Spring 2003

ALASKA PIONEER FRUIT GROWERS NEWSLETTER

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President: **Dan Elliot**, HC31 Box 5196, Wasilla, AK 99654 ph 376-5196
Vice President: **Kevin Irvin**, 2000 Douglas Drive, Wasilla, AK 99654 ph 357-6510
Treasurer: **Alice Brewer**, 1201 W. 45th Ave., Anchorage, AK 99503 ph 563-6734
Board Members at Large: **Dwight Bradley**, 22008 Voyles Blvd, Chugiak, AK 99567 ph 688-1268
Margaret McConnell-Paul 8140 Woodgreen Cir. Anchorage, AK 99518 522-0506
Editor: **Tami Schlies**, P.O. Box 672255, Chugiak, AK 99567 ph 688-5711 Email schlies@gci.net
Membership information and dues payments contact Alice Brewer or Tami Schlies

Association News

Another spring is here, and the itch to be in the garden so easily outweighs the need to get this newsletter done, I apologize for the delay. Our annual apple grafting workshop at Dimond Greenhouses was a huge success, with a great turnout and new member introduction. Welcome Bill Spencer! A special thank you to Lawrence Clark for once again donating a sum of money to the Association to aid in the newsletter publication.

Let me know how those grafts come out, everyone! And as your orchards come to life, please consider jotting down a few notes for me to put into an orchard report in the summer newsletter. What survived? What didn't? How did the strange winter affect the plants, pests, weeds, or anything else in your yard? I can organize notes into a worthwhile article, so send them in. We all want to know!

Our First orchard tour of the year will be May 15th at 7 PM in Palmer. We will be touring River Bean's orchard. From Anchorage, take the Glenn to Palmer and turn right at the 2nd light. Drive about 3 miles toward Butte and take a left on Smith Rd. (within 1 mile of Clark-Wolverine Rd.) After ½ mile turn right onto the paved road and follow the signs to Mountain View R.V. Park. River's place is on the left right after the R.V. Park.

Our June tours will be the first weekend in June. We are excited to have guest speaker Bernie Nickolai from Edmonton tour with us Friday morning, June 6th or maybe Saturday the 7th (dates and places pending.) He will also be speaking the evening of June 6th at 7 PM in the ACE building (2221 East Northern Lights Blvd.), room 130. There will be a fee of $5 for this lecture if you wish to attend.

Also, heads up for the tours in July and August. July 10th we are going to Kevin Irvin's and August 14th we will go out to Doug Tryck's nursery. Watch your mail for reminder cards detailing the exact times and locations of the orchard tours.

Treasurer's report
March 13, 2003
By Alice Brewer

Our account balance on 2/18/03 was $5869.47. The rootstock order from Lawyer's Nursery cost $383.56, leaving us with $5485.91. Two members renewed their memberships at $16.00 each, and then we issued a check for $401.51 for a ticket for Bernie Nikolai to come speak in May. Printing and postage for the fall and winter newsletters were $190.88, leaving us with an account balance of $4925.52.

Book Reviews

By Tami Schlies

Organic Gardening in Cold Climates by Sandra Perrin

This sounded like a promising book when I picked it up, but I was a little disappointed at the simplicity of the subject matter. She covered the basics, but there was nothing new for me in it. I had hoped for an explanation of how best to make the organic methods work in our cold, short season, since we have such a limited time period for microorganisms to render organic material useable by plants.

Only 9 pages in this 142 page book are specifically about organic fertilizers or pest controls. Instead, the author took the reader step by step through the process of gardening in general, from starting seeds to preparing your soil to hardening off. The entire second half of the book is a listing of vegetables with descriptions and hints on how to serve them. You get a much better deal for your money buying the A.C.E. publication **16 Easy Steps to Gardening** for $4.

Sunset's **Western Garden Book.**

I was a little leary at first that such a book could truly address our unique Alaskan climate, but I am thoroughly pleased with the results. They have devised a new climate zone map, Alaska included, in detailed enough scale to actually be of use. They even included a microclimate map of the Anchorage and Mat-Su valley area!

The *Guide to Plant Selection* was an interesting feature if you are unsure of what you might need in your yard. Perennials with showy flowers, colored foliage plants, garden trees, plants for rock gardens, and even plants for windy areas are a few of the categories offered. Full color photos on these pages do not cover every plant listed, but do offer a large variety for viewing.

The *Plant Encyclopedia* is amazing, with over 8,000 entries detailing each species and various cultivars, which zones they are known to grow in, and their needs. They are indexed at the back of the book by both botanical and common name.

Finally, the *Practical Guide to Gardening* at the end of the book presents a whole list of gardening topics in alphabetical order, from biennials to grafting and pruning to weeds. Once again, full color photographs and well written text make this a useful resource to any gardener, beginner or advanced. Each section of the book is easily accessed by color coding along the page edges.

American Horticultural Society **Pests and Diseases.**

While this book is not the type most people curl up to read on a cold winter's night, I found it to be another worthwhile resource for any garden. You can research any problem by either plant or by symptom. Each section is color coded along the page edge for easy use. The pages on *Individual Plant Problems* are separated into sections like "Garden Trees" or "Bulbs", and then alphabetically listed by common name and the name of the problem.

The *Gallery of Symptoms* allows you to look at general problems with a particular part of the plant, such as leaves, stems, or fruits. Full color photographs accompany each symptom or pest, as well as a listing of types of plants affected and the season of affect. A short description follows with the page number for a full description and the recommended treatment.

Here is an exerpt from the book on a problem I believe we have seen in several orchards around Anchorage, including during the pruning at Dwight Bradley's orchard. The photograph in the book looks exactly as the orange fungus on those trees:

"**Coral Spot**
SYMPTOMS Bright, coral to orange raised pustules appear on dead or dying stems ... Many different plants may be affected, but currants (*Ribes*), Elaeagnus, magnolias, and maples (*Acer*) are very susceptible. Dieback occurs, and if the infection spreads down into the crown, the whole plant may be killed.
CAUSE The fungus *Nectria cinnabarina*. Spores are produced all year, and water, either as rain or as irrigation splash, is the main method of dispersal. The fungus enters the plant through a wound or colonizes a dead snag left by physical injury or poor pruning.
CONTROL Prune out all dead or dying stems promptly, cutting well back into sound, healthy wood. Discard wood bearing the pustules. Dispose of the garden debris that may be harboring the disease."

The Vegetable Gardener's Bible by Edward C. Smith

This was another basic gardening book I read this year. The author gardens in Vermont, apparently a cold and uninviting climate for gardening, though I have never been there myself. He espouses what he terms W.O.R.D.: Wide rows, Organic methods, Raised beds, and Deep soil. I approve of all of these theories, though I do wonder about the need to double dig here in Alaska, when most plant roots don't go too deep into the cold soils anyway

Although the author does not necessarily present a lot of new or innovative ideas to experienced gardeners, his writing is very complete and his suggestions more practical than many other basic gardening books I have read. His organic methods were insightful, including compost methods and companion planting. Vast numbers of pictures of his own 1500 square foot garden help the reader more fully understand the text – even the photo captions are informative all on their own. The listing of vegetables at the end of the book were pretty basic, but even they presnted some useful hints on growing.

The author's sense of humor shines through in the writing, making this a fun book. I would recommend this book to any gardener looking for a good read.

Did You Know?

Dr. Dinkel sometimes gets 2 grafted trees per single rootstock using an interesting method he calls root grafting. Those long taproots we often cut off to fit the tree into a pot can be used as rootstock by grafting directly onto it in some cases. The best success is with a 12 inch or longer root cutting with at least some developed root hairs. Whip and tongue graft as normal and plant it at the graft level or slightly below. Voila!

