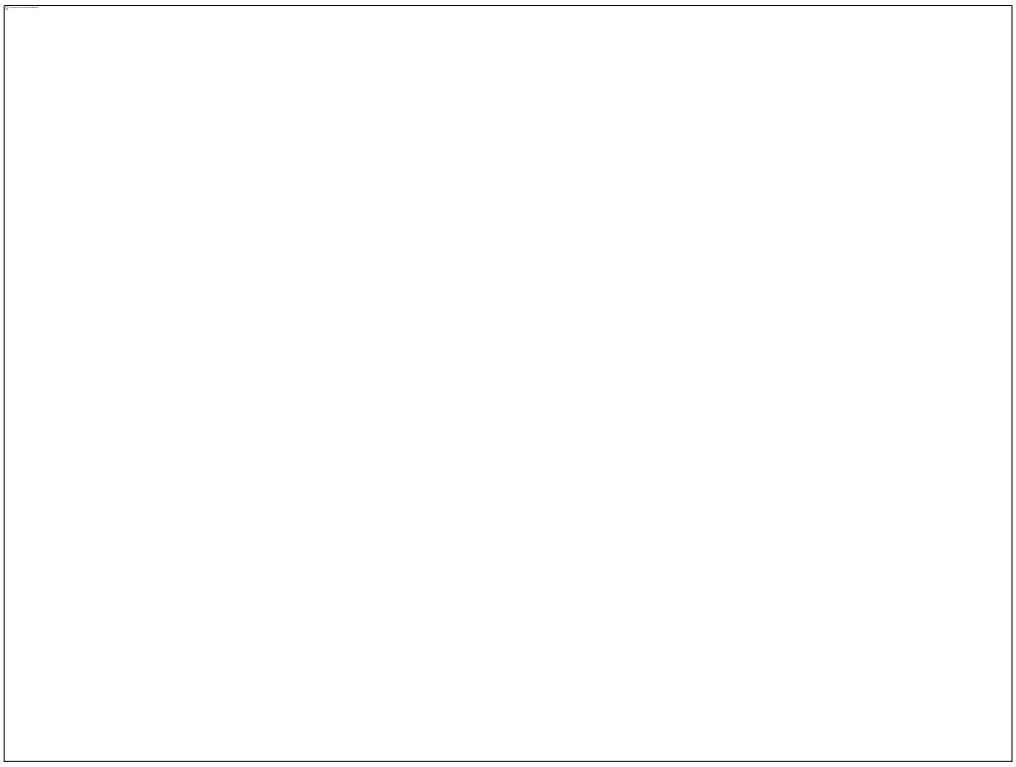
Biofiltration Sod™

Revolutionizing the development of native grasses on roadsides, bio-swales and other environmental mitigation areas.

•A combination of coarse and fine bladed grasses that create an excellent weed barrier.
•Withstands extreme heat in full sun conditions.
•Adapts to most soil types.
•Reduces soil erosion.
•Will recharge and purify ground water.



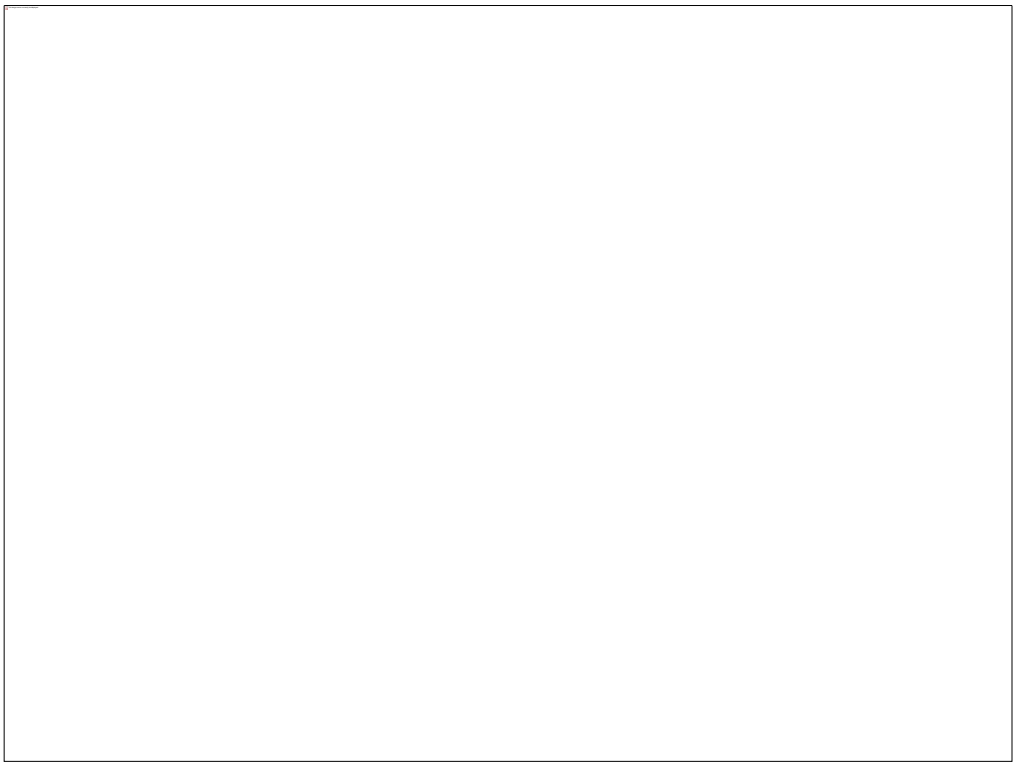
Delta Native Heartland Sod™
A combination of grasses that coexist well in most soil conditions. These perennial sod forming grasses provide a natural increase in the biodiversity of your native grass population.
•Fine to medium leaf blades.
•Excellent drought tolerance.
•Grows in full sun and partial dry shade.
•Creates a natural diverse habitat for wildlife.



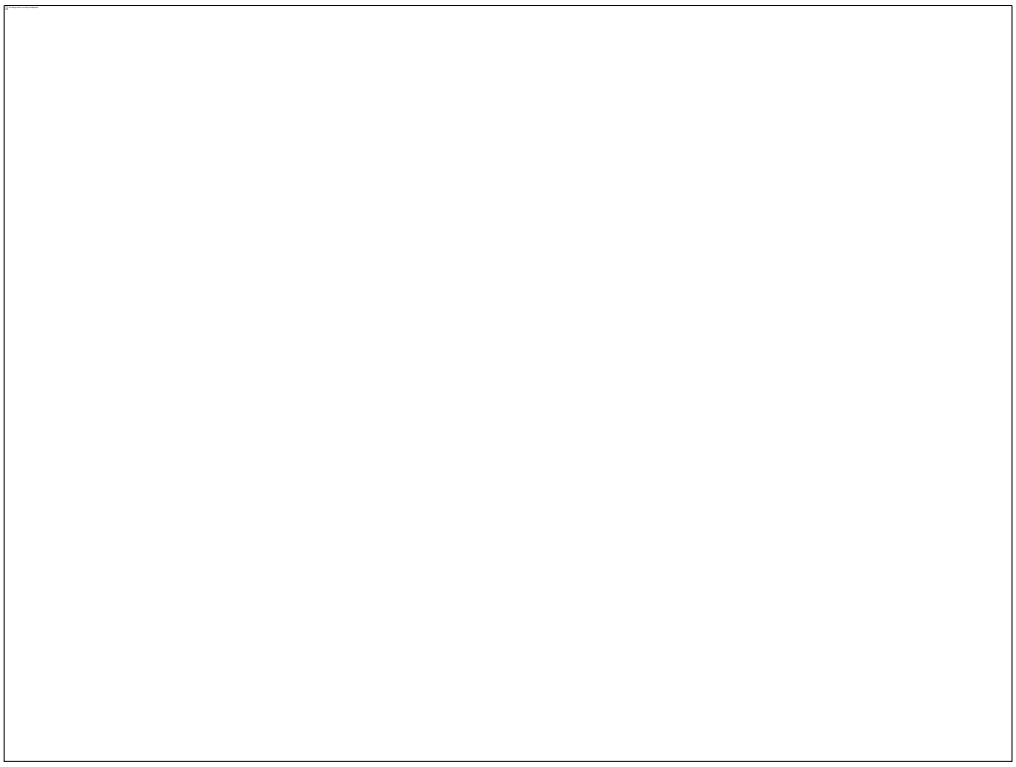
Native Preservation Mix™

The complex beauty of native grasses are showcased in this dark green, fine textured sod.

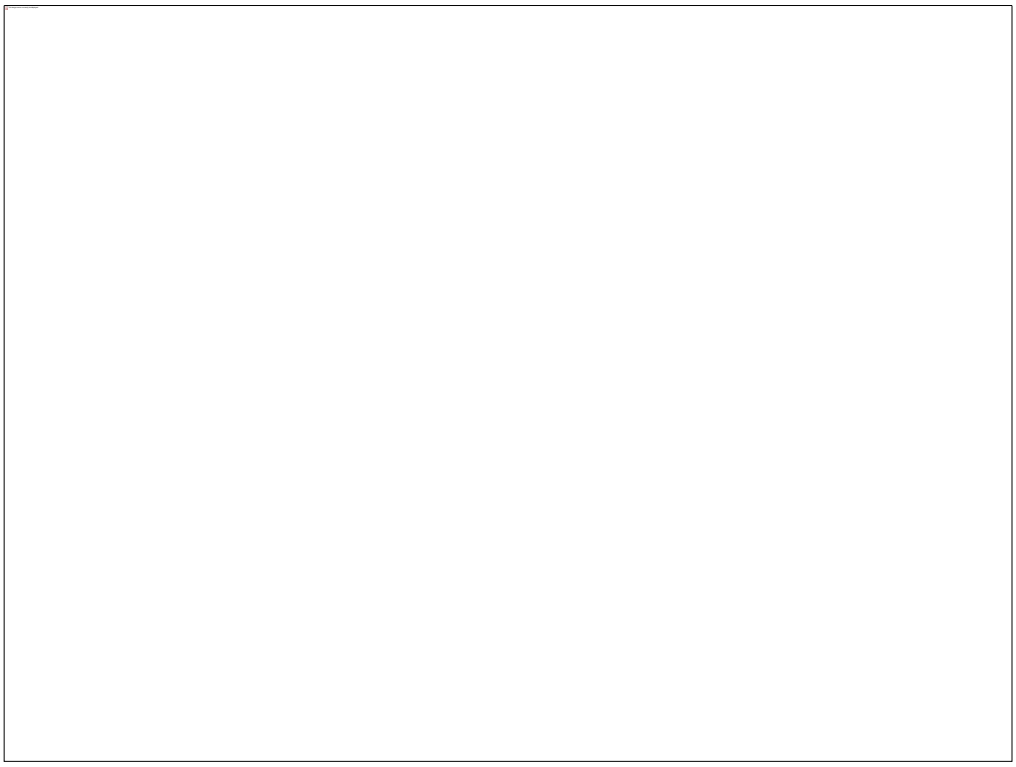
•Narrow fine leafed texture.
•Naturally drought resistant.
•Withstands partial shade and full sun.
•Excellent for sloped hillsides, median and roadside applications.



