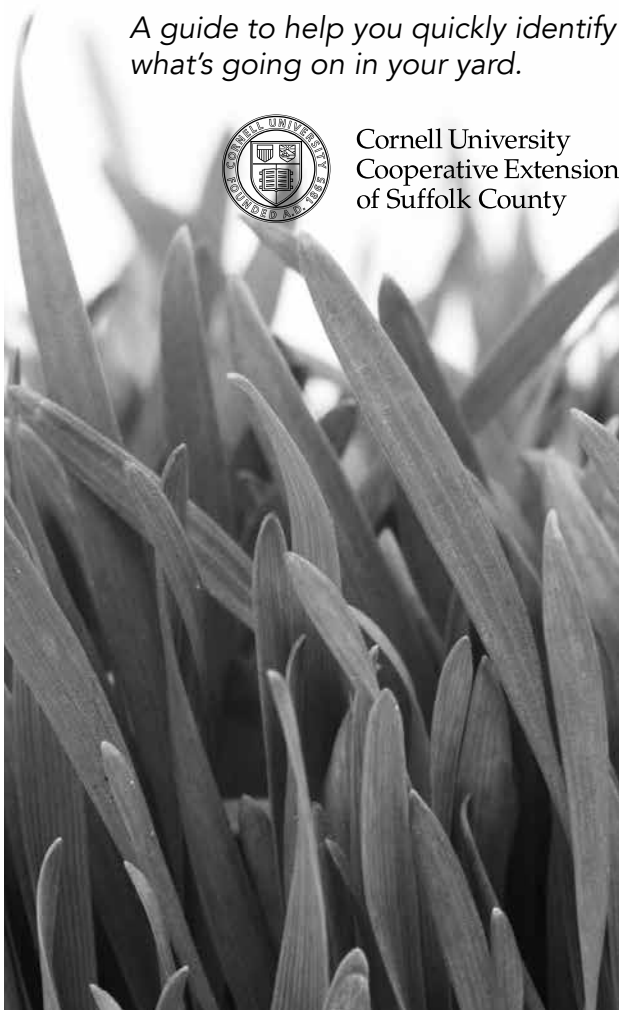


# Qwik Pest

*A guide to help you quickly identify  
what's going on in your yard.*



Cornell University  
Cooperative Extension  
of Suffolk County





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## **Nitrogen and Phosphorus Laws**

- No nitrogen fertilizer on turf including weed and feed formulas from Nov 1 - April 1 on non county properties, no nitrogen anytime on county turf unless under exemption. (Golf, athletic, newly seeded and sodded turf)
- No Phosphorous fertilizer (phosphate greater than 0.67 N-P-K analysis) on turf ANY TIME unless a soil test shows the need or on newly established turf during the first growing season.
- No fertilizer of any kind if turf is within 20 feet of surface water. The only exception is if you have side guards on the spreader and you have a 10 foot wide vegetated buffer then you can apply a fertilizer that does NOT contain phosphorous up to THREE feet away from surface water.

## **Winter Care**

- Water thoroughly twice during winter to prevent winter desiccation: once just before frost sets in and once when there is a mid-winter thaw in January or Early February
- Wait to prune plants with winter injury until new growth has emerged because often there are still live buds within damaged branches (fill in can take a few years on conifers).
- When you do prune after winter desiccation injury, cut back to about a quarter inch above a live bud and get rid of truly dead branches.

## Compost Quick Look

- Salts should be less than 3-4mmhos/cm, best is in range of 0.35-0.64mmhos/cm (mmhos/cm is same as dS/m)
- Carbon to nitrogen ratio best is 25:1, should not exceed 70:1
- Levels should not exceed the following (ppm is the same as mg/Kg):
  - Arsenic no more than 41 ppm
  - Cadmium no more than 35 ppm
  - Copper no more than 1500 ppm
  - Lead no more than 300 ppm
  - Mercury no more than 7.8 ppm
  - Nickel no more than 420 ppm
  - Selenium no more than 100 ppm
  - Zinc no more than 2800 ppm
- pH of the compost should be 6.8-7.3
- Particle size passes 3/8 screen

## How to Tell One Adult Insect from Another

**True Bugs:** Wings at rest lie flat over each other, X shaped marking due to half hard and half membranous wings, juice box straw mouth part.