Apple production @ O'Brien Orchards
49152 Orchard circle Kenai .AK 99611
907/776-8726
E-Mail obrienorchards @gci.net

2000	2001	2002
Breakey .25#	Breakey 10#	Breakey 25#
Centennial 45#	Centennial 25#	Centennial Crab 184 #
		Bud 9 – 1#
CGE 3#	CGE 5#	CGE 3#
		Carroll 30#
Chestnut crab 2#	Chestnut crab 10#	Chestnut Crab 43#
Dawn .25#	Dawn 10#	
	Ginger gold .5#	
Goodland 6#	Goodland 20 #7	Goodland 16 #
		Enigma 4#
Heyer 12 10#	Heyer 12 7#	Heyer 12 –5#
Heyer 20 .5#	Heyer 20 1#	Heyer 20 – 5#
		Idamac .5 #
	July Red 5#	July Red 1#
Mantet 1.5#		
Norcue 2#	Norcue 20#	Norcue 4 #
Norda .2#	Norda 5#	Norda 20#
	Norhey .5#	
		Norjuice 1 #
Norland 225#	Norland 225#	Norland 177#
Norson 5.#	Norson 10#	Norson 3#
	Norquay Delight 1#	
Novosibirski Sweet.25#	Novosibirski Sweet .25#	
Oberle .25#		Oberle Crab 2 #
Oriole .2#		
Parkland 275 #	Parkland 200#	Parkland 125#
Patterson .25#	Patterson .25#	Patterson 1 #
	Pristine .5#	
Red Duchess 2#	Red Duchess 2 #	Red Dutchess 2#
		Red Sparkle 1 #
Rescue 25#	Rescue 10#	Rescue 53 #
Rothern 18 .5#	Ropthern18 3#	Rosthern 18 –1 #
		Rubinette .5 #
Sept.Ruby .15#	Sept.Ruby .15#	September Ruby 5 #
State fair 12#	State fair 20#	State Fair 20 #
Summer Red 1#	Summer Red 2#	
Summer Scarlet .2#	Summer Scarlet .2#	
Trailmen 20#	Trailmen 20#	Trailman 68 #
Westland 25#	Westland 50#	Westland 111 #
Vista Bella 2#	Vista Bella 15#	Vista Bella 5 #
	Yellow Jay 3#	Yellow Jay 5 #
Yellow Trans. .1#	Yellow Trans 10#	
		Zestar .5 #
Total 668#	Total 737#	Total 922.5 #

Member to Member

- **For sale:** Topsoil and aged horse compost (3 years old). $20.00 per pick-up load - you haul. Can arrange loading for large loads. Will arrange trade for grafting and pruning help on 2 trees. Call Lenore in Peter's Creek at 688-5888

- For sale – first come, first serve. Potted and ready to go. Prices for APFG members only on these fruits: Call Tami at 688-5711 or 529-6499

Scarlet Surprise apple on M-26 rootstock - 3/8" caliper - $9.00

Shipova mountain ash tree - 3/8" caliper - $9.50

Red Jade currants - 6-12" - $3.50

Jahn's Prairie gooseberries - 1-2' - $4.00

September Sun kiwi vine, female – 1-2' - $8.50

Pasha kiwi, male – 2-4' - $8.50

Victory flowering quince – 1-2' - $7.50

Does Artificial Lighting Affect Trees?

By William R. Chaney

Dept. of Forestry and Natural Resources, Purdue University

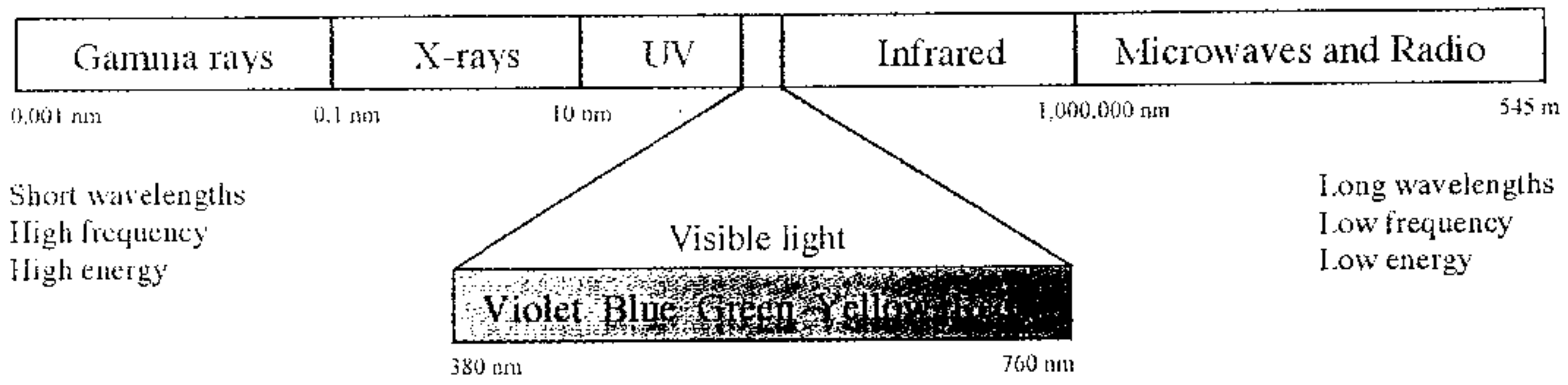
The simple answer is yes, excessive night lighting is now recognized as a form of pollution with the potential for causing damage to some trees. However, effects of supplemental lighting on trees are complex and understanding tree response depends on the type of lamps used and the spectrum of radiation they emit, the intensity of that radiation, and the role of light in certain biological processes.

Light Pollution

Prior to widespread use of outdoor electric lighting, the night sky was a stunning view with several thousand stars visible on a clear moonless night. But, with the increase in lighting to provide safety, security, advertisement, and esthetics, light pollution has grown to be a vexing problem. Today our earth is wrapped in a luminous fog called skyglow caused by artificial lighting reflecting off airborne water droplets and dust particles that obscure much of the heavens from view. As a consequence, twenty percent of us can no longer see the Milky Way. Much of the artificial light provided is so bright and inefficiently directed that its use has negative effects.

One of the harmful effects of excessive night lighting is the tremendous waste of energy and the environmental damage associated with producing electricity from mining, drilling, refining, combustion, and waste disposal. For example, it is estimated that 30% of the electricity generated for outdoor illumination is simply squandered by being misdirected into the sky. The International Dark-Sky Association estimates this wasted electricity costs $1.5

Electromagnetic Spectrum and Wavelengths



billion annually and results in 12 million tons of carbon dioxide in its generation. Many roadways and high traffic areas are so intensely lit that visibility is actually reduced due to glare and poorly shielded fixtures. Another negative impact is that the annual cycles of growth and reproduction in trees controlled by day length can potentially be altered by supplemental night lighting.

The Electromagnetic Spectrum

To understand the potential effects of night lighting on trees, it is important to be aware of the nature of the wide spectrum of radiant energy to which trees are exposed. The electromagnetic spectrum refers to all the radiant energy that travels in wave form varying in wavelength from a fraction of a nanometer (nm) to kilometers. For convenience, several segments of the electromagnetic spectrum are grouped together. All segments of this spectrum have important roles in the functioning of our biosphere. For a consideration of the effects of night lighting, it is the visible and infrared segments that are important. Visible light is 380 to 760 nm along the spectrum. This narrow band of radiation is very important because it is the part our eyes detect making vision possible and it is also essential for photosynthesis and processes that control growth and development of plants. Collectively the visible wavelengths produce white light, but it can be separated into a spectrum of colors. Infrared (760 - 1,000,000 nm) radiation we detect as heat. These are the wavelengths absorbed by increasing levels of so called greenhouse gases in the earth's atmosphere causing air temperature to increase and responsible for global warming. Although not visible to our eyes, the infrared wavelengths are as biologically important as the visible part of the electromagnetic spectrum.