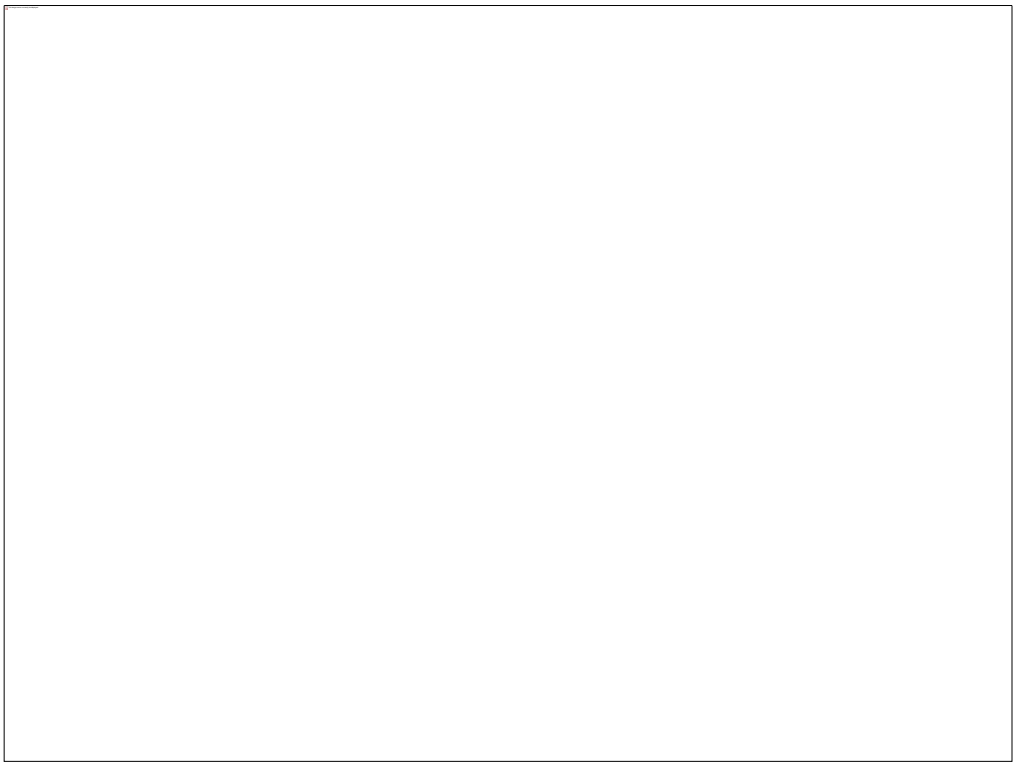
Even though Perennial Rye has high fertility requirements it is a perfect grass to use with dicots. By not fertilizing the rye grass it does not have competitive advantage and stays in equilibrium.



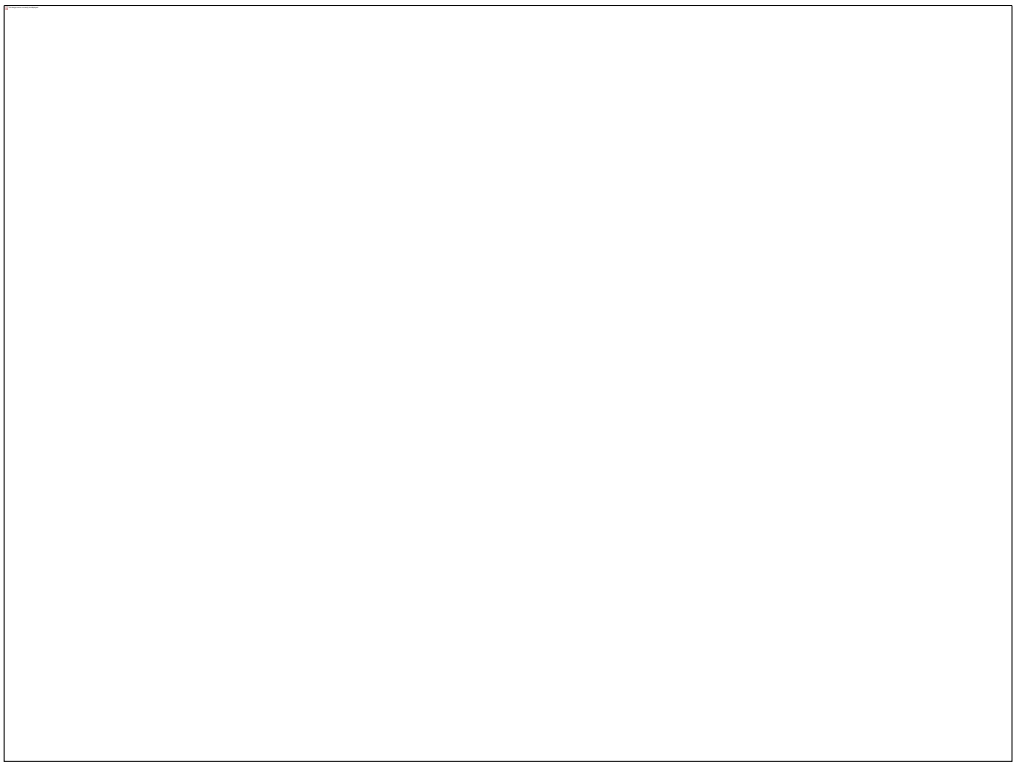
Grasses and dicots must be selected for a specific site to account for shade, fertility management, and irrigation strategies. Wear, use, sun/shade, rainfall amounts, humidity, winter and summer temperatures are factors. Location on commercial sites; entry vs. service area behind the warehouse.



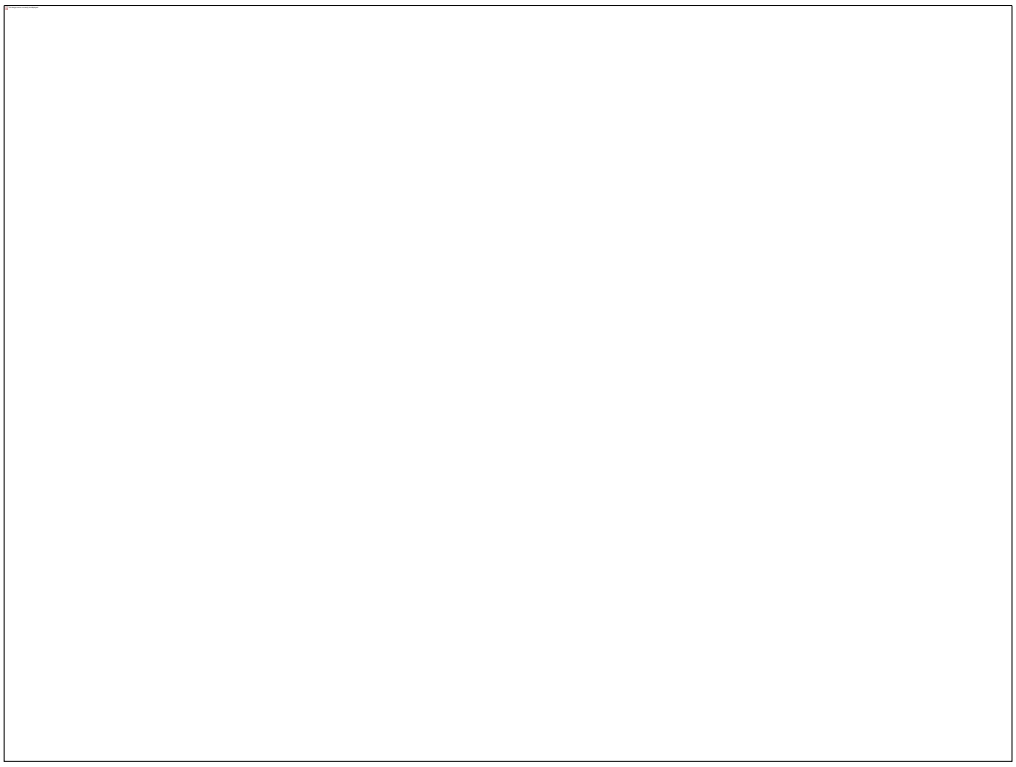
Even though Perennial Rye has high fertility requirements it is a perfect grass to use with dicots. By not fertilizing the rye grass it does not have competitive advantage and stays in equilibrium.
A survey of lawns shows that an variety of dicots thrive in the same cultural environment as turf. From 83 to 139 plant species of dicots were found in a survey of 350 lawns areas. Studies at Oregon State show that a mixture of lawn and Dicots can be a sustainable mix for low fertility inputs, more drought tolerance in cool season grass areas.