**Beetles:** Two hard outer wings that swing outward from center line with two membranous wings beneath.



**Butterflies:** wings straight up at rest, hair like antennae, hairless body.

**Moths:** wings fold flat on back at rest, fuzzy body and antennae.

Spiders, mites and ticks are not insects. They have only two body parts, head and abdomen, 8 legs, and NO antennae.

## Know Your Larvae

**Beetle Grub:** six "buggy" type legs, or legless, brown head capsule.

**Caterpillar:** Brown head capsule, 6 buggy legs, PLUS sucker legs on abdomen which have little brown stitch marks inside.

**Sawfly:** Brown head capsule, 6 buggy legs, PLUS sucker legs on abdomen which have NO little brown stitch marks inside.

**Maggot:** May or may not have head capsule, no legs, may have two hooks at the back end or star shaped appendage.

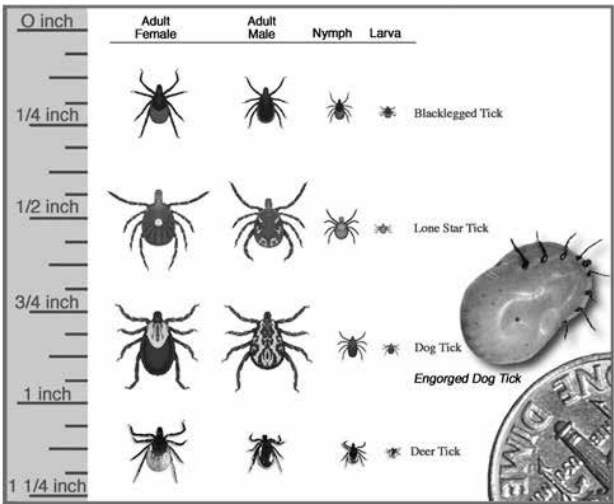
# Telling Ticks Apart

If it has antennae and three body parts (head chest belly) it is NOT a tick. Ticks have head and belly.

Look at the rim of the tick with a magnifier: if the rim is scalloped like a pie crust, it is not a deer tick.

- Deer ticks have black legs not brown
- A speck of glitter on the back is a lonestar tick
- a white shield is a dog tick
- solid black is a deer tick
- white streaks on the back a dog tick
- plain brown a lonestar tick
- Mahogany red tick with a black shield is a deer tick

We do not have chiggers on Long Island; the bites are from a mass of larval lone star ticks.



# How To Tell the Difference Between Different Certain Types of Evergreens

## True spruce (*Picea*)

- Spruce has round needles, fir has flat needles.
- Spruce needles when pulled off the branch leave a small "thingie" attached, fir do not.
- Spruce branches are more radially arranged than fir.
- Needles NOT green to the wood.
- Needles have brown spur or bristle.
- Needles do not have swollen base Needles are usually round as opposed to flat.
- Needles usually sharply pointed.
- Needles do not have white lines EXCEPT *P. omorika*.
- End bud usually NOT resinous.
- Cones pendulous and long.
- Cones do not disintegrate.
- Branches usually drooping, especially *P. omorika*.



## How do I tell what a hemlock is compared to other similar evergreens with NEEDLES?

- Hemlock has two white lines down the back of the of the needle.

## If I am looking at scale leaved evergreens, how do I tell the difference?

- False cypress (*Chamecyparis*) has white



banded lines on the back of the scales, arborvitae do not.

- Boxwoods have opposite leaves, *Ilex* have alternate leaves.