Trees and Electromagnetic Radiation

Trees are dependent for normal growth and development on three aspects of electromagnetic radiation; quality (wavelength or color), intensity (brightness), and duration during a 24 hour period (photoperiod). It doesn't matter to a tree whether the radiation comes from the sun or artificial sources as long as the required wavelength, intensity, and duration are provided. Two important photobiological processes in trees and the wavelengths required are: 1) **Photosynthesis** requiring visible blue (400-450 nm) and red (625-700 nm) and (2) **Photoperiodism** requiring visible red (625-760 nm) and infrared (760-850 nm). The role of light in **photosynthesis** and the conversion of this radiant energy to a chemical form in sugars that trees can use is well known. The role of day length or **photoperiod** in control of vegetative growth and reproductive activities may be less appreciated.

Relatively high light intensity of 1000 microeinsteins per square meter per second (E/m^2/sec) is adequate for photosynthesis in most trees (200 E/m^2/sec for shade-adapted trees), but photoperiod responses may be induced with as little as 0.06 to 3 E/m^2/sec, only a fraction of that needed for photosynthesis. As a point of reference, indoor lighting sufficient for reading is about 4.6 and full moon light is about 0.004 E/m^2/sec. A 100 watt incandescent bulb provides 5 E/m^2/sec at 5 feet away and a 150 watt fluorescent cool white bulb provides 17 E/m^2/sec at the same distance.

It has been known since the 1940s that it is the duration of uninterrupted darkness during

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a 24 hour cycle that governs developmental processes in trees such as dormancy, shoot growth, and flowering. A photo-reversible pigment called phytochome is able to perceive the length of the day and night period depending on whether it absorbs red (625-760 nm) or infrared (760-850 nm) wavelengths of radiation. Even a momentary flash of light during the dark period is sufficient to create the physiological condition induced by a short night or, conversely, a long day.

Trees as well as other plants are classified as short-day, long-day, or day-neutral according to their response to day length. Short-day trees flower and enter dormancy when day length shortens in late summer. Long-day trees flower in early summer and continue vegetative growth until days shorten in the fall. Day-neutral trees are not affected by day length at all. Photoperiod can also influence leaf shape, surface hairiness (pubescence), and drop in the fall; pigment formation; and root development as well as onset and breaking of bud dormancy. Some types of night lighting can alter the natural photoperiod and, consequently, upset these developmental processes.

Effect of Night Lighting on Trees

It should be clear from the above discussion that most night lighting does not have the intensity to affect photosynthesis, but it might affect trees that are sensitive to day length. Artificial lighting, especially from a source that emits in the red to infrared range of the spectrum, extends the day length and can change flowering patterns and, most importantly, promote continued growth, preventing trees from developing dormancy that allows them to survive the rigors of winter weather. Young trees, because of greater vigor and a tendency to grow longer naturally, will be more subject than older mature trees to cold injury as a result of growth prolonged by artificial illumination.

Continuous lighting, which unfortunately is the most common, is potentially even more damaging than lighting that is turned off late in the evening. The foliage of trees grown in continuous lighting may be larger in size and

High	Intermediate	Low
Acer ginnala (Amur maple)	*Acer nigrum* (Black maple)	*Fagus sylvatica* (European beech)
Acer negundo (Boxelder)	*Acer palmatum* (Japanese maple)	*Fraxinus americana* (White ash)
Acer platanoides (Norway maple)	*Acer rubrum* (red maple)	*Fraxinus nigra* (Black ash)
Betula alleghaniensis (Yellow birch)	*Acer saccharum* (Sugar maple)	*Fraxinus pennsylvanica* (Green ash)
Betula lenta (Sweet birch)	*Cercis canadensis* (Redbud)	*Fraxinus quadrangulata* (Blue ash)
Betula nigra (River birch)	*Cornus sanguinea* (Bloodtwig dogwood)	*Ginkgo biloba* (Ginkgo)
Betula papyrifera (Paper birch)	*Gleditsia triacanthos* (Honeylocust)	*Ilex opaca* (American holly)
Betula pendula (European white birch)	*Ostrya virginiana* (Ironwood)	*Liquidamber styraciflua* (Sweetgum)
Betula populifolia (Gray birch)	*Phellodendron amurense* (Corktree)	*Magnolia grandiflora* (Southern magnolia)
Carpinus caroliniana (Hornbeam)	*Quercus alba* (White oak)	*Malus sargenti* (Sargent's crabapple)
Catalpa bignonioides (Southern catalpa)	*Quercus rubra* (Red oak)	*Picea engelmanni* (Engelmann spruce)
Catalpa speciosa (Northern catalpa)	*Quercus montana* (Rock chestnut oak)	*Picea glauca* (White spruce)
Cornus florida (Flowering dogwood)	*Quercus stellata* (Post oak)	*Picea glauca densata* (Black Hills spruce)
Cornus sericea (Redosier dogwood)	*Sophora japonica* (Japanese pagoda tree)	*Picea mariana* (Black spruce)
Fagus grandifolia (American beech)	*Tilia cordata* (Littleleaf linden)	*Picea pungens* (Colorado blue spruce)
Liriodendron tulipifera (Tuliptree)		*Pinus banksiana* (Jack pine)
Platanus hybrida (London planetree)		*Pinus flexilis* (Limber pine)
Platanus occidentalis (Sycamore)		*Pinus nigra* (Austrian pine)
Populus deltoids (Cottonwood)		*Pinus ponderosa* (Ponderosa pine)
Populus tremuloides (Quaking aspen)		*Pinus resinosa* (Red pine)
Robinia pseudoacacia (Black locust)		*Pinus rigida* (Pitch pine)
Tsuga canadensis (Hemlock)		*Pinus strobus* (White pine)
Ulmus americana (American elm)		*Pyrus calleryana* (Bradford pear)
Ulmus pumila (Siberian elm)		*Quercus palustris* (Pin oak)
Zelkova serrata (Zelkova)		*Quercus phellos* (Willow oak)

Compiled from Cathey and Campbell (1975) and Hightshoe (1988) more susceptible to air pollution and water stress during the growing season because the stomatal pores in leaves remain open for longer periods. There is a good deal of variation in the susceptibility of woody plants to artificial lighting (Table 1). Highly sensitive trees should be avoided in areas where high-intensity lighting rich in red and infrared wavelengths is used.

Spectra Produced by Different Light Sources and Their Effects on Trees

Different light sources have different emission spectra. That's to say that one type of lamp gives off more light of certain wavelengths (color) than another type of lamp. For example, fluorescent light is high in blue and low in red wavelengths whereas light from incandescent bulbs is lacking in the blue part of the visible spectrum, but high in red and infrared. Mercury vapor lamps emit principally violet to blue wavelengths and metal halide emit in the green to orange range. High pressure sodium (HPS) lamps emit high intensities rich in the red and infrared wavelengths (Table 2).

Table 2: Wavelength emitted by different types of light sources and their potential effects on photobiological processes in trees.