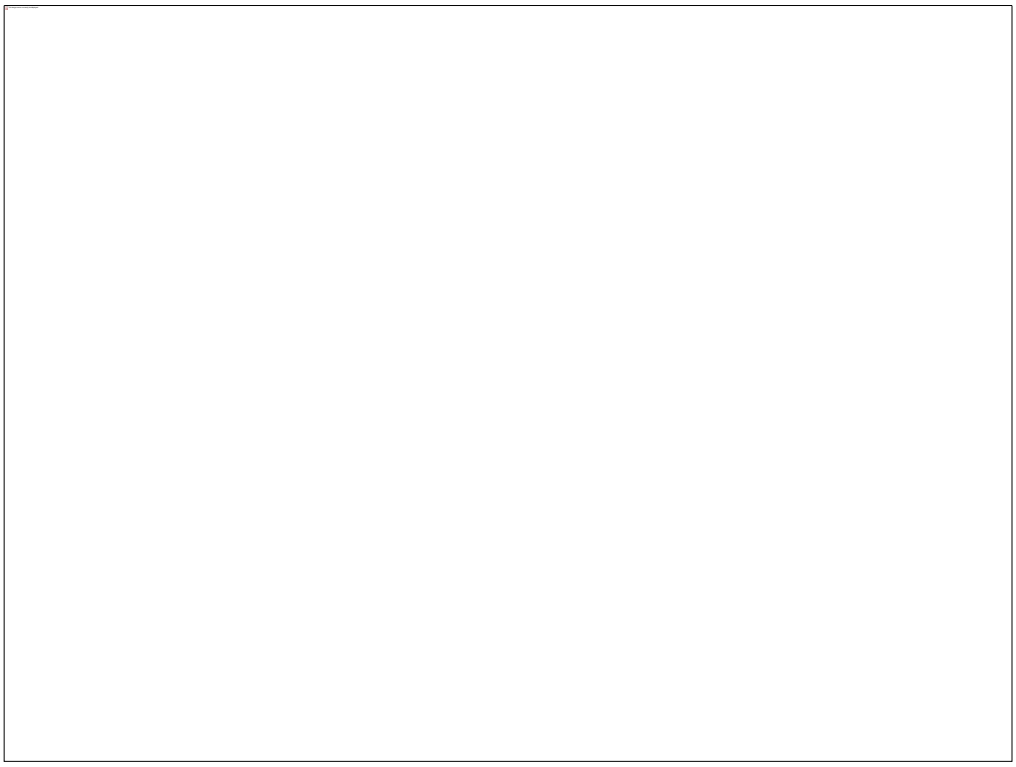
Bellis perennis is very drought tolerant but will go dormant in prolonged dry periods. Wild varieties are hardier than domesticated varieties



Blends well with grass. SpreadThe many different ornamental cultivars include:
'Paprika- Orange Red
'Calistoga'-white
'Cerise Queen'-vivid pink
'Island Pink'- Pink
'Red Beauty'- Red
'White Beauty'-White
'Fire King'-Red
'Lilac Beauty'-Lavender
Several, including 'Kelwayi',[26] and 'Lansdorferglut'
The many hybrids of this species designated *Achillea* x *taygetea* are useful garden subjects,[28] including: 'Appleblossom', 'Fanal', 'Hoffnung', and 'Moonshine'.[29]
Companions via Rhizomes. Will stay green under prolonged drought.
Spanish for "little Feather" yarrow was known as *herbal militaris*, for its use in stanching the flow of blood from wounds.[



Very drought tolerant; ‘Fresa’ is a dense low growing plant. Flowering period is shorter than white clover but this plant blends well with grass.

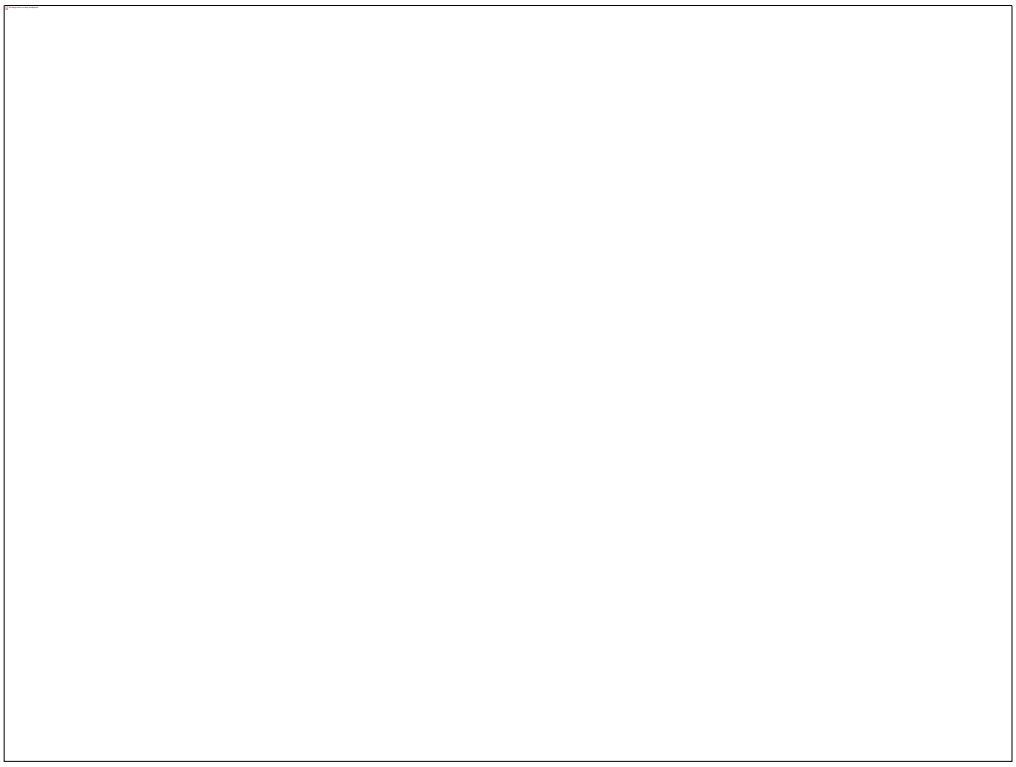


Very drought tolerant. Wild varieties are variable in growth and flowering habit. 'Pipolina' cultivar is lower growing than common varieties. Flowers do attract bees.

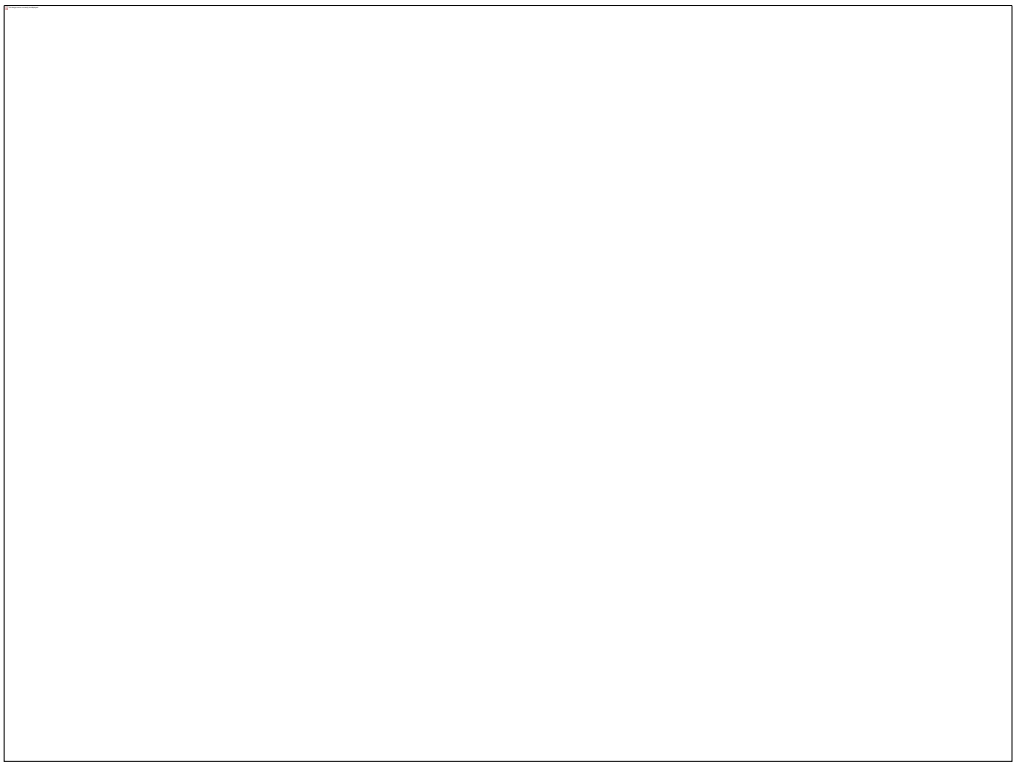
White clover grows amongturfgrass, crops, and in a large number of other landscapes.[1] It is also found in a limited range of different field type environments. White clover can tolerate close mowing, and can grow on many different types and pHs of soil, but prefers clay.[1] It is considered to be a beneficial component of natural or organic lawn care due to its ability to fix nitrogen and out-compete lawn weeds. Natural nitrogen fixing reduces leaching from the soil and can reduce the incidence of some lawn diseases that are enhanced by the availability of synthetic fertilizer.[2]
They are not easy for humans to digest raw, however, but this is easily fixed by boiling the harvested plants for 5–10 minutes.[3] Dried flowerheads and seedpods can also be ground up into a nutritious flour and mixed with other foods, or can be steeped into a tisane. White clover flour is sometimes sprinkled onto cooked foods such as boiled rice.

Four leaf Trifolium repens, in its natural setting. Three-leaf shamrocks can be seen

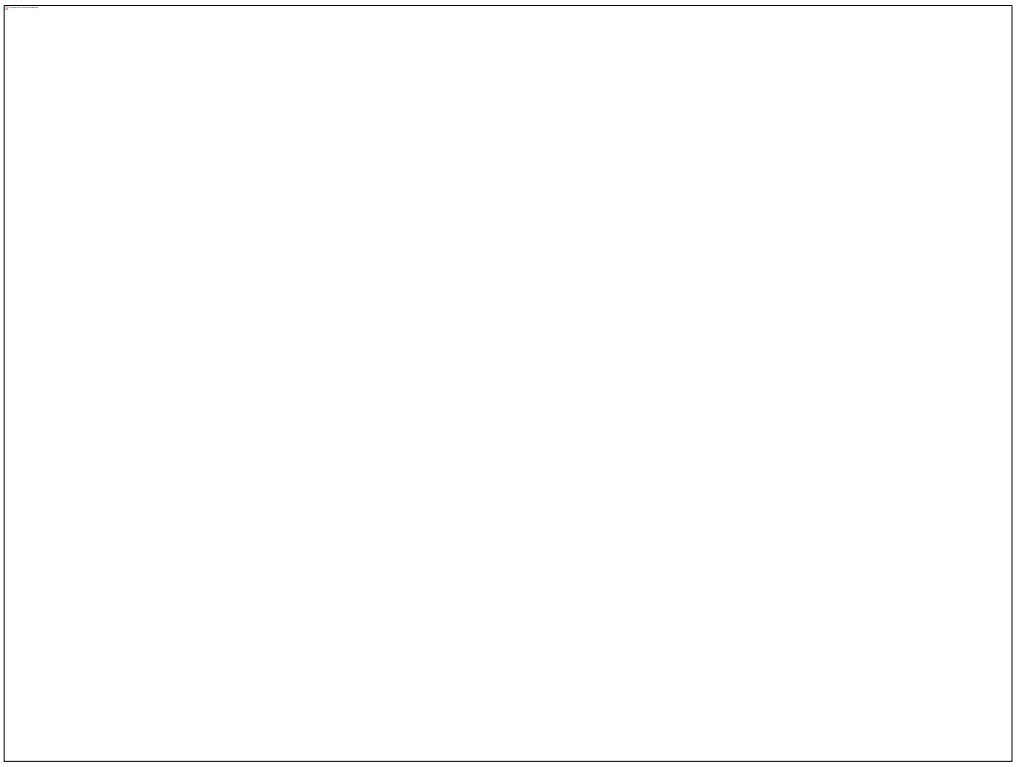
When used in soups, the leaves are often harvested before the plant produces flowers. The roots are also edible, although they are most often cooked firsthand.