### How do I tell what a pine is?

- Pine needles come wrapped in a bundle by a papery, waxy sheath at the base of the bundle. Pines come with 5, 3, and 2 needles per sheath.
  - **Five needles:** eastern white, swiss stone, limber and Japanese white
  - **Two needles:** Austrian, mugo (swiss mountain), Scots, Japanese black, Japanese red
  - **Three needles:** pitch pine How do I tell the difference between spruce and fir?

### True fir (*Abies*)

- Needles green to the wood.
- Needles that have been shed leave a round scar.
- Needles have a swollen base.
- Needles are dark above and light beneath.
- Needles are flat and blunt. (EXCEPT *Abies cephalonica* Meyer's dwarf fir)
- End buds USUALLY resinous.
- Cones upright and stiff.
- Cones disintegrate.
- MOST with branches that do not droop.

## Is it root rot?

Is your plant growth slow compared to others of the same?

Yes  No

If you look at the terminal bud scars from recent years are they closer together than on others of the same kind of plant?

Yes  No

Do leaves yellow, wilt or fall prematurely?

Yes  No

Do margins of the leaves die in summer?

Yes  No

Are roots discolored and limp rather than crisp and white?

Yes  No

Does the plant have only a few small side branches, or have dead side branches and only main branches are alive?

Yes  No

Are the roots dead? You can test by trying to slip off the outer covering of the root from the inner core.

Yes  No

Is the canopy asymmetric or misshapen because major branches are dead?

Yes  No

During the winter has there been major cankering and dieback of small branches?

Yes  No

On mature trees can you see mushrooms sticking out of the trunk (shelf fungi) or from the base of the tree especially in late summer and early autumn?

Yes  No

When you remove a bit of bark just at base of tree is there a fungal sheath beneath or are there "shoestrings" ?

Yes  No

Leaves have black or brown tips plus yellowish color?

Yes  No

## How well did the plant grow?

You can tell how well your tree or shrub grew this year. Grab yourself a branch. The tip of the branch should be intact. At the end of this branch is a terminal bud, or the growing tip of the tree.

If you trace backwards with your fingers, you'll find the scar or bud scale scar from last year where this growing tip originated.

The vigor of your plant corresponds to the distance between scar and growing tip. A distance of less than 2 inches is considered poor, 2-6 inches is moderate growth, and more than 6 inches per year is considered vigorous growth.

You can also use this scale to assess what you are purchasing prior to purchase.

How are your pre-existing trees doing?

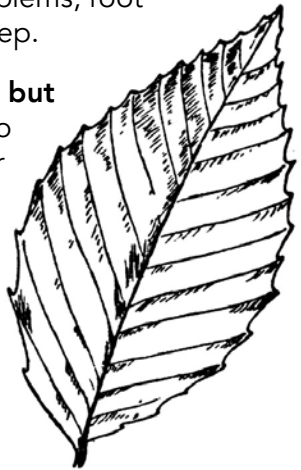
- New growth of 12-18 per year is good, 6-8 is minimally acceptable.
- Young trees should have at least 9-12 inches of terminal growth per year.
- Large, very mature trees usually average 6-9 inches of growth.
- If the plant is newly transplanted, you

expect to see growth reductions for 2-3 years, with the first couple of years being the worst.

During these initial periods of adjustment you would expect to see small leaf areas, extremely low annual growth, perhaps 0-1" but as long as the plant keeps its leaves it's likely that it will survive.

## Leaf Diagnosis

- **Green and normal shape but too small:** insufficient water, lack of nitrogen, zinc deficiency, nematode problems, root problems, planted too deep.
- **Green and normal shape but wilting:** not enough or too much water, root rot, poor drainage, excess fertilizer, root feeding insects, exposure to chemicals.
- **Normal shape, but yellow:** nitrogen deficiency, normal aging.
- **Normal shape and color but with a brown edge:** frost damage, salts build up in soil, herbicide damage.
- **Normal shape but brown in center:** sunburn or scald.
- **Normal shape but pale and NEW leaves have deep green veins:** iron deficiency.
- **Normal shape but pale and ALL leaves have deep green veins:** soil too wet, drainage bad, roots rotting.