Light source	Wavelengths emitted	Potential effect on trees
Fluorescent	High blue, low red	Low
Incandescent	High red and infrared	High
Mercury vapor	Violet to blue	Low
Metal halide	Green to orange	Low
High pressure sodium	High in red to infrared	High

In the early days of street lighting the lamps used most commonly were either low-intensity incandescent filaments or higher intensity fluorescent, mercury vapor, or metal halide lamps. These light sources, although attractive to insects, had little effect on plants because they emitted predominately the shorter wavelengths of the visible portion of the electromagnetic spectrum, except for incandescent filaments which emit a relatively balanced spectrum of all wavelengths but at an intensity too low to effect most trees. In the mid-1960s, high pressure sodium (HPS) lamps were developed which emit considerable high-intensity light in the red and infrared regions. Increased injury to woody plants has been reported since the widespread introduction of this type of artificial lighting.

What to Do

When artificial lighting is considered essential, mercury vapor, metal halide, or fluorescent lamps should be used in this order of preference. High pressure sodium lamps should be avoided and even low intensity incandescent is best excluded due to its high output of infrared and potential impact on some tree species. Fixtures shielded so that all of the light is directed toward the ground onto pedestrians and vehicular traffic and away from plants should be employed to reduce light pollution and harm to trees (Fig. 1). In all cases up-lighting and shining light over great horizontal distances should be avoided (Fig. 2). Lights should be turned off or dimmed during off-peak hours to avoid continuous lighting of trees, which has the greatest potential for upsetting normal growth patterns. When planting trees where supplemental night lighting already exists, select those with low sensitivity to light (Table 1).

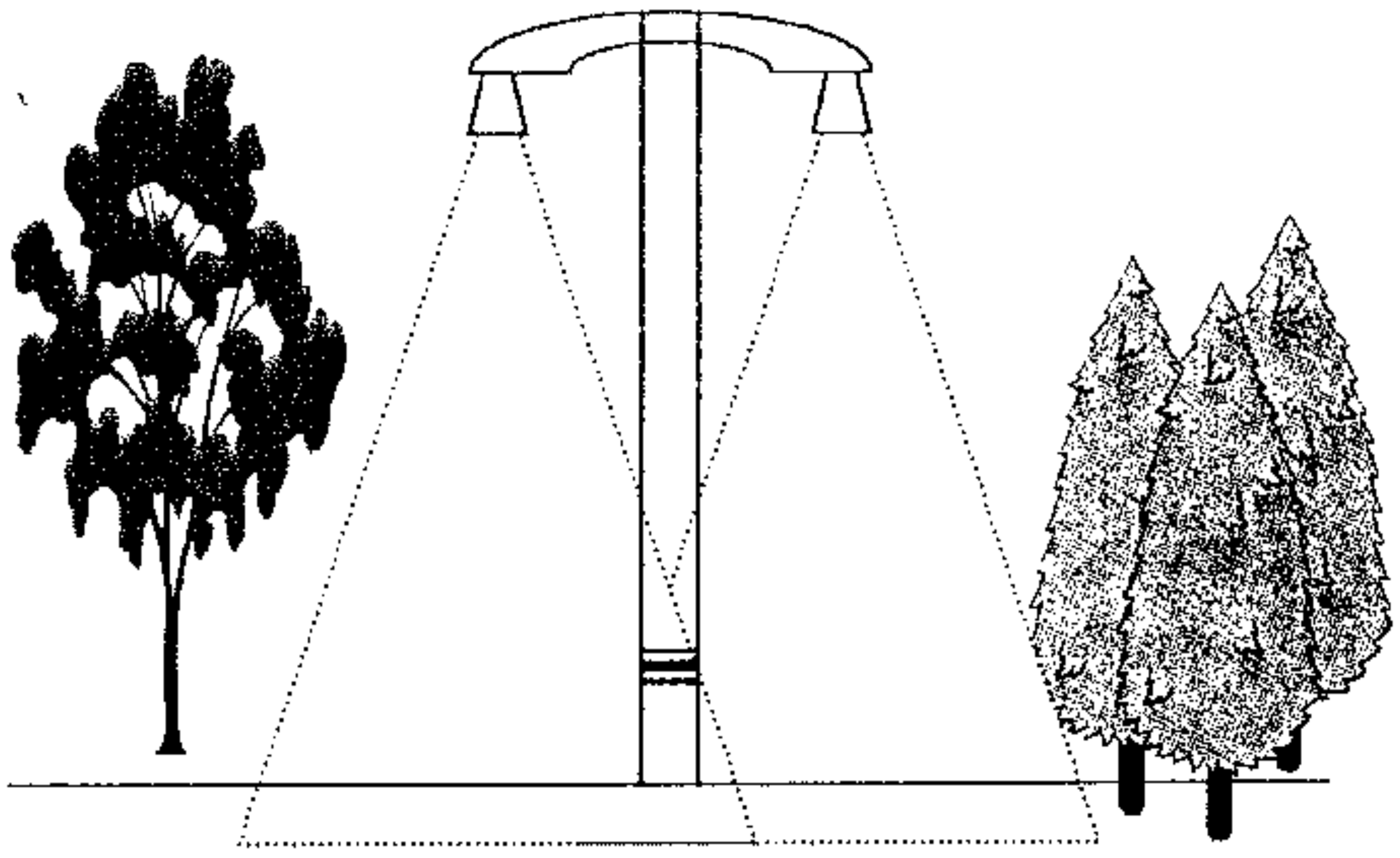

Figure 1: Best lighting design that with proper choice of lamp type will provide night light and minimize light pollution and effects on trees.

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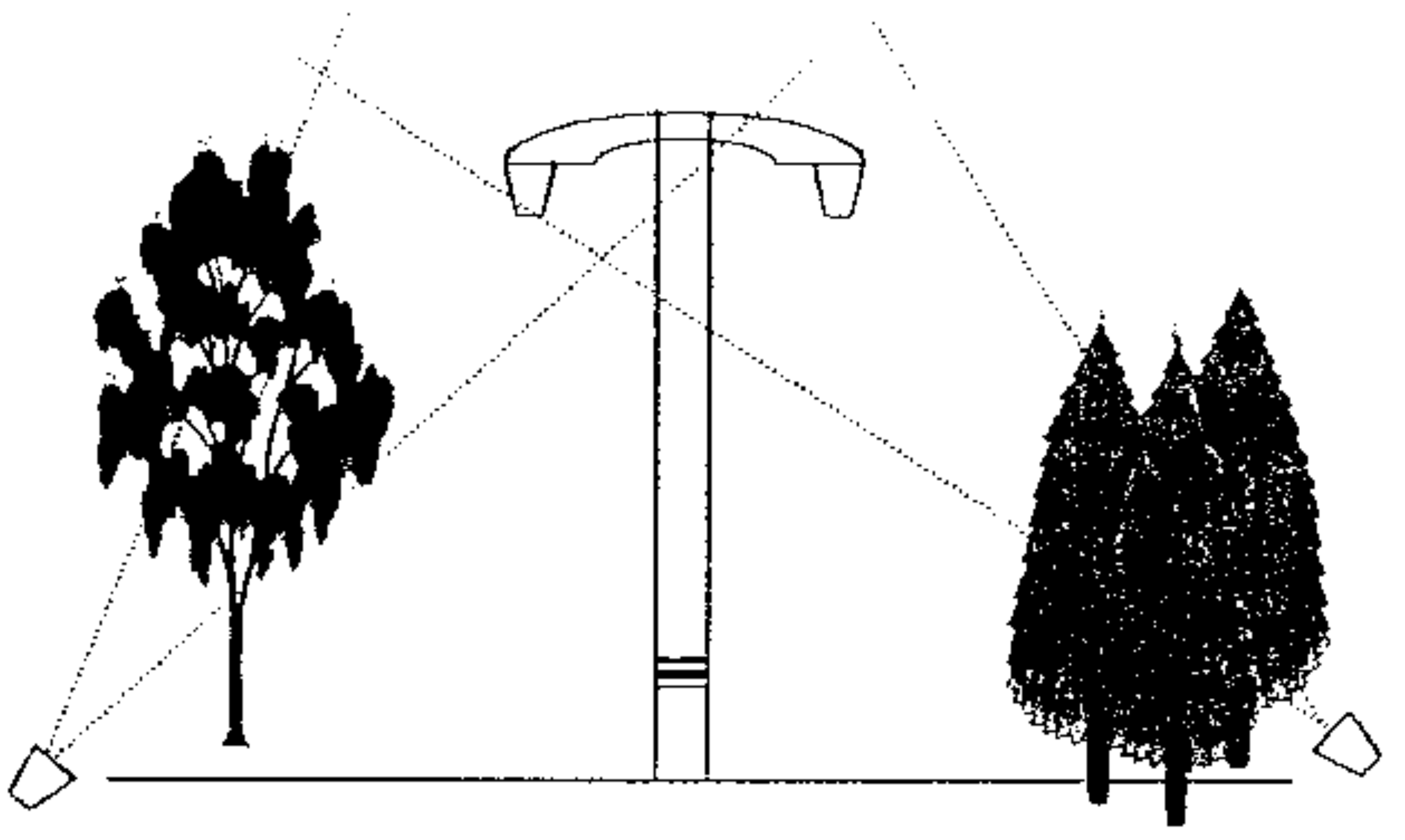