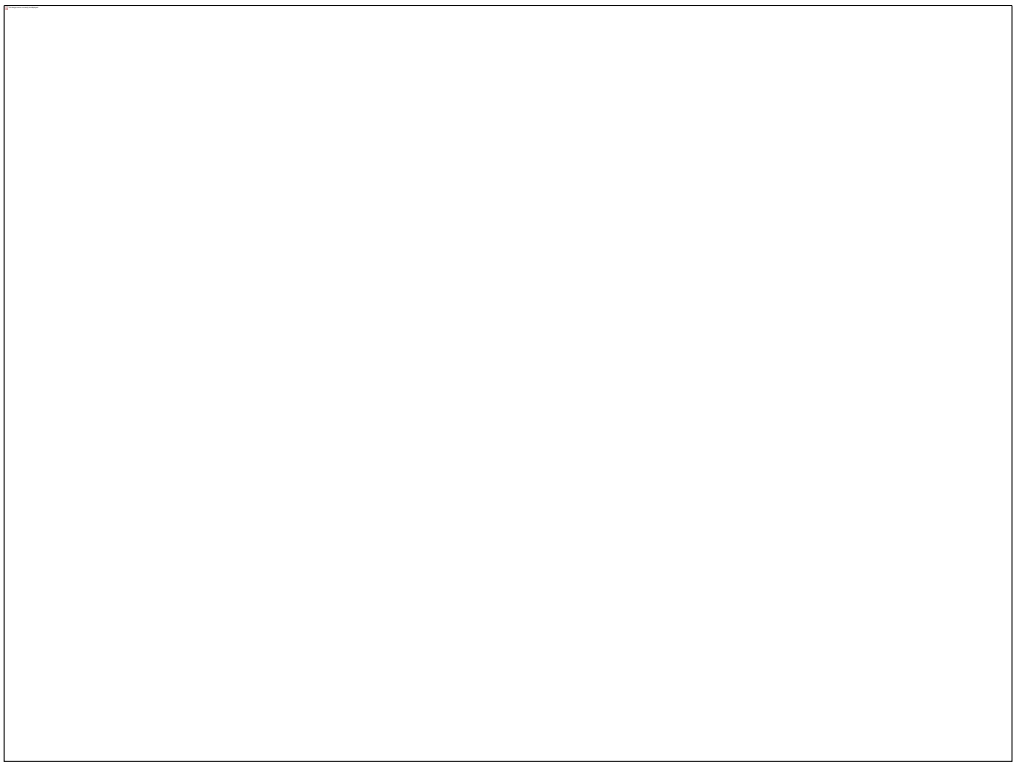


The most drought resistant of the lawn dicots. Very compatible with grasses. Spreads by rhizomes but is not aggressive. Produces yellow flowers in the spring.
It was used in the past to stuff mattress; the coumarin scent (smells like new-mown hay) acts as a flea repellant; Used as a sedative to help women in childbirth.

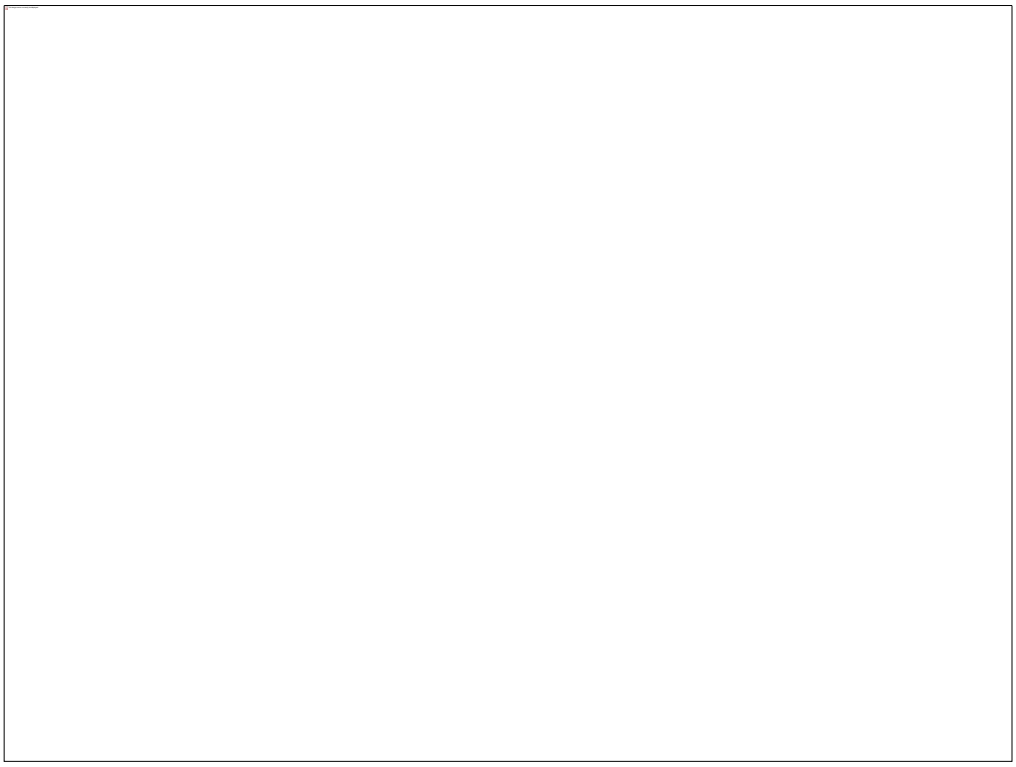


Common Self-heal
Quite drought tolerant in temperate climates; Tends to form dense, tight patches, Produces purple flowers at mowing height; edible; used as a poultice to promote healing.
Lamiaceae family