- **Normal shape but with mottled color:** viral infection.
- **Normal shape but purplish:** phosphorous deficiency, frost or herbicide damage.
- **Normal shape but with a chewed edge:** grasshoppers, beetles, birds, snails, crickets, caterpillars.
- **Normal shape but is ragged, torn, or has straight brown lines across the surface:** high wind or animals crashing through.
- **Normal shape but with a silvery color:** leafhoppers.

## Planting/Mulch Depth

- Plant trees and shrubs at level with the place where the base of the plant **WIDENS** just before the largest roots begin (you may have to excavate the neck of the ball to find it).
- Clip off hair like roots that have formed above the widened portion.
- THEN *no more* than 3 inches of mulch.
- Big chunks of mulch are better than finely shredded mulch because they provide better air and water movement and do not support weeds.
- **DO NOT VOLCANO MULCH!!!!** Your trees and shrubs will eventually die.
- *Do not apply mulch that smells odd or like ammonia.* This means the mulch is sour and can burn your plants by its acid pH. Pull sour mulch off plants immediately and water thoroughly.

# Pruning Tips

- Prune Hydrangeas that flower on OLD wood in the summer.
- Prune Hydrangeas that flower on NEW wood in late winter before new foliage forms.
- Try not to prune climbing hydrangea except to control size.
- Prune out old canes and dead canes so light and air get to the base.
- Prune hedges so that the BOTTOMS are WIDER than the top or else the bottoms will get shaded out.
- No wound paint.
- No "topping" or "tipping" by cutting branches back part way---not good for plants.
- No flush cuts into plant beyond branch collar, not stub cuts where a large piece sticks out beyond branch collar.
- **Use Three-Cut method:** 1-Make an undercut about 12 inches from the trunk. 2-Make a top cut farther out on the limb. 3-Remove the stub with final cut, being careful not to cut flush against the trunk. Leave the collar intact.
- Remove no more than 25% of the crown in a single year, crown should be 60% of the plant.
- Trees/shrubs that flower on new growth produced in the spring can be pruned in winter. (crapemyrtle, linden, buddleia)



- Trees/shrubs that flower on the previous summers new growth should be pruned after flowering. (crabapple, cherry, forsythia)
- **Between branch vertical spacing:** 12" for small-stature trees; 18" for medium - large trees.

## Is it a Hazard Tree?

- Flush cuts of side branches on large, horizontal branches are one of the most dangerous situations since it can cause the main branch to fail and hit someone below.
- Fungus fruiting bodies on flush cuts coated with wound dressing on the type of branch mentioned above signal extreme hazard.
- Wounds extending into the ground (like lightning scars) are of particular concern and should be examined regularly.



- If two vertical cracks appear on opposite sides of the tree it can be a sign of root injury or breakage, usually associated with a circumferential internal separation of wood, very dangerous.
- If a tree cavity has accumulated enough moisture and organic matter to support a seedling, that tree may fail soon.
- Small or no new leaves or buds, small leaf size, unusual or darker than normal color.
- Reduced twig growth, evidence of crown dieback.
- Look for sprinklers hitting trees everyday, which leads to infection of the main stem or root collar:
  - Is the soil cracking or bulging around the base? If so, it could indicate the buttress roots are getting ready to heave.
  - Does the trunk have one side that does not widen at the base?
  - Are there loose dead branches hung up in the canopy?
  - Loose bark? (often ignored, but do not misinterpret if tree normally exfoliates its bark)
  - Clusters of mushrooms at the base? Uh-oh. On the list, pronto.
- Leaning or lopsided trees are more of a hazard than those growing vertically, but if a tree has ALWAYS grown off center, it is generally not an undue risk. A SUDDEN lean indicates breakage or weakening of support roots, should be cause for alarm and immediate action