Figure 2: Poor lighting design using unshielded fixture and upward directed spots. Even with proper selection of lamp type to minimize direct effects on trees, wasteful night sky pollution occurs.

For More Information

A significant number of private organizations and government agencies exist today with the objective of preserving the night sky by alerting the public to the problems and providing solutions. For more information contact:

Illuminating Engineering Society, 120 Wall Street, Floor 17, New York, N.Y. 10005, http://www.iesna.org

International Dark-Sky Association, 3225 N. First Avenue, Tucson, AZ 85719, http://www.darksky.org

Featured Fruit
Red Raspberry
Rubus idaeus

Native to North America, red raspberries grow from perennial roots. The tall, thorny canes are brownish red and woody, reach full size the first year, produce heavily the second year, then die and are replaced by new canes. Leaves consist of 3 to 5irregularly toothed leaflets, whitish and hairy underneath. Flowers are white, with 5 petals, and appear in clusters. Fruits are red when ripe, and are made up of numerous tiny druplets. Summer bearing varieties only produce fruit once per cane, while everbearing canes fruit a little the first year on the upper third of the cane and then the second year on the lower 2/3 of the cane. Wild varieties, shorter than cultivated varieties, can be found in thickets and at forest edges, often near water or roadsides in full sun. The best berries come from plants that receive winter chill and a slow warm up period in the spring. Good drainage is a must. During flowering and fruiting, the plants are heavy feeders and need consistent moisture. Collect raspberries in the late summer and early fall.

How to Convert an Inorganic Fertilizer Recommendation To an Organic One

Wayne McLaurin, Professor of Horticulture
Walter Reeves, Horticulture Educator/Media Coordinator

The success of any garden begins with the soil. A fertile, biologically active soil provides plants with enough nutrients for good growth. Fertilizers supplement or renew these nutrients, but they should be added only when a soil test indicates the levels of available nutrients in the soil are inadequate.

In the garden, whether you are growing annuals or perennials, vegetables or flowers, most of the crops have a few short months to grow and develop flowers and fruits. The soil must provide a steady, uninterrupted supply of readily available nutrients for maximum plant growth. Fertilizer form, particle size, solubility, and potential uptake are extremely important in fertility programs for gardening.

Organic gardeners place great emphasis on using natural minerals and organic fertilizers rather than manufactured ones in order to build their soil. If you use organic materials as all or part of your fertilization program, this bulletin will help you calculate the proper amount to use from the guidelines recommended by a soil test. Most organic materials must be used in combination since many do not have a balance of N-P-K; you should become familiar with the attached list of fertility values of organic sources of nutrients (Table 1, page 4).

Organic Matter

Organic matter is the varied array of carbon-containing compounds in the soil. Organic matter is created by plants, microbes and other organisms that live in the soil. Organic matter provides energy for biological activity. Many of the nutrients used by plants are held in organic matter until the organisms decompose the materials and release them for the plants' use. Organic matter also attracts and holds plant nutrients in an available state, reducing the amount of nutrients lost through leaching. It improves soil structure, so that air reaches plant roots and the soil retains moisture. The organic matter and the organisms that feed on it are central to the nutrient cycle.

Fertilizer Labels – What They Mean

Georgia law requires fertilizer producers to display the guaranteed analysis (grade) on the fertilizer container. A fertilizer grade or analysis that appears on the bag is the percentages of nitrogen (N), phosphorus (P_2O_5) and potassium (K_2O) in the material. A 5-10-15 grade fertilizer contains 5 percent N, 10 percent P_2O_5 and 15 percent K_2O. A 50-pound bag of 5-10-15 fertilizer contains 2.5 pounds of N ($50 \times 0.05 = 2.5$), 5 pounds of P_2O_5 ($50 \times 0.10 = 5$), and 7.5 pounds of K_2O ($50 \times 0.15 = 7.5$), for a total of 15 pounds of nutrients. The other 35 pounds of material in the bag is filler or carrier.

The fertilizer ratio is the ratio of the percentages of N, P_2O_5 and K_2O in the fertilizer mixture. Examples of a 1-1-1 ratio fertilizer are 10-10-10 and 8-8-8. These fertilizers have equal amounts of nitrogen, phosphorus, and potassium. An example of a fertilizer with a 1-2-3 ratio is 5-10-15. This fertilizer would have twice as much phosphorus and three times as much potassium as nitrogen.

Fertilizer Recommendations

It is difficult to recommend a specific fertilizer type or amount of fertilizer for any given situation. All fertilizer recommendations should take into consideration soil pH, residual nutrients, and inherent soil fertility. Fertilizer recommendations based on soil analyses are the very best chance for getting the right amount of fertilizer without over- or under-fertilizing.

Fertilizer recommendations based on soil tests result in the most efficient use of lime and fertilizer materials. This efficiency can occur only when valid soil sampling procedures are used to collect the samples submitted for analyses. To be beneficial, a soil sample must reliably represent the field, lawn, garden or "management unit" from which it is taken. If you have questions about soil sampling, please contact your local county extension office for information.

Soil pH

An underlying cause of poor fertility in Georgia is acidic soil. Raising the pH near 6.5 stimulates the activity of microorganisms that helps decompose organic matter and unlocks nutrients bonded to the soil particles.

Soil pH ranges are essential considerations for any fertilizer management program. The soil pH strongly influences plant growth, the availability of nutrients, and the activities of microorganisms in the soil. It is important to keep soil pH in the proper range for production of the best yields and high quality growth.

The best pH range for most plant growth in the garden is 6.0 to 6.5. Soils deficit in calcium or other alkaline substances are or can become too acidic. For example, Coastal Plain soils become strongly acid (pH 5 or less) with time if lime, a primary source of needed calcium, is not applied. A soil test, essential for determining how much lime should be applied, should be done every two years.