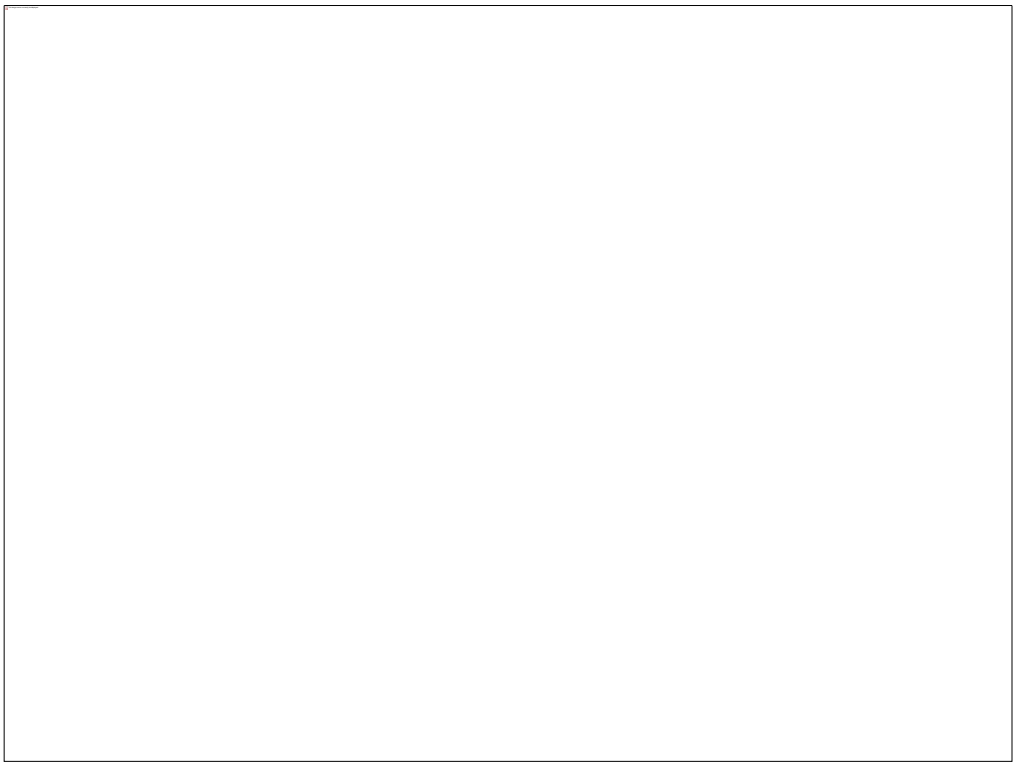




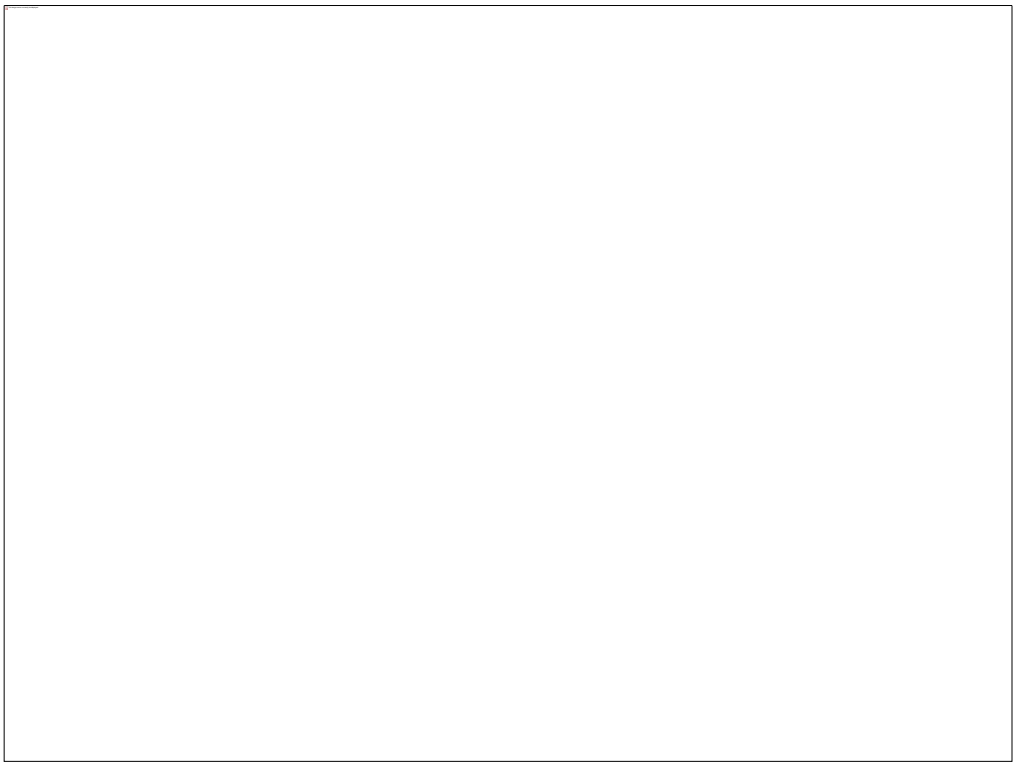
Handles shade very well; low growing; Foliage is somewhat coarse but this plant blends with grass very well. Variegated variety is available. Wild bees love the flowers of this plant.
Medicinal- Treat inflammation of the eyes; used to treat tinnitis.
It was used in beer making as a flavoring, for clarification, and as a preservative; this was before hops were used.
Caution with this plant; toxic to horses and cattle

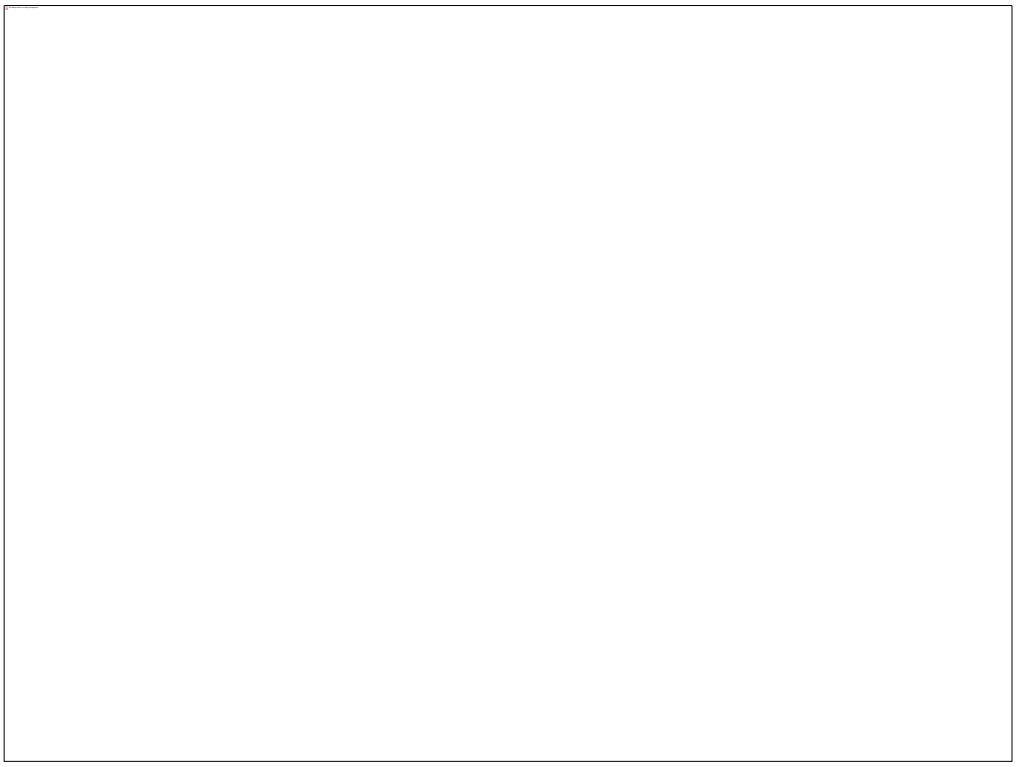


Tolerates wet soils and moderate shade quite well. Vigorous spreader, Yellow flowers in spring at mowing height, Foliage is somewhat coarse. Poisonous; bitter so cattle won't graze it.

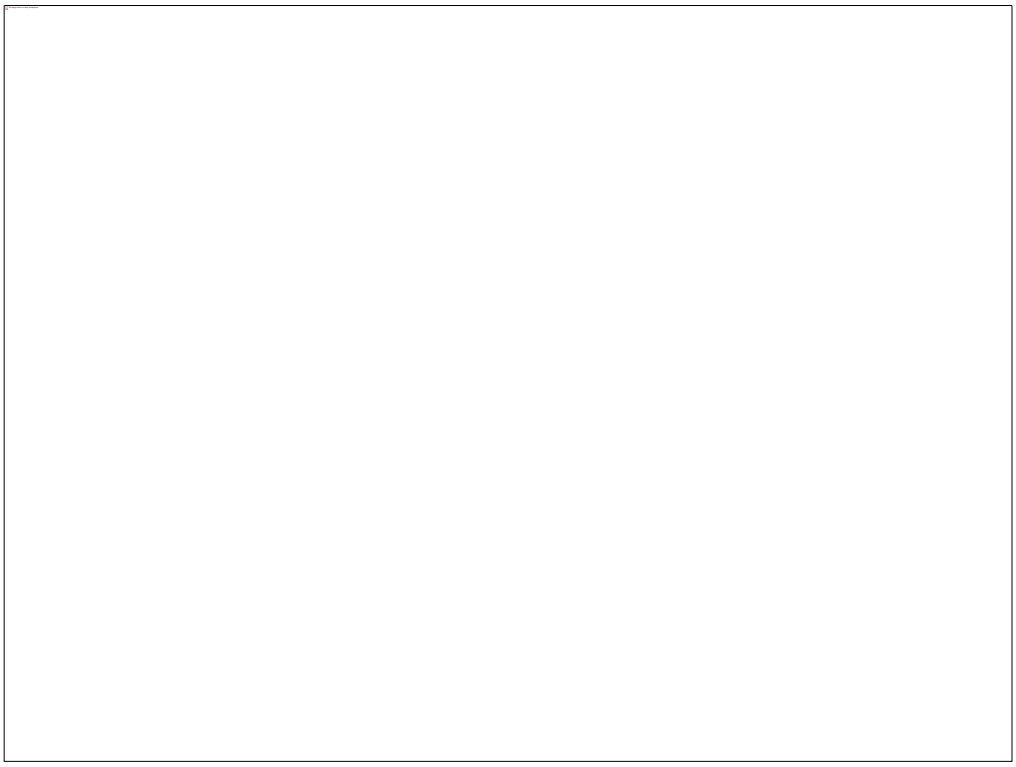


Performs well in wet areas and in shady areas. Stays low growing at all times. Produces blue flowers in the Spring; spreads by stolons, seed is self sterile.





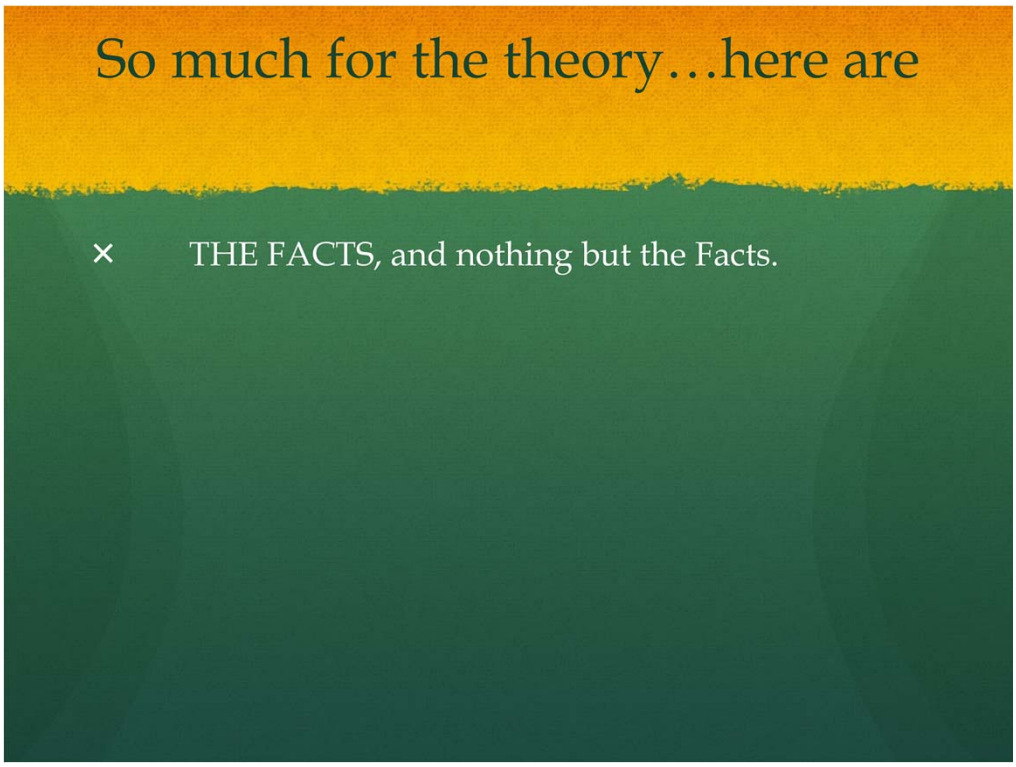
Blends well with grass. Similar to Achillea but a lighter green and not as drought tolerant. Has a lemon fragrance when mowed. Not as persistent as other dicots under regular mowing.
Comes from the Greek for “earth Apple” because of the apple-like scent of this plant



Behaves like an herbaceous perennial, often dying back to the ground in winter. Mixes well with grass; produces yellow flowers at mowing height. Does very well in deep shade and under trees with limited root zones like redwoods.