## Azalea issues

- Black walnuts bug azaleas, so do not mix the two plants, or even use compost that may contain black walnut leaves or debris. If planted too near, expect to see wilt and slow death.
- Azaleas are also very sensitive to aluminum sulfate which may be used near hydrangeas. Aluminum will build up in soil and be released in acidic environments. Woe to the bed where hydrangeas and azaleas co-habitate and the acidifying fertilizer is applied to the azaleas along with aluminum sulfate to hydrangeas to keep the blue bluer or turf greener nearby. This scenario(s) will often mess up your flower buds.
- If you dead head too late in the season you may disturb flower buds.
- **Nitrogen deficiency:** Yellowy green color is like the universal choking sign for an azalea, but did you know that as nitrogen deficiency progresses, older leaves turn RED or develop reddish blotches before falling off. New foliage under these conditions will be smaller than normal and will be greenish yellow.
- Often, after a short planting life or 1-3 years, you'll see half of the plant die out, girdling roots, spots, petal blight, poor flowering, and increasingly smaller leaves from year to year (a sure sign of decline).
- Over cultivation kills azaleas because of their shallow root systems: Leave them ALONE!!! Cultivation, leaf blowing, and any fiddling with the azalea very shallow root system will quickly cause decline and death.

- Give them a nice, acidic mulch of pine bark chunks.
- Weed and feed products blown into azalea beds hurt azaleas. Rapid release fertilizers cause salts to build up around the azaleas shallow roots leading to a physiological "drought. Salts build up also increases the potential for root rot. Keep products away from azaleas and switch to a slow release fertilizer.
- De-icing salts also bother the roots creating a physiological drought and promoting root rot. Slow, deep watering in early spring can help to dilute this issue.
- Azaleas with bright yellow leaves with bright green veins could mean a nutrient deficiency or it could be an INDUCED nutrient deficiency due to improper pH. Azaleas are in the blueberry family and want acid soil conditions, which is just the opposite of what they get when planted along concrete walkways and foundations. These areas of concrete leach and thus push the pH up, leading to yellow leaves with green veins.
- A discolored rim around the edge of azalea leaves or marginal yellowing can be caused by excess salt, low moisture in sandy soil, or can be caused by overwatering. A quick probe of the soil will tell you which way the moisture is leaning. Black or gray edges all around the leaf usually mean drought. If the tip of the leaf dies back, it is usually root rot. Alternate flooding and dehydration can also lead to the above symptoms.
- **Phosphorous deficiency:** Foliage will be darker than normal and a dull green with a reddish undersurface especially along the midrib. Lower leaves may die on more

vigorous shoots, developing reddish purple blotches then turning an overall purplish brown. The dead ones cling for a few days and then fall off.

- **Potassium deficiency:** Look for yellowing between veins of young foliage with marginal leaf scorch and necrotic tip lesions on just mature leaves. As the deficiency worsens, leaves turn bronze and die back is common with leaves rolled UPWARDS from margins and lots of leaf fall.
- **Calcium deficiency:** Yellowing and stunting along with tip burn of just expanding foliage, TWISTED leaf tips, death of terminal and lateral buds.
- **Magnesium deficiency:** Weird yellowing starting at leaf tips and leading into a gradual fade of normal green from leaf---veins eventually lose color too. May also see reddish-purple blotches on UPPER leaf surfaces. Symptoms most common on upper leaves of plants with severe leaf drop from vigorous shoots.
- **Iron deficiency:** Yellow leaves with bright green veins that then turn cream colored and finally white. Boron deficiency: Necrotic areas through newly expanding leaves causes severe distortion with eventual death of terminal buds followed by death of lateral buds. Flowers are affected too with browning of interior on base of petals.
- **Copper deficiency:** You may see a light green edge on young leaves followed by a bit of browning of main shoot tips---tips of side shoots may eventually die.

## Is It (or its branch) Dead

- **Woody ornamentals:** scrape a tiny bit of bark off near the base of the plant or branch: if it is green it is alive
- **Turf:** If its wilted and matted chances are it dead. If crown white and turgid, alive.
- If not sure, bring a piece inside, treat like house plant in zip lock bag. It should green up if alive.