Calcium will not spread quickly throughout the soil profile. It must be thoroughly incorporated before planting; therefore, lime should be broadcast and thoroughly incorporated to a depth of 6 to 8 inches to neutralize the soil acidity in the root zone. To allow adequate time for neutralization of soil acidity (raising the pH), lime should be applied and thoroughly incorporated two to three months before seeding or transplanting. However, if application can not be made this early, liming will still be very beneficial if applied and incorporated at least one month prior to seeding or transplanting.

The preferred liming material for Georgia gardeners is dolomitic limestone. In addition to calcium, dolomitic limestone also contains 6 to 12 percent magnesium in which all Georgia soils routinely become deficient.

Environmental Effects on Organic Nutrient Uptake

1. **Temperature/Soil Temperature -** Early spring in Georgia is cool and soil temperatures rise slowly to the point where microorganisms are active. Until the soil warms sufficiently and the fertilizer materials are broken down into their useable form, organic fertilizers may not successfully stimulate plant growth. This may cause stunting of growth early in the season when using organic fertilizers.
2. **pH** - Too low or too high a pH in the soil profile can cause the nutrients to become unavailable. Most plants grow well at a pH of 6.0 - 7.0. The exceptions are Irish potatoes which are grown at a pH of approximately 5.5. Potatoes are grown at this pH to reduce the incidence of scab disease (*Streptomyces* spp.). Also, blueberries grow at a pH of less than 5.0, while the rhododendron family grows well around 5.5.

To replace the inorganic fertilizer recommendations from the Soil Test Report with organic fertilizer:

Organic Fertilizer for 1000 Square Feet of Garden Space

1. Calculate the nitrogen (N) recommendation first.

Example:

Soil test results recommend 20 lbs. of 5-10-15 plus 1.0 lb of ammonium nitrate (34-0-0) per 1,000 sq. ft. of garden. Use blood meal (12-1.5-0.6) for your nitrogen source of fertilizer. Divide the nitrogen number of the inorganic source (5) by the nitrogen number of the blood meal (12). Multiply this answer times the lbs. of inorganic fertilizer recommended.

5 ÷ 12 = .41 x 20 lbs. =
8.2 lbs. of blood meal per 1,000 sq. ft.

For the 1.0 lb. of ammonium nitrate (34-0-0) called for using blood meal calculate:

34 ÷ 12 = 2.8 x 1.0 lb. = 2.8 lbs. of blood meal extra

Total organic nitrogen = 11 lbs. of blood meal (8.2 lbs. + 2.8 lbs.)(The 1.5 phosphorus and 0.6 potassium is not significant enough to be counted.)

2. Calculate the phosphorus (P_2O_5) recommendation next.

Example:

Use steamed-bone meal (approx. 1-11-0) for the phosphorus source. Divide the phosphorus number (10) by the organic phosphorus number (11) and you get 0.91. Multiply 0.91 times the 20 lbs. needed for a total of 18.2 lbs. of steamed-bone meal required for 1000 sq. ft.

Total organic phosphorus = 10 ÷ 11 =0.91 x 20 lbs. = 18.2 lbs. of steamed-bone meal per 1,000 sq. ft.

3. Calculate the potassium (K_2O) recommendation next.

Example:

Sulfate of Potash Magnesia or Sul-Po-Mag (0-0-22) is recommended for the potassium requirements. Dividing the potassium number recommended (15) by the potassium number of the Sul-Po-Mag (22) equals 0.682. Multiplying 0.682 times 20 lbs. of fertilizer needed results in 13.6 lbs of Sul-Po-Mag per 1,000 sq. ft.

Total organic potassium = 15 ÷ 22 = 0.682 x 20 lbs. = 13.6 lbs. of Sul Po Mag per 1,000 sq. ft.

NOTE - If you use wood ashes, it is recommended that no more than 10-12 lbs. be used per 1,000 sq. ft./year due to its high salt concentrations.

Assuming blood meal, bone meal, and Sul-Po-Mag are used, the equivalent to 20 lbs. of 5-10-15 plus 1.0 lb of ammonium nitrate per 1,000 sq. ft. of garden is 11 lbs. of blood meal, 18.2 lbs. of steamed bone meal, and 13.6 lbs. of Sul-Po-Mag.

Organic Fertilizer for 100 Feet of Row

To replace inorganic fertilizer recommendations with organic fertilizer per 100 linear feet of row

1. Calculate the nitrogen recommendation first.

Example:

Soil test results recommends 7 lbs. of 5-10-15 plus 0.5 lbs. of ammonium nitrate per 100 linear feet of garden row. Using blood meal (12-1.5-0.6) for your nitrogen source of fertilizer, divide the nitrogen number of the inorganic source (5) by the nitrogen number of the blood meal (12). Multiply this answer times the lbs. of inorganic fertilizer recommended.

5 ÷ 12 = .41 x 7 lbs. = 2.9 lbs. of blood meal per 100 linear feet of row

For the 0.5 lbs. of ammonium-nitrate called for using blood meal calculate:

34 ÷ 12 = 2.8 x 0.5 lbs. = 1.4 lbs. of blood meal extra
Total Organic Nitrogen = 4.3 lbs. of blood meal per 100 linear feet of row

2. Calculate the phosphorus recommendation next.

Example:

Use steamed-bone meal (approx. 1-11-0) for the phosphorus source. Divide the phosphorus number (10) by the organic phosphorus number (11) and you get 0.91. Multiply 0.91 times the 7 lbs. needed for a total of 6.4 lbs. of steamed-bone meal required per 100 linear foot of row.

Total organic phosphorus = 10 ÷ 11 = 0.91 x 7 lbs.= 6.4 lbs. of steamed-bone meal per 100 linear feet of row

3. Calculate the potassium recommendation next.

Example:

Use Sul-Po-Mag (0-0-22) for the potassium requirements. Dividing the potassium number needed (15) by the potassium number of the Sul-Po-Mag (22) equals 0.682. Multiplying 0.682 times 7 lbs. of fertilizer needed results in 13.6 lbs of Sul-Po-Mag per 100 linear foot of row.

Total organic potassium = 15 ÷ 22 = 0.682 x 7 = 13.6 lbs. of Sul Po Mag per 100 linear feet of row

Assuming blood meal, bone meal, and Sul-Po-Mag are used, the equivalent to 7 lbs. of 5-10-15 plus 0.5 lb of ammonium nitrate per 100 linear feet of row of the garden is 4.3 lbs. of blood meal, 6.4 lbs. of steamed bone meal, and 13.6 lbs. of Sul-Po-Mag.

Table 1

Guide to the Mineral Nutrient Value of Organic Fertilizers

(Percent[1])