Not a perfect solution

- The driving force will be
  - Restrictions on water use
  - Restrictions on herbicide use
  - Best used on lawns known as drive-by lawns
    - Not subject to heavy wear
    - Not fertilized or watered intensely



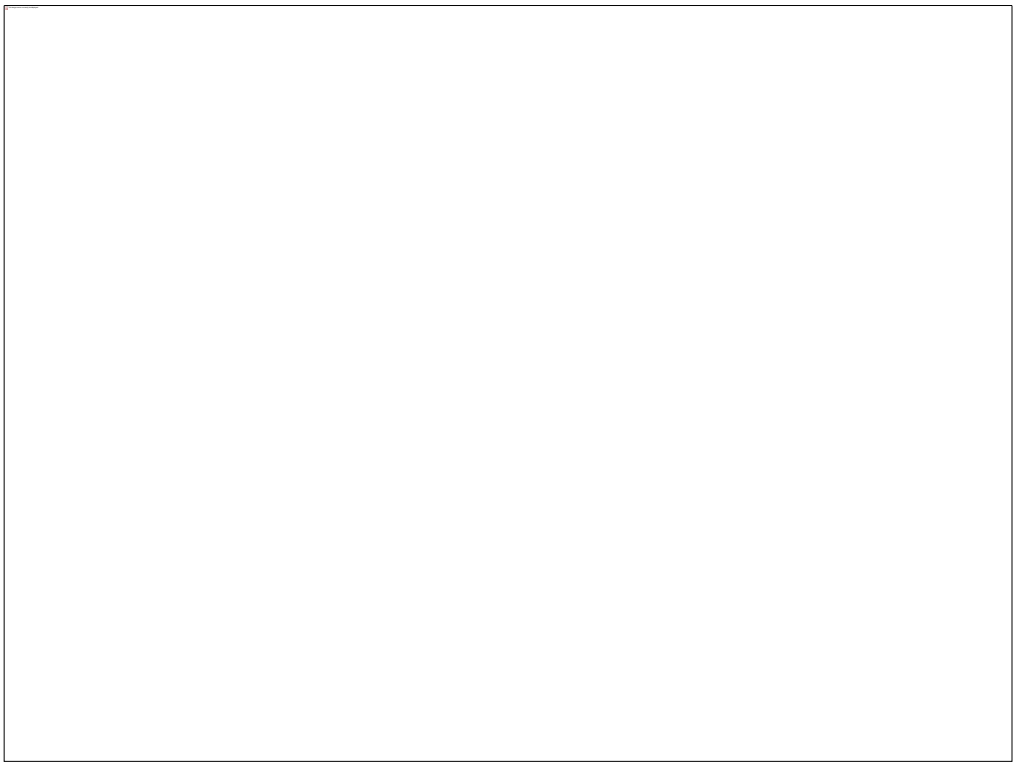
GIVE ME A DOLLAR!