## Poison Ivy

- Shiny green or red pointed leaves, usually in groups of 3.
- Leaves may have serrated edges.
- Fuzzy vines versus smooth.
- Green-White, ribbed fruit.
- Wear plastic gloves, NOT leather or cotton.
- DO NOT WEED WACK OR BURN.



## How to decontaminate if you have touched poison ivy

- The earlier you wash the better, even in a running stream or under a hose.
- If more than 10 minutes has elapsed since exposure, you might not stop the breakout altogether but at least can prevent further spread.
- Stay outdoors for initial decontamination

- The first step is to use isopropyl rubbing alcohol, NOT soap.
- This takes off sap BUT also takes off skin protective oils so do NOT go back in the yard or garden because sap will penetrate your skin TWICE as fast.
- Get UNDER your fingernails!!!!
- After alcohol, wash skin with LOTS of water; temperature does not matter according to some sources but others say warm water opens pores and allows faster penetration of sap so stick with cool water.
- The last step is to take a shower with warm water and soap; soap is not used before this step because you'd just be moving the sap around.

## Leaf Diagnosis

**Normal shape but with a bronze color:**

spider mites

**Puckered:** mites, zinc deficiency, aphids, virus, leaf curl fungus: leaf will seldom DIE except with a mite infestation

**Normal shape but semicircles cut from leaf:**

leaf cutter bees

**Still has a stalk but all the surrounding leaf tissue is gone:** birds, rabbits, ants

**Whole leaf is gone:** rats, birds, rabbits, squirrels, ants

**Sudden, multiple leaf drop during the growing season:** frost, drought, fertilizer burn

## Pure, Live Seed

- Take the percent purity and percent germination from the seed label.
- Multiply them together as decimals for each, add them up and convert back to percent.
- That is how much of the pound will potentially germinate.

*Example:*

Midnight KBG	0.195	X	0.95	=	0.185
Serene KBG	0.295	X	0.95	=	0.280
Manhattan PRG	0.2925	X	0.95	=	0.278
Creeping red fescue	0.195	X	0.8	=	0.156
					<hr/>
					0.899

- This means 89.9 % pure live seed in this mix. What is your recommended overseeding rate? In the example above it is 5 pounds. How much of that 5 pounds will germinate?

$5 \times 0.899 = 4.495$  pounds will actually germinate.

$5 - 4.495 = 0.5$ , so need to compensate for that half pound of junk.

- Your actual seeding rate is 5.5 pounds to account for the half pound that will not germinate, more or less.

## Grading Light & Seeding Rates

- Need at least 50% sunlight = minimum 4 hours daily for turf to survive, 6 hours to thrive.
  - Grade A = 8 or more hours
  - Grade B = 6 - 8 hours
  - Grade C = 4 - 6 hours
  - Grade D = 2 - 4 hours
  - Grade F = less than 2
- **Kentucky bluegrass:** 2 lbs/1000 sq. ft pure live seed
- ***Poa trivialis*:** 1-2lbs/1000 sq. ft pure live seed
- **Fine Fescues:** 5 lbs/1000 sq. ft pure live seed
- **Tall fescue:** 8-12 lbs/1000 sq. ft pure live seed
- **Rye:** 7-10lbs/1000 sq. ft pure live seed

## Grass Seeding Tips

- Freeze for 48 hours prior to seeding to crack seed coat and speed germination by half.
- Do follow up fertilization with 0.75 lbs N/1000 sq ft 4-6 weeks after seeding at 1.5 to 2 inches of growth for maximum establishment and to prevent damping off.
- Use 50% more seed when dormant seeding to compensate for rot and bird predation.
- Never use rye in shade and no more than 10% in a mix unless you want all rye in five years.
- Core aerate sod 4-6 weeks after laying to allowing rooting and prevent rotting.

- Never bury seed more than 1/8 inch: it will not come up well, so let bed settle before seeding.
- Sew seed in two lots at right angles to each other for good over seeding pattern.
- The best seeding time is from the third week of August through the second week in October. Do not renovate in spring if you can help it due to weed pressure.