Materials	N	P_2O_5	K_2O	Relative Availability
Alfalfa Meal	3.0	1.0	2.0	Medium-Slow
Blood Meal	12.0	1.5	0.6	Medium-Rapid
Bone Meal (steamed)	0.7-4.0	11.0-34.0	0.0	Slow-Medium
Brewers Grain (wet)	0.9	0.5	0.1	Slow
Castor Pomace	5.0	1.8	1.0	Slow
Cocoa Shell Meal	2.5	1.0	2.5	Slow
Coffee Grounds (dry)	2.0	0.4	0.7	Slow
Colloidal Phosphate	0.0	18.0-24.0	0.0	Slow
Compost (not fortified)	1.5	1.0	1.5	Slow
Cotton Gin Trash	0.7	0.2	1.2	Slow
Cottonseed Meal (dry)	6.0	2.5	1.7	Slow-Medium
Eggshells	1.2	0.4	0.1	Slow
Feather	11.0-15.0	0.0	0.0	Slow
Fertrell - Blue Label	1.0	1.0	1.0	Slow
Fertrell - Gold Label	2.0	2.0	2.0	Slow
Fertrell - Super	3.0	2.0	3.0	Slow
Fertrell - Super "N"	4.0	3.0	4.0	Slow
Fish Meal	10.0	4.0	0.0	Slow
Fish Emulsion	5.0	2.0	2.0	Medium-Rapid
Fish Scrap (dry)	3.5-12.0	1.0-12.0	0.8-1.6	Slow
Garbage Tankage (dry)	2.7	3.0	1.0	Very Slow
Grape Pomace	3.0	0.0	0.0	Slow
Granite Dust	0.0	0.0	6.0	Very Slow
Greensand	0.0	1.0-2.0	5.0	Slow
Guano (bat)	5.7	8.6	2.0	Medium
Guano (Peru)	12.5	11.2	2.4	Medium
Hoof/Horn Meal	12.0	2.0	0.0	Medium-Slow
Kelp[2]	0.9	0.5	1.0-4.0	Slow
Manure[3] (fresh)				
Cattle	0.25	0.15	0.25	Medium
Horse	0.3	0.15	0.5	Medium
Sheep	0.6	0.33	0.75	Medium
Swine	0.3	0.3	0.3	Medium
Duck	1.1	1.4	0.5	
Poultry (75% water)	1.5	1.0	0.5	Medium-Rapid

Materials	N	P_2O_5	K_2O	Relative Availability
Poultry (50% water)	2.0	2.0	1.0	Medium-Rapid
Poultry (30% water)	3.0	2.5	1.5	Medium-Rapid
Poultry (15% water)	6.0	4.0	3.0	Medium-Rapid
Manure[3] (dry)				
Cricket Manure	3.0	2.0	1.0	Medium-Rapid
Goat	2.7	1.8	2.8	Medium
Dairy	0.7	0.3	0.6	Medium
Steer	2.0	0.5	1.9	Medium
Horse	0.7	0.3	0.5	Medium
Hog	1.0	0.7	0.8	Medium
Sheep	2.0	1.0	2.5	Medium
Rabbit	2.0	1.3	1.2	Medium
Marl	0.0	2.0	4.5	Very Slow
Mushroom Compost	0.7	0.9	0.6	
Sulfate of Potash Magnesia[4]	0.0	0.0	22.0	Rapid-Medium
Soybean Meal	6.7	1.6	2.3	Slow
Urea[5]	42.0-46.0	0.0	0.0	Rapid
Wood Ashes[6]	0.0	1.0-2.0	3.0-7.0	Rapid

Some of the materials may not be available because of restricted sources.

[1] The percentage of plant nutrients is highly variable; average percentages for materials are listed.
[2] Contains common salt, sodium carbonates, sodium and potassium sulfates.
[3] Plant nutrients, available during year of application, vary with amount of straw/bedding and method of storage.
[4] Also known as Sul-Po-Mag or K-Mag.
[5] Urea is an organic compound; but as manufactured sources are synthetic, it is doubtful that most organic gardeners would consider it acceptable.
[6] Potash content depends on the tree species burned. Wood ashes are alkaline, containing approximately 32% CaO.

For those who do not want to figure out the equivalent weights, here is an approximation of amounts of ingredients to use to attain the correct amounts of organic fertilizers called for in the soil test for 1,000 square feet.

Table 2
Organic Fertilizer Recommendations

Recommendations for Inorganic Fertilizers	Nitrogen [1] Needed for 5 lbs. of 5-10-15 From Organic Source	Phosphorus Needed for 5 lbs. of 5-10-15 From Organic Source	Potassium Needed for 5 lbs. of 5-10-15 From Organic Source
5 lbs. 5-10-15 (using component fertilizers)	2.0 lbs. blood meal 8.3 lbs. alfalfa meal 4.2 lbs. cotton seed meal 2.0 lbs. feather meal 2.5 lbs. fish meal 2.0 lbs. hoof meal 8.0 lbs. of cricket manure 4.0 lbs soybean meal	4.5 lbs. bone meal 1.4 lbs. colloidal phosphate	3.1 lbs. Sul-Po-Mag 15.0 lbs. greensand 15.0 lbs. granite dust 25.0 lbs. kelp
	Nitrogen Needed for 5 lbs. of 6-12-12	Phosphorus Needed for 5 lbs. of 6-12-12	Potassium Needed for 5 lbs. of 6-12-12
5 lbs 6-12-12 (using component fertilizers)	2.0 lbs. blood meal 10.0 lbs. alfalfa meal 5.0 lbs. cotton seed meal 2.0 lbs. feather meal 2.5 lbs. fish meal 2.5 lbs. hoof meal 10.0 lbs. of cricket manure 3.7 lbs soybean meal	5.5 lbs. bone meal 3.0 lbs. colloidal phosphate	2.7 lbs Sul-Po-Mag 12.0 lbs. greensand 12.0 lbs. granite dust 20.0 lbs. kelp
	Nitrogen, Phosphorus and Potassium Needed for 5 lbs. of 10-10-10		
5 lbs. 10-10-10 (for even analysis fertilizers)	33.3 lbs. of compost (1.5-1-1.5) 33.0 lbs. of 30% poultry manure (3-2.5-1.5) 50 lbs of Fertrell 1-1-1		
	Nitrogen Needed for 5 lbs. of 10-10-10	Phosphorus Needed for 5 lbs. of 10-10-10	Potassium Needed for 5 lbs. of 10-10-10
5 lbs. 10-10-10 (using component fertilizers)	4.2 lbs. blood meal 17.0 lbs. alfalfa meal 8.3 lbs. cotton seed meal 3.3 lbs. feather meal 5.0 lbs. fish meal 4.2 lbs. hoof meal 16.7 lbs. of cricket manure 7.5 lbs soybean meal	4.5 lbs. bone meal 2.8 lbs. colloidal phosphate	2.3 lbs. Sul-Po-Mag 10 lbs. greensand 16.6 lbs. of kelp

[1] Use only one of these amounts of fertilizer materials to equal 5 lbs. of nitrogen or use one-half of 2 different materials to make up the 5 lbs. of nitrogen required. The same process can be used for any other nutrient in the chart.

