



# Landscape, Floriculture, and Ornamentals News



*A Newsletter for the Professional  
Landscape, Floriculture, and  
Ornamentals Industries*

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## Floral Status of Malaysia and Mexico

*Ken Leonhardt*

*CTAHR Extension Floriculture Specialist*

FloraCult<sup>®</sup> International is a trade magazine published by International Horticulture Publications Co. of Batavia Illinois. It has often profiled a country whose floral industry is emerging or undergoing significant change. Some of these events may impact the floral industry in Hawaii and the U.S. at large. Some points that caught my attention in two such articles are restated here in brief.

🌺 *Malaysia: cut flowers' newest trade competitor*, by Nancy Laws, February 1997. Here it is pointed out that floral exports have increased from \$7 million in 1988 to \$20 million in 1994, due in large part to government initiated policies intended to bolster cutflower exports. A variety of tax incentives are available to local and foreign investors. The government has supported growers participation in international trade shows and exhibitions by covering travel and freight costs, supports an overseas sales office, and brings in foreign consultants with production and marketing expertise. Readily available construction materials and good communication and transportation infrastructure are reasons to expect continued industry growth. Of interest to Hawaii orchid growers is the government's ambition to increase orchid cutflower production in the lowland state of Johor to over 2,900 hectares (7,200 acres) and, "replace Thailand as the major cut orchid producer in Asia." Targeted markets include Singapore, Japan, Australia, Taiwan, Hong Kong, and South Korea. Potted orchid production has not gone overlooked as several Taiwanese phalaenopsis producers are expected to joint venture with Malaysian producers this year.

🌺 *Changes in Mexican floriculture*, by Marta Pizano, June 1997. This article reviews production and marketing strengths and weaknesses of Mexico's cutflower industry and identifies deficiencies that need to be overcome in order to be more competitive in export markets. Mexico produces cutflowers on over 10,000 hectares (24,700 acres) of mostly open fields. Greenhouse production is recorded at only 425 hectares (1050 acres). From this area, 15 million tons of flowers were produced in 1994 of which approximately 90% was consumed within the country during celebrations, holidays, and everyday life. Despite NAFTA, suitable climate and geography, and a large and low cost labor force, Mexico has not yet realized much of its potential as a flower exporter, although the U.S. imported \$24.6 million in flowers in 1995 which accounted for over 90% of

Mexico's flower exports. Rose, carnation and traditional flowers make up the bulk, although modest and declining amounts of anthurium, dendrobium orchid, and "other orchid" are listed.

The Mexican government recognizes the industry shortcomings and has initiated technical and financial programs to assist growers. Universities and research centers are said to offer training and technical support. Many of these programs are coordinated through several local, regional, and national organizations such as the Mexican Flower Council. The need to improve crop culture including pest and disease management, and postharvest management and infrastructure are emphasized.

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### International Flower Bulb Center Now On-line

The International Flower Bulb Center, Hillegom, The Netherlands, is now on-line. Their site on the World Wide Web is at <http://www.bulb.com>. In-depth information on trends and variety performance as well as how-to information, news and feature stories and photographs are just a few of the features offered.

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### 1996 Netherlands Bulb Industry Statistics

9 billion bulbs produced annually  
7 billion exported  
4.55 billion to international growers of cutflowers and potted plants  
2.45 billion to home gardeners worldwide  
1 billion to U.S. gardeners  
Source: *Netherlands Flower Bulb Information Center, Brooklyn, NY*

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### Special Local Need (SLN) Labelings for Agriculture Chemicals in Hawaii

**New.** Plumerias; Monterey Florel® Brand Pistill (Lawn and Garden Products; 264-263-54705); HI-960006 new 9/23/96-9/22/01. Promotes leaf drop. Promotes winter flower production in warm climate.

**Expired.** Carnations; Plantvax® 75W (Uniroyal; 400-144); HI-810014 expired 2/13/97.

Source: *The Pesticide Label*, CTAHR Dept. of Environmental Biochemistry, Jan-Feb 1997

### Hibiscus Mealybug

David Kuack, editor  
GMPRO magazine

Florida flower and foliage growers may soon have a new pest to deal with: Hibiscus mealybug, *Maconellicoccus hirsutus*, is traveling through the Caribbean toward Florida, said Univ. of Florida entomologist Lance Osborne. The insect has put growers out of business and wiped out entire forests in other countries. It has hundreds of ornamental plant hosts: hibiscus, chrysanthemum, allamanda, begonia, ficus, palms, poinsettia and pothos. Osborne said arrival of the mealybug is inevitable and could come into Florida on imported plant material or be carried by a hurricane.