## Calculating how much fertilizer to apply

**Solid fertilizer:** Divide 100 by the N number from the N-P-K ratio. The answer is the number of pounds of product to provide one pound of actual Nitrogen per 1000 square feet of turf

**Liquid fertilizer:** Divide 100 by the N number from the NPK ratio to get the number of pounds of product to provide one pound of actual Nitrogen per 1000 square feet of turf. Look at the label. Chances are it will tell you how many pounds are in a gallon of the liquid. You know how many pounds you want... you just have to back calculate to tell you how much of the liquid in the gallon you need to give you the pounds you want.

- For example, if the label says the N-P-K analysis is 14-0-8 and there are 10.75 pounds of liquid in a gallon, we know that we need 100 divided by 14 to give us 7.14 pounds of product for 1 pound of actual nitrogen.



Then,

$$\frac{10.75 \text{ pounds}}{1 \text{ gallon}} = \frac{7.14 \text{ pounds (you want)}}{? \text{ Gallons}}$$

Divide 7.14 by 10.75 = 0.66 gallons

0.66 gallons gives you the required 7.14 pounds of product to give you one pound of actual nitrogen/1000 square feet.

- How do I accurately measure 0.66 gallons?

Look up how many ounces are in one gallon or check the ounces on a half gallon or gallon jug.

$$\frac{128 \text{ ounces}}{1 \text{ gallon}} = \frac{? \text{ Ounces}}{0.67 \text{ gallon}}$$

Multiply 128 by 0.67 = 85.76 ounces

## How Quickly Does the Fertilizer Release Nitrogen?

- To determine whether a product is a fast release, moderate release or slow release product divide the % slow release by the N number. Usually this is designated as the W.I.N. number or water INSOLUBLE nitrogen
- For example, a product, N-P-K analysis 18-0-3, contains 4.5% slow release nitrogen, or Water insoluble nitrogen.
- So: 4.5 divided by 18 = 0.25
- If your answer for any product is above 0.29, slow release, 0.29-0.15 moderate, 0.15 or less, fast release.

## Lime Choice

- CALCITIC Limestone has less than 5% magnesium
- DOLOMITIC Limestone has more than 5% magnesium (pure magnesium carbonate is known as dolomite)
  - Pulverized - fine, dusty, fairly fast acting
  - Granular - slow acting, inexpensive
  - Pelletized - fast acting, easy to spread, more expensive

LBS LIME/1000 SQ.FT. (To raise pH to 6.5)

INCORPORATE INTO TOP 6 OF SOIL

pH	SAND	LOAM	CLAY
4.0	125	215	300
4.5	100	165	235
5.0	75	125	175
5.5	50	85	110
6.0	25	50	60

## Lime: Effective Neutralizing Value

Look on the lime label for the ENV, or the effective neutralizing value.

Now divide 100 by this number.

The result is the amount of lime needed to provide one unit of 100% effective neutralizing value.

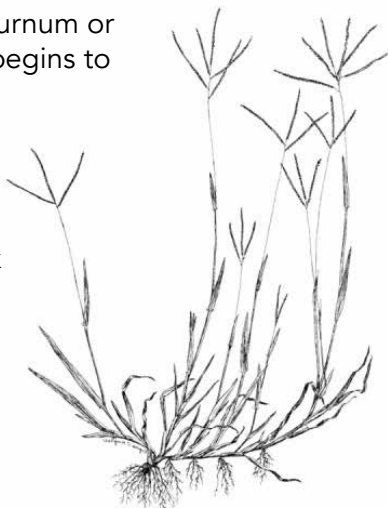
*Examples:*

- Lime #1 has an ENV of 70.  $100 \div 70 = 1.42$ . So for every pound of lime they recommend you put down, you actually have to put down 1.42 pounds.

- Lime #2 has an ENV of 89.7.  $100 \div 89.7 = 1.11$ . Even though Lime #1 is cheaper by the pound, it will cost more to treat your property because you ultimately have to buy more of it.