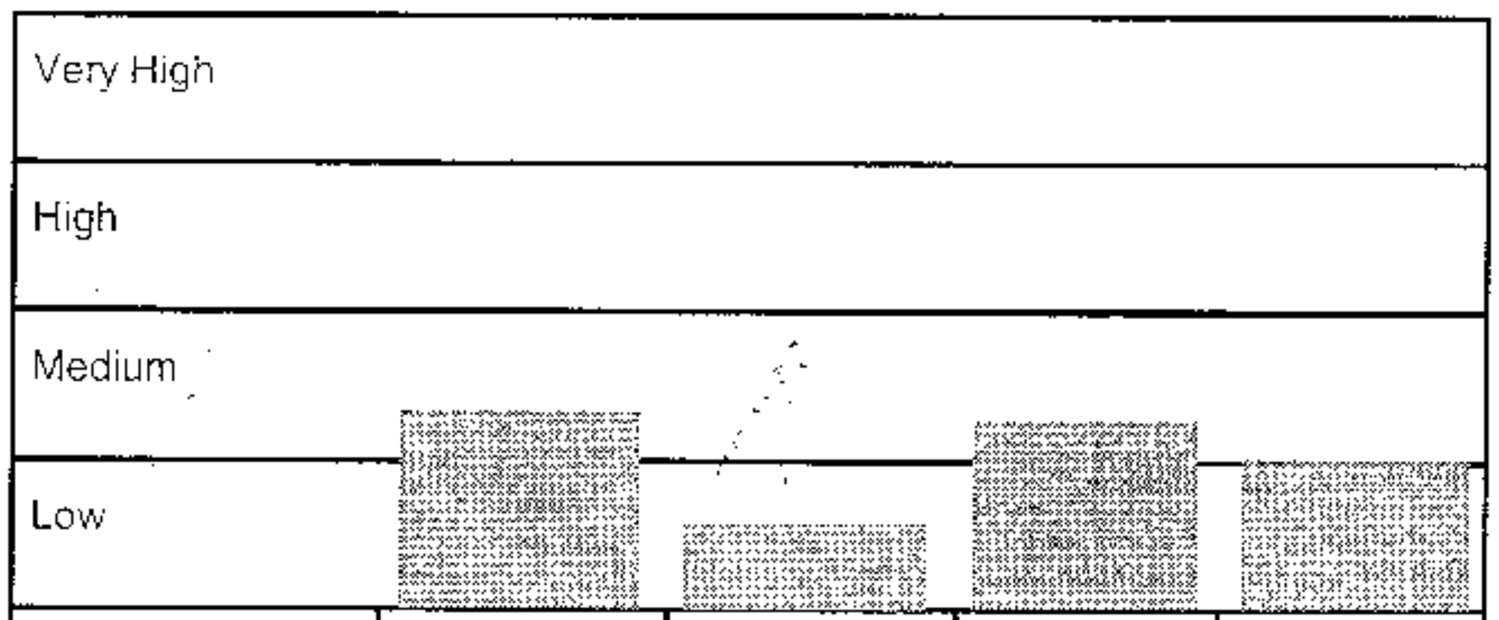
The University of Georgia
College of Agricultural and Environmental Sciences
Cooperative Extension Service

Soil Test Report

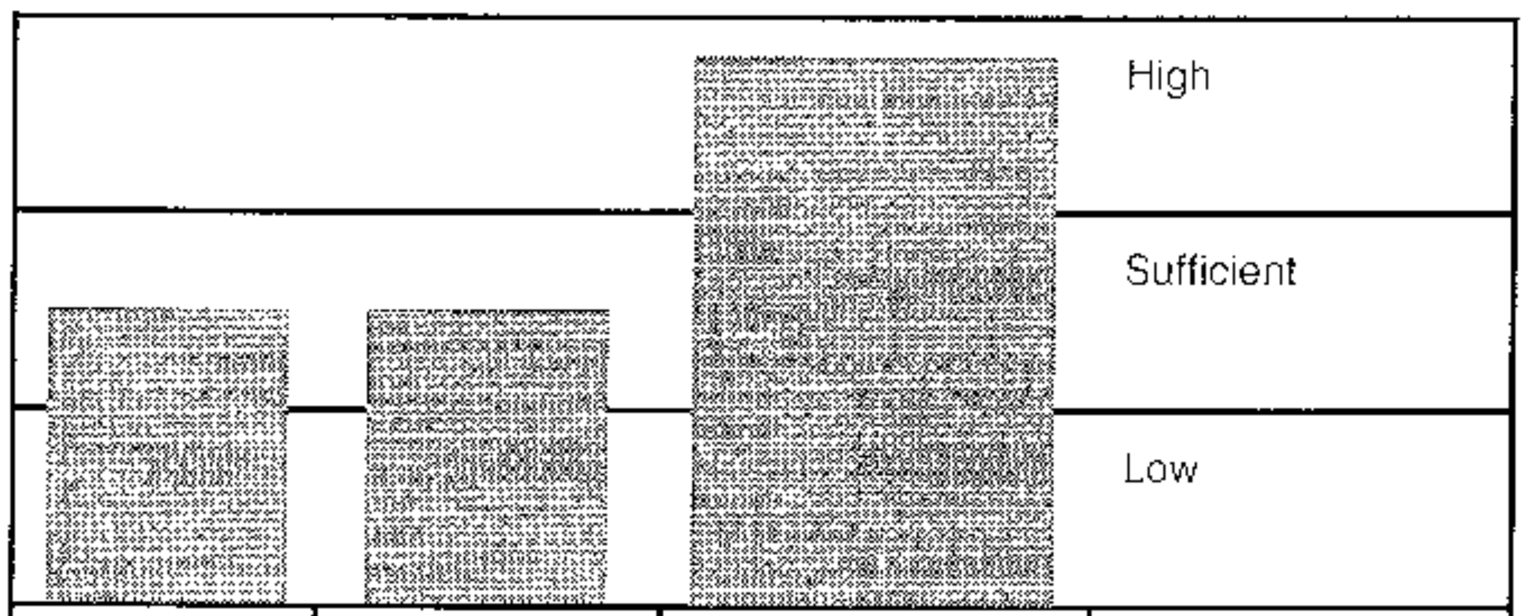
Sample ID — Soil, Plant and Water Laboratory — (CEC/CEA Signature)

Grower Information	Lab Information	County Information
Client: John Doe 123 Nowhere Lane Sample: 1 Crop: Vegetable Garden	Lab #1755 Completed: 05/10/2000 Printed: 05/10/2000	Tift County P O Box 7548 Tifton, GA 31793

Results



	Phosphorus (P)	Potassium (K)	Calcium (Ca)	Magnesium (Mg)
Soil Test Index	40.25 lbs/Acre	37.77 lbs/Acre	339.5 lbs/Acre	60.43 lbs/Acre



Zinc (Zn)	Manganese (Mn)	Soi pH	
1.854 lbs/Acre	1.604 lbs/Acre	6.9	Soil Test Index

Recommendations

Limestone: 0 pounds per 1000 square feet

Broadcast 20 pounds of 5-10-15 plus 1 pound of ammonium nitrate per 1000 square feet, or apply 7 pounds of 5-10-15 plus ½ pound of ammonium nitrate per 100 linear feet of row.

The recommendation given above is for medium feeders, which include crops such as beans, beets, broccoli, cantaloupes, corn, cucumbers, eggplant, greens (kale, mustard, turnip, collards), okra, English peas, peppers, radish, squash, watermelon and sweet potatoes.

For heavy feeders such as cabbage, lettuce, onions, tomatoes and Irish potatoes, double the recommendation.

For light feeders such as southern peas, reduce the recommendation in half.

Apply 1 tablespoon of borax per 100 feet of row to broccoli and root crops such as turnips and beets. This can be applied by mixing the borax thoroughly with approximately 1 quart of soil in a container and then applying the mixture along the row; or it can be mixed with a quart of water and applied to the soil in solution.

For sweet corn, apply 1 tablespoon of zinc sulfate per 100 feet of row and sidedress with 1 to $1^{1}/_{3}$ pounds of ammonium nitrate (or equivalent amount of nitrogen) per 100 feet of row.

APFG Newsletter
c/o Tami Schlies, Editor
PO Box 672255
Chugiak, AK 99567

Raspberry candy

2 c. Raspberry puree
4 c. sugar
4 envelopes unflavored gelatin
1 c. cold water
½ t. almond flavoring
1 c. chopped walnuts or pecans
Powdered sugar

Crush berries and put through sieve or food mill to remove seeds. Add sugar to pulp. Soak gelatin in the water for 5 mins. Add to berry mixture and cook for 20 mins. over medium heat, stirring to prevent sticking. Remove from heat. Mix in almond flavoring and chopped nuts. Pour into a greased cake pan. Let stand 2 days or until stiff and firm. Cut into squares and roll each square in powdered sugar. Store in cool, dry place.

Our first Orchard Tour is May 15th! See inside for details