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### About Research

Eileen Herring,  
Science Librarian, Hamilton Library

Effects of six fertilizers on vegetative growth and flowering of phalaenopsis orchids. Wang, Y.T. 1996. *Scientia Horticulturae* 65 (2-3):191-197.

Six water-soluble fertilizers were applied at two different concentrations to young seedlings of Phalaenopsis Tam Butterfly. After seven months, leaf span, leaf size, total leaf area, and shoot and root fresh weight were measured. No differences were found between the various fertilizers at either concentration. The higher concentration application (200 ppm) for all fertilizers produced wider leaf spread, more and larger leaves, and greater total leaf areas. This study suggests that if Phalaenopsis orchids are grown in media having good moisture and nutrient retention capacity, any balanced fertilizer will produce good growth. Since flowering is directly related to leaf production and expansion, higher fertilizer rates are suggested to produce rapid growth in young plants. Fertilizer concentrations can be reduced for mature plants in order to avoid producing excessively large plants which increases production costs.

❧ Testing the light acclimatization potential of *Chrysalidocarpus lutescens* Wendl. Reyes, T., T.A. Nell, J.E. Barrett and C.A. Conover. 1996. *HortScience* 31(7): 1203-1206.

Areca palm (*Chrysalidocarpus lutescens* Wendl.) performance as low light interior plants was evaluated by using varying production light and fertilizer levels for 8 months, then placing the plants in interior conditions for 3 months and measuring the light compensa-



tion point, chlorophyll concentration and carbohydrate reserves. Three light levels (481, 820 and 1231 mmol/m<sup>2</sup>/s) were combined with three application rates of 20-10-20 fertilizer (0.015, 0.03 and 0.06 oz/2 gal pot or 440, 880, and 1660 mg/6.25L pot). The interior conditions tested were 20 mmol/m<sup>2</sup>/s for 12 hours daily at 70°F (21°C) and a relative humidity of 50%. Previous studies have shown that plants which adapt well to low light interior conditions exhibit anatomical and physiological changes during exposure to low light levels which result in lower light compensation points and higher chlorophyll concentrations. In this study, regardless of the production treatments used, areca palms did not exhibit these adaptations to low light and instead used internal carbohydrate reserves for growth. For this reason, areca palm is not recommended for extended interior use under the low light levels characteristic of most homes and commercial spaces.

☞ Root distribution of six palm species grown in cupric hydroxide-treated containers. S.E. Svenson and T.K. Borschat. Fort Lauderdale Res. and Edu. Center, Univ. of Florida, 3205 College Ave., Fort Lauderdale, FL.

The root distribution of seedlings of *Acoelorrhaphes wrightii*, *Carpentaria acuminata*, *Chrysalidocarpus lutescens*, *Livistona chinensis*, *Phoenix roebellenii*, and *Washingtonia robusta* were grown in nontreated containers or in containers treated on their interior surfaces treated with 25, 50, or 100 g/liter copper hydroxide. Seedlings of all species grown in treated containers had reduced circling or matted roots at the container wall-growing medium interface. The distribution of roots was specific and was significantly influenced by the rate of copper hydroxide. Copper treatment did not induce visual signs of copper toxicity, nor differences in shoot growth, nor differences in the number of higher-order lateral roots.

☞ Performance of nitrate-N fertilizers on bermudagrass in humid tropical conditions. M.D. Hamilton, F. Cruz, and J. McConnell. College of Agriculture and Life Sci., Univ. Guam, UOG Station, Mangilao, Guam.

The performance and leaching of six nitrogen fertilizers on bermudagrass was studied under humid tropical conditions. Ammonium nitrate was applied to the turf monthly at rates between 0.25 and 6 lb/1000 sq ft. Performance was gauged on clipping dry weights, color evaluation, and visual ratings. Leachates were checked for nitrate levels. A rate of 2 lb/1000 sq ft produced quality turf while yielding a minimum of nitrate leaching. Rates of 4 and 6 lb/month resulted in the highest nitrate leachings without an increase in quality. Rates of less

than 2 lb had less than 9 ppm nitrate leachate, but produced unacceptable quality.

Nutralene, Nitroform, sulfur coated urea, IBDU, and ammonium nitrate were applied at 2lb/1000 sq ft/month. Slow release forms were applied as a 3 month dose. Nutralene, SCU, and Nitroform had peak nitrate leaching levels 2 weeks after application. IBDU had peak nitrate levels after 4 weeks. Turf quality diminished at 6 weeks.