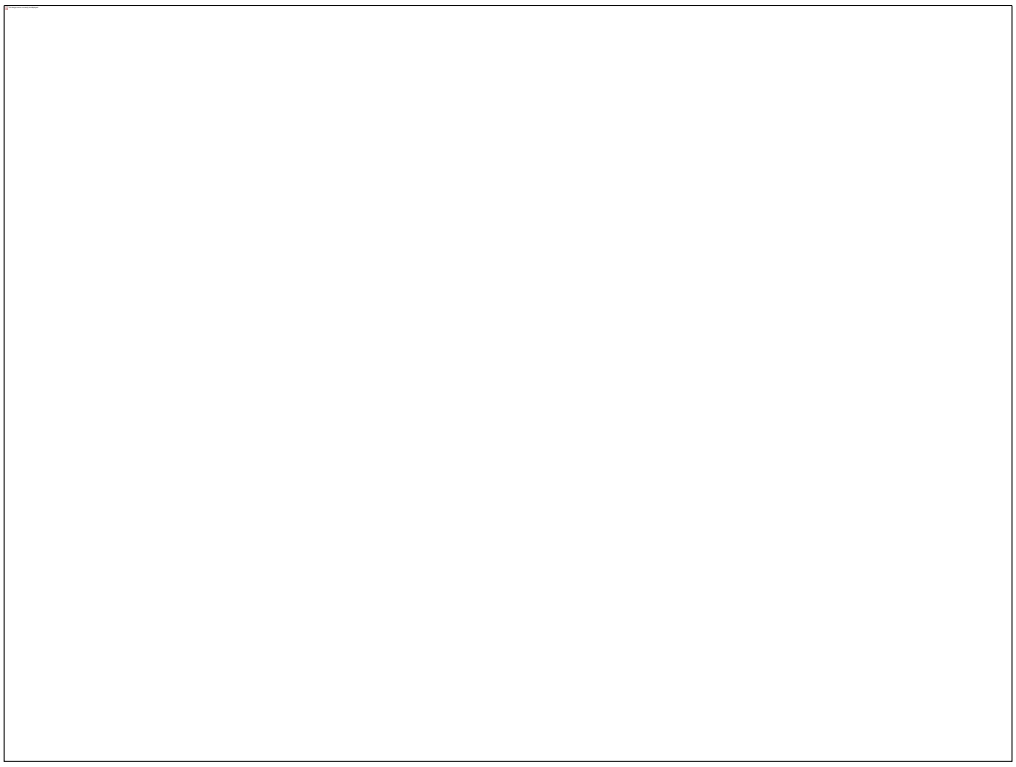
Typical vs. Sustainable

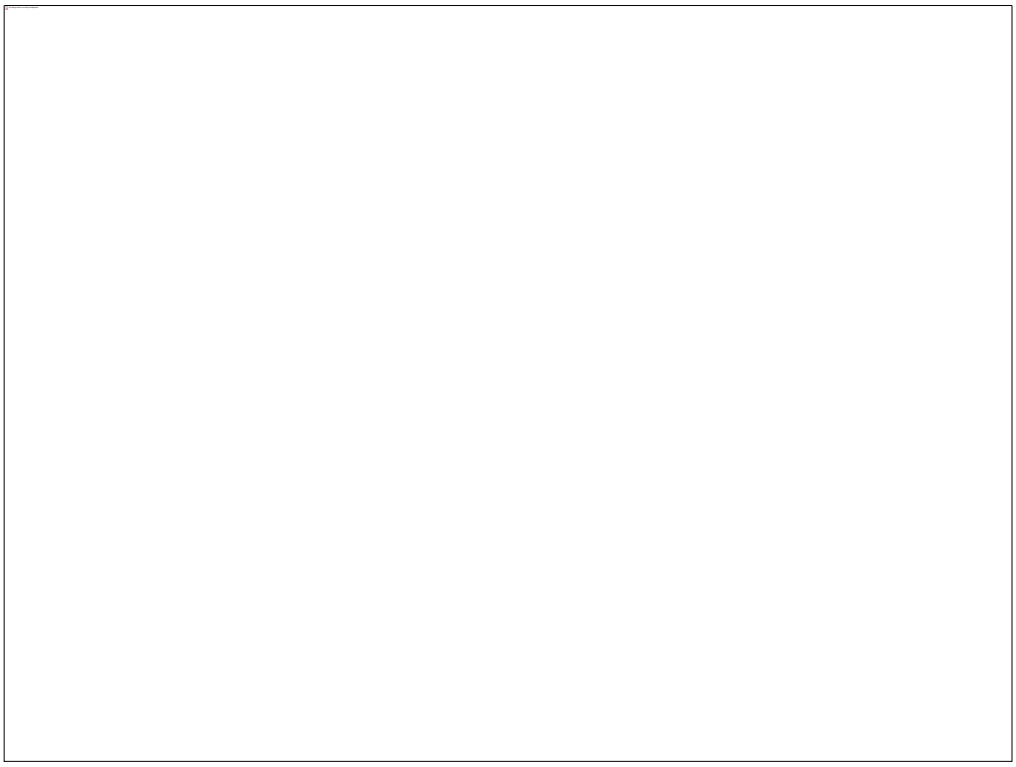
- × Water Usage
- × Pests
- × Diseases

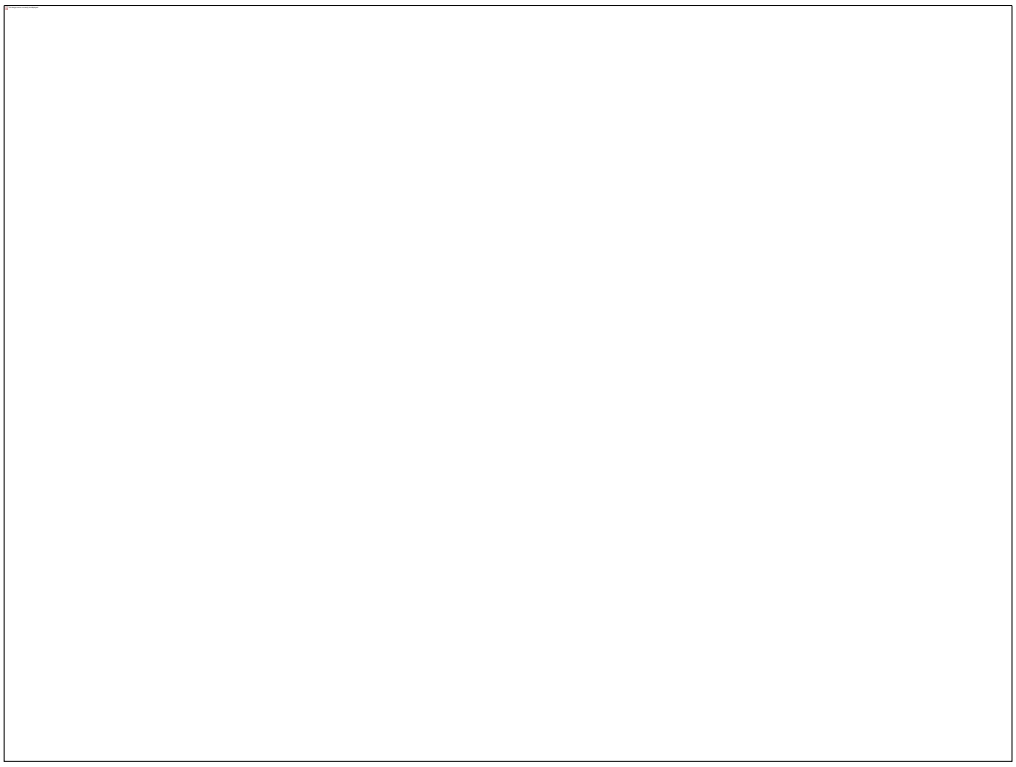
Typical vs. Sustainable

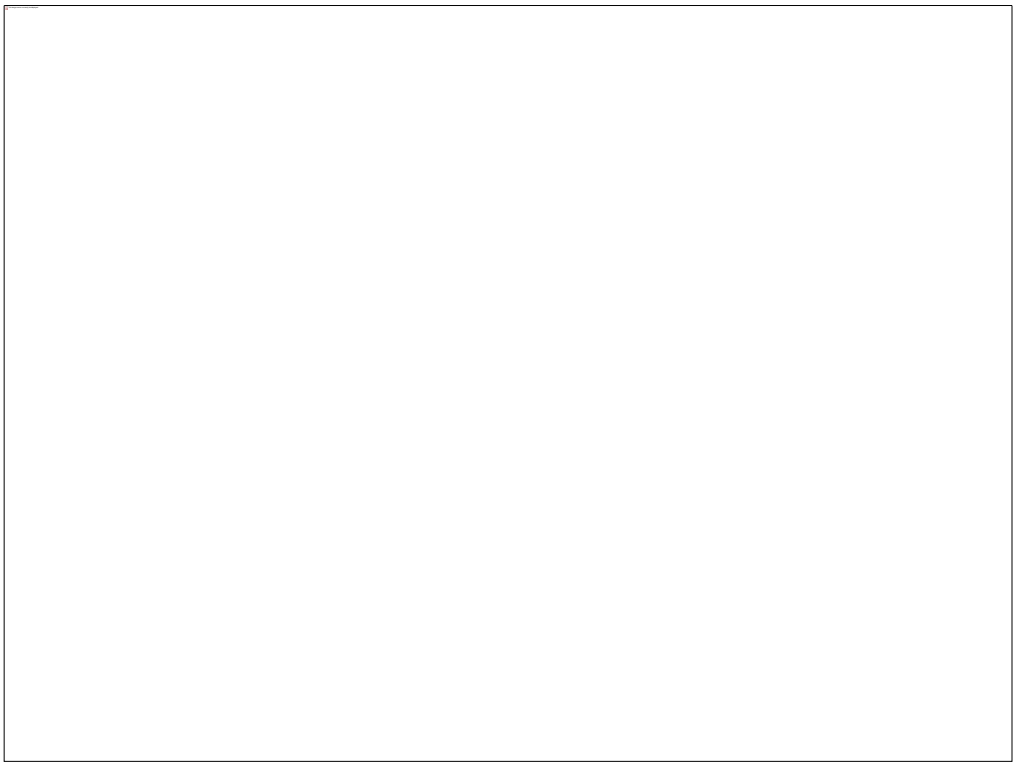
- Definition and Characterizes
- Landscape Design
- Pests and Diseases
- Water Usage