## Timing for Crabgrass Control

- When soil temperatures reach 55°F for three consecutive days at one inch soil depth.
- OR apply Pre-M for smooth crab when soil temps remain above 50 at FOUR INCH DEPTH for 24 hours.
- OR apply PRE-M between the bloom of red maple, the star magnolia and April 16... this encompasses the average initial emergence of smooth crabgrass.
- OR apply pre-M at the first bloom of the Callery pear.
- By the time lilac begins to bloom, it is too late for Pre-M and too early for POST-M.
- BEST POST-M, when 80% emerged, May 15-June 4, or bloom of arrow wood viburnum or multiflora rose begins to bloom.
- BEST post emergence treatments are AFTER peak emergence, time your post-M for after early June.



## How deeply should you irrigate?

- Most plant roots are in the top 18 inches of soil but to be on the safe side, water to a depth of 24 inches.
- One inch of water penetrates 12 inches so you can use a depth of 2 inches and thus calculate the volume you need for water to penetrate to a depth of 24 inches.
- Area X Depth = Volume
- 1 gallon = 231 cubic inches
- 1 sq. foot = 144 sq inches
- EXAMPLE: 400 square feet X 24 inches depth
- 400 square feet must be converted to square inches, 1 square foot = 144 square inches, so in this example
- $400 \times 144 = 57,600$  square inches
- $57,600$  square inches X 24 inches depth =  $2,400$  cubic inches
- $2,400$  cubic inches  $\div$  231 cubic inches in a gal. = 10.4 gallons

## Volume of Irrigation

- How do you know what depth of irrigation to apply to a certain area?
- How do you know what depth of top dressing to apply to a certain area?

The master formula:

$$\text{Area X Depth} = \text{Volume}$$

- 1 sq.foot has 144 sq inches
- 1 gallon has 231 cu inches

*EXAMPLE:*

350 sq. ft to receive 1.5 inches of irrigation:

350 sq ft X 144 sq.in

Equals 50,400 sq. inches X 1.5 inches

Equals 33,600 cubic inches of irrigation

33,600 divided by 231 cubic inches = 145.45 gallons water

## To wet soil 6-9 inches, run this long

If in 15 min. Your system applied	Sandy soil	Intermediate	Clay soil
1/8 inch	30 minutes	60 minutes	120 minutes
1/4 inch	15 minutes	30 minutes	60 minutes
3/8 inch	10 minutes	20 minutes	40 minutes
1/2 inch	7-8 minutes	15 minutes	30 minutes

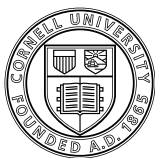
## Irrigation of new plants

- Proactive irrigation results in over 3 times the weight of new roots growing into backfill soil compared to reactively irrigated trees (after wilt).
- Target irrigation to ROOTBALLS for first season after planting.
- For a 3 caliper tree, this is about 10 gallons every 3 days: this gives you a saturated rootball PLUS moist soil for the roots to spread into.
- For a smaller specimen of container grown woody a great method is to plunge the pot up to the rim in slightly larger vessel filled with water and let it soak there until no air bubbles come to the surface.
- Many of the container mixes are extremely light and fluffy, making the interface between the mix and the existing soil (if it has not been amended with organic matter) difficult for roots to adjust to.
- Shake it off and replace with soil that is on site.

## Evaluate Drainage

- Sugar maples, red oaks, hickories indicate good drainage.
- Sycamores, tulip trees, moist soils.
- Tupelo, willows, swamp white oak poor drainage.
- You can tell whether you need surface drainage or subsurface drainage simply by walking into a puddle.

- if it is firm underfoot in puddle: the problem is surface drainage.
- if you sink to your ankle it a sub surface issue.
- Look at soil color: red or brown, drainage usually fine, yellow, may have issues, blue or gray continuously saturated soils with lack of oxygen, mottled blue/gray means seasonal water issues.



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