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### Think About Gypsum Before Spending Your Money

Gypsum is often advertised as the magic bullet to improve the structure of clay soil. This is not necessarily true. Any improvement in soil structure from gypsum only occurs when there is much more sodium than calcium in the soil. In Hawaii, we do have some soils with high levels of sodium and applying gypsum may help in those cases.

On soils that are not high in sodium, the gypsum does little good. Instead, consider aerifying and top dressing with compost. Aerify with large tines and punch 20 to 40 holes per square foot. Top dress with a mature compost and rake or drag in.

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### Tree Selector Computer Program Available

A program to aid in selecting tropical trees is now available. This program is designed to work on Macintosh computers using Hypercard. It provides information on several trees in Hawaii and recommends trees based on user specified criteria. The text of the information was adapted from *How to Select a Tree* and *How to Plant a Tree* by Mary Young, Honolulu Botanic Garden. The program is part of the Farmer's Bookshelf developed by Kent Kobayashi and Skip Bittenbender. The tree selector was adapted to the Farmer's Bookshelf series by Kim Oshiro, David Hensley, and Julie Yogi, Department of Horticulture-CTAHR. This program does not run on DOS or Windows machines.

If you would like to obtain a free copy of the Tree Selector for Macintosh, contact David Hensley, Department of Horticulture, UH, 3190 Maile Way, Honolulu, HI 96822-2279.

## *Dendrobium* Icy Pink 'Sakura'

H. Kamemoto, A. R. Kuehnle, T. D. Amore, and  
N. C. Sugii, CTAHR Dept. of Horticulture

A new *Dendrobium* flower color, Icy Pink, was first encountered in our breeding program in 1977 from a cross between a two-tone lavender *D. Jaquelyn Thomas*, O580-4N, and a white *D. phalaenopsis*, K43-14. One offspring, K360-8, produced a pale pink flower among other siblings with two-tone lavender flowers. K360-8 was then crossed to tetraploid *D. phalaenopsis*, W15-6. Among the offspring, K816-32 produced tinged flowers that were slightly darker pink than the K360-8 parent. Subsequently, K816-32 was self-pollinated with the objective of obtaining an even darker pink tinged flower. *D. Icy Pink 'Sakura'* (K1224-6) was the result (Figs. 1 and 2).

K1224-6 appeared to possess some desirable qualities for commercial cut flower production, and therefore was micropropagated for further observation and evaluation in glasshouse and saranhouse environments. The performance of the majority of characteristics were better for plants grown in the glasshouse (Table 1).

The desirable features of K1224-6 are:

1. New, attractive, delicate icy pink flowers (RHSCC 54D for tepals, 54C for lip). This color was recently identified chemically as pelargonidin, an anthocyanidin that differs from the cyanidins occurring in lavender-purple flowers.
2. Flowers are slightly larger and fuller than those of amphidiploid cut flower cultivars.
3. Sprays are long with long scapes.
4. It is relatively free of bud drop.
5. Good vase life. The half-life of cut sprays was about 20 days. Even those harvested at a young stage, when only half of the flowers on the spray were open, kept nearly as well as those harvested at two-thirds to three-quarters maturity.
6. Flower yield was moderate and distributed throughout most of the year (Table 2). As the plants matured, the yields increased.

The undesirable feature of K1224-6 is the long, droopy sprays, especially when sprays are kept beyond the three-fourths maturity stage. This problem can be alleviated by harvesting sprays when only 50% of the flowers are open.

Because of the unique and attractive "new" dendrobium color, the parent of K1224-6 is being registered as *Dendrobium* Icy Pink. By the rules of orchid nomenclature any offspring resulting from selfing the

parent, K816-32, must retain the same name; hence the progeny K1224 must also be called *D. Icy Pink*. Since K1224-6 is a clone, Sakura (cherry blossom) was chosen as the cultivar name.



**Table 1. Characteristics of K1224-6 in glasshouse and saranhouse.**

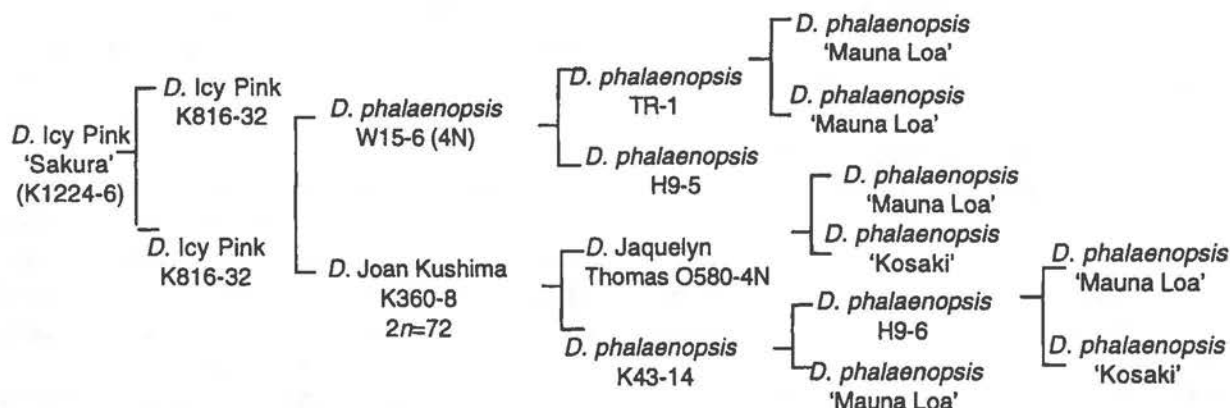
Characteristics	Glasshouse	Saranhouse
Flower width (in)	2.9 ± 0.5	2.4 ± 0.6***
Pedical length (in)	2.3 ± 0.4	2.6 ± 0.7**
No. flowers per spray	14.7 ± 1.7	12.8 ± 1.4**
Scape length (in)	7.9 ± 1.2	8.2 ± 0.9 ns
Raceme length (in)	23.3 ± 5.5	19.4 ± 4.1**
% bud drop	0.78 ± 2.1	1.7 ± 2.3**
% sprays with bud drop	6.5 ± 11.5	13.5 ± 15.9**
No. sprays per plant	10.9 ± 2.3	8.7 ± 3.0**
Pseudobulb height (in)	35.8 ± 5.9	30.4 ± 6.3**

\*\*\* significantly different at 99% level; ns - not significant

**Table 2. Monthly spray yields of K1224-6 in glasshouse (G2) and saranhouse (S), based on 47 plants in glasshouse and 57 plants in saranhouse.**

	1994		1995		1996		TOTAL	
	G2	S	G2	S	G2	S	G2	S
JAN	8	15	21	9	29	24		
FEB	9	13	8	19	17	32		
MAR	11	19	7	4	18	23		
APR	6	3	5	7	11	10		
MAY	4	3	11	13	15	16		
JUN	2	2	18	6	20	8		
JUL	0	2	6	18	6	20		
AUG	6	9	6	3	38	66	50	78
SEP	15	25	12	15	29	52	56	92
OCT	13	26	45	48	106	57	164	131
NOV	6	9	45	0	42	20	93	29
DEC	2	6	10	0	14	40	26	46
TOTAL	42	75	158	123	305	311	505	509



Fig. 1. Pedigree of *Dendrobium* Icy Pink 'Sakura'.

## Root Mealybugs

Arnold H. Hara  
CTAHR Dept. of Entomology, Hilo

Root mealybugs occur only on roots of their host plants. Because they are undetected, occurring below-ground, root mealybugs can be a serious pest. Currently, the Hawaiian Islands have 7 species of root or hypogaeic mealybugs. The most pestiferous species have been the coffee root mealybug, *Geococcus coffeae*, and *Rhizoecus hibisci*. Plant host range of these root mealybugs are very wide, infesting grasses, palms, citrus, cyperus, pineapple, coffee, mango and syngonium.

In pots, root mealybugs occur throughout the root mass; however, they are concentrated between the root-ball and the pot. Infestations of root mealybugs are noticeable only if the root-ball is removed from the pot.

The white waxy material is the most important sign of root mealybug infestation. Mealybugs secrete lots of white waxy material that covers their bodies. Female mealybugs lay eggs or give birth to live young (crawlers). If eggs are laid, they usually hatch in less than 24 hours. Crawlers are the dispersal stage and are highly mobile. Once the crawlers find a suitable site, they settle down and begin to feed on roots with their sucking mouthparts. The entire life cycle ranges from 2-4 months depending on the species. Adults live from 27-57 days, also depending on species.

### Prevention

Because the root mealybug is very difficult to control, every effort should be made to prevent spread and es-

tablishment. The following practices are recommended to prevent spread and establishment:

1. Inspect roots of newly purchased plants for root mealybugs by removing the pot.
2. Avoid root-bound plants by re-potting as needed; root-bound plants encourage mealybugs.
3. Use clean pots and media; if infested wash with soap and water.
4. Treat or remove infested plant hosts from your premises.
5. Do not allow water from infested areas to drain into clean areas; crawlers can be transported in water.

### Control

Research by the University of Hawaii, CTAHR, has demonstrated that insecticides and/