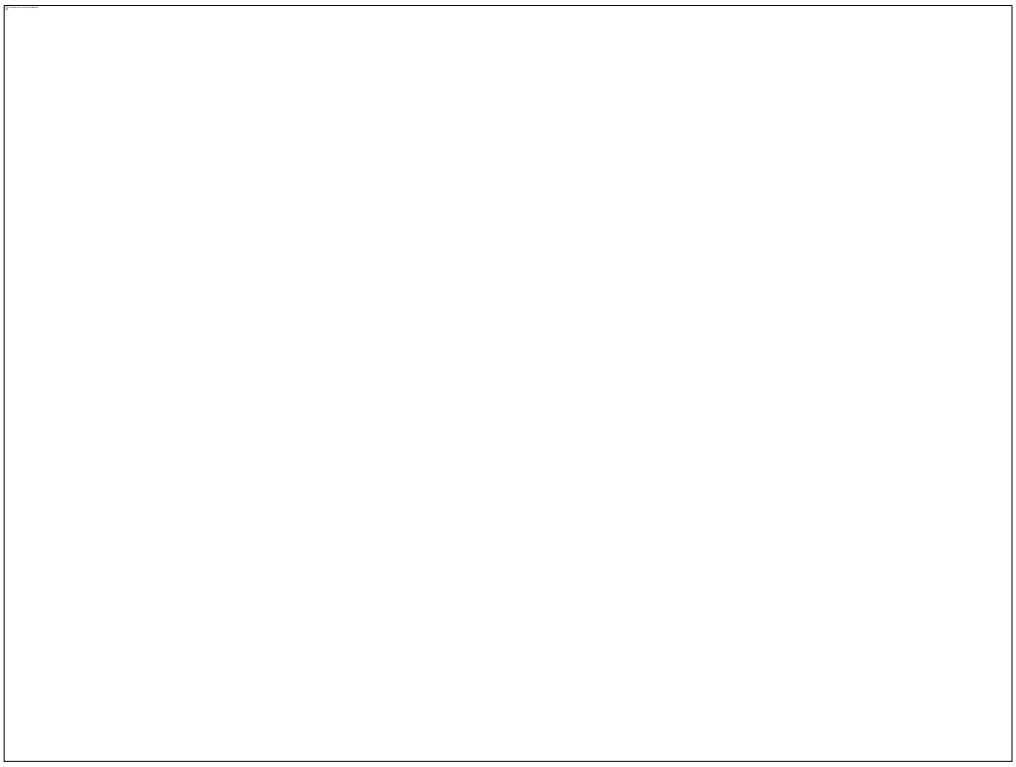


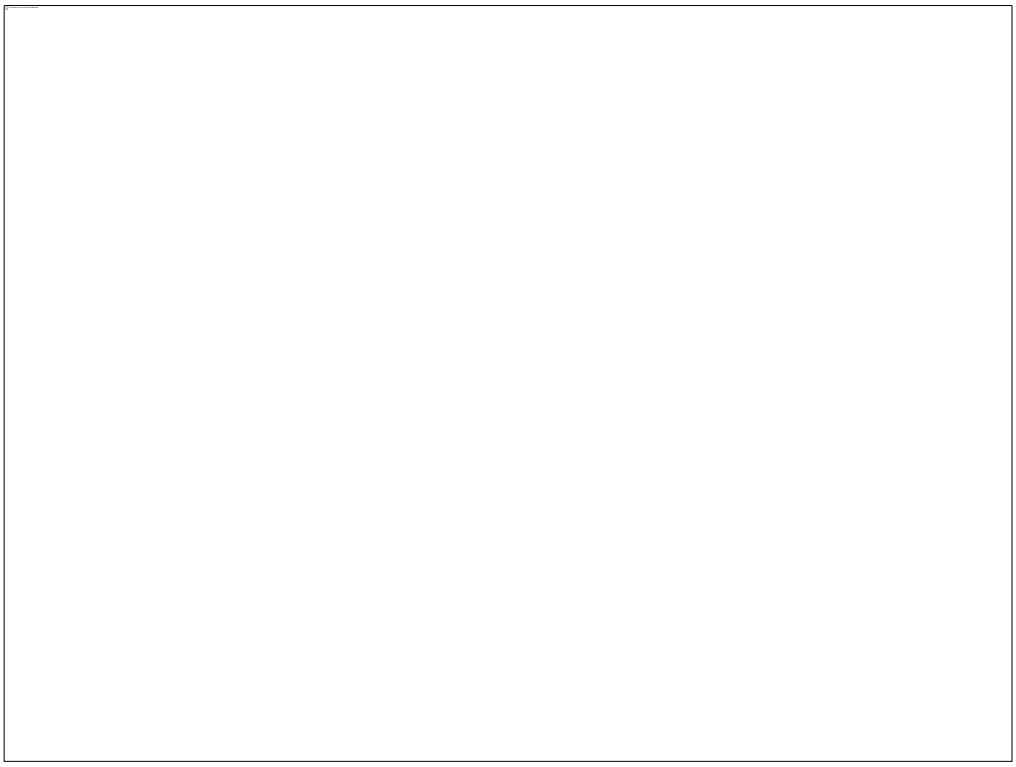




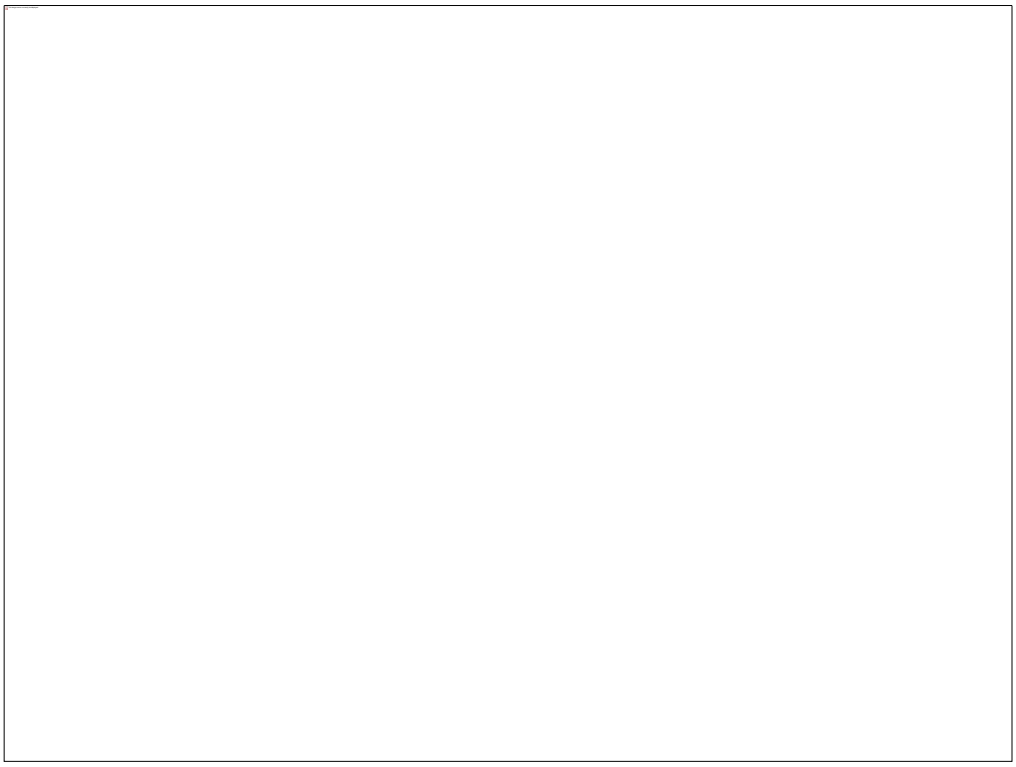


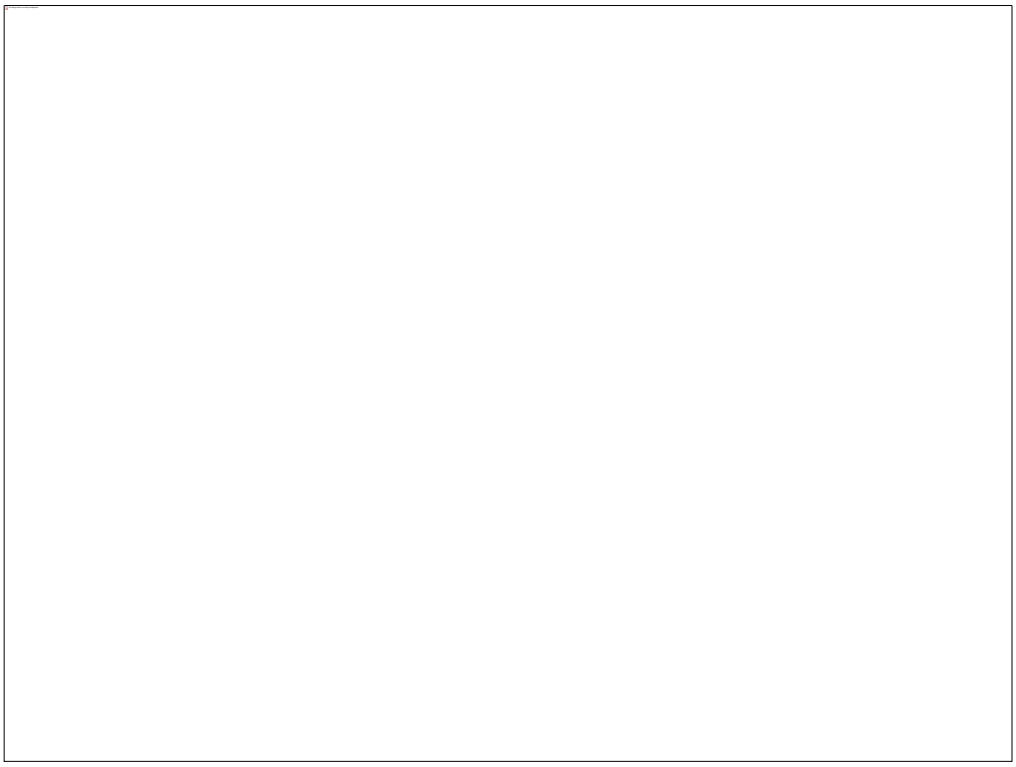






I need your Help Here→oooooooH

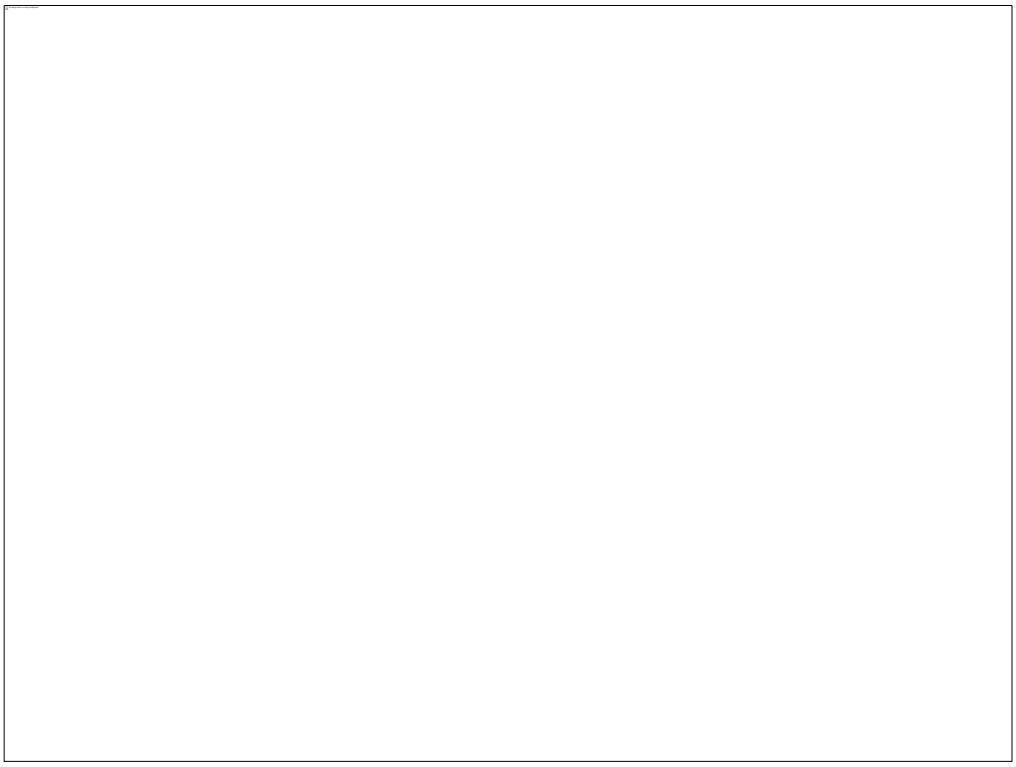


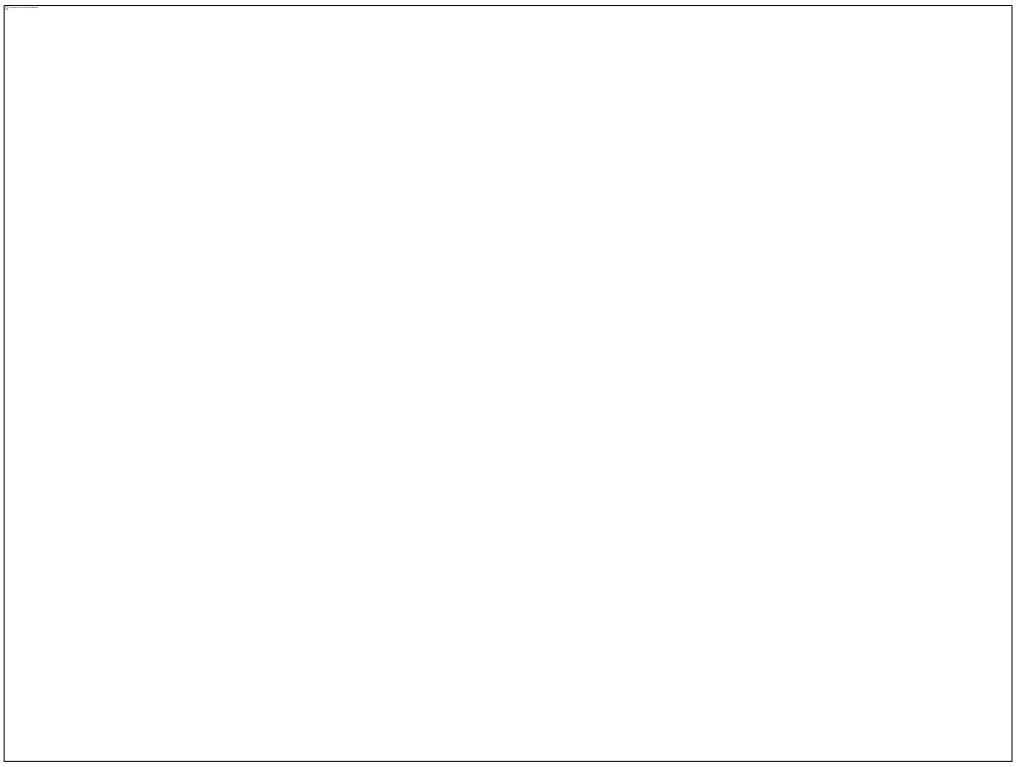


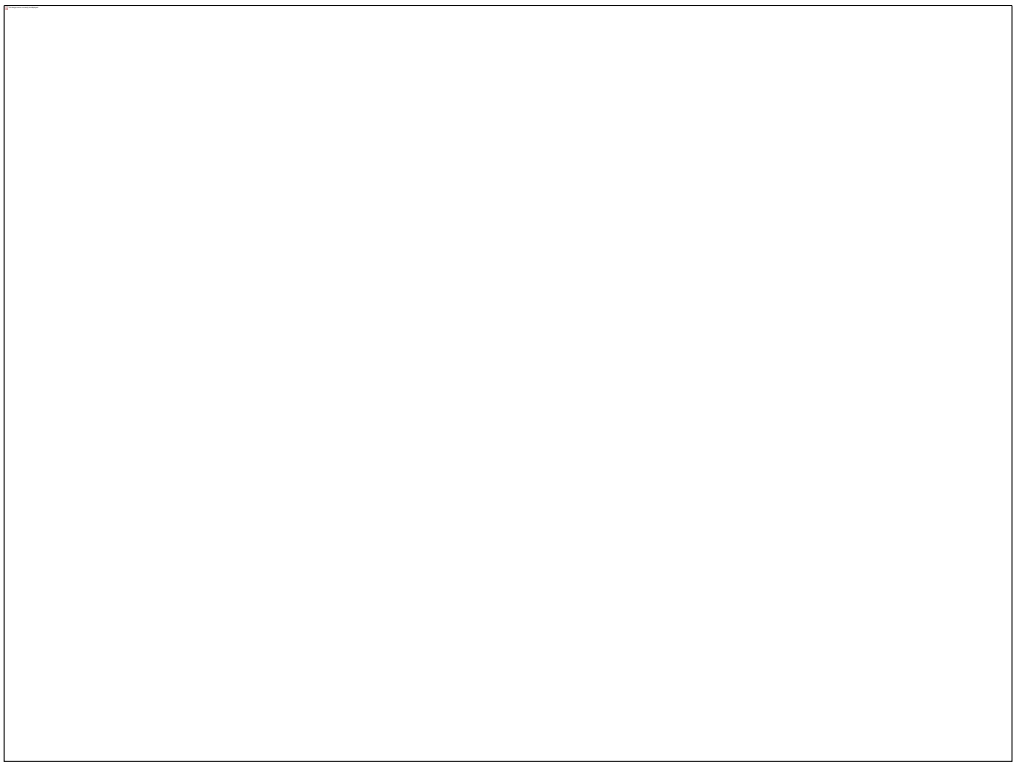
Water 57,000 gallons

Yard Waste 670 Pounds

Maintenance 80 hours/year







Square footage is about 2100 sq.ft.
Yard Waste= 420 pounds at 0.94 pounds of carbon in the form of methane per pound of waste—394 pounds
Maintenance Difference= 65 hours at minimum wage of $15/hour=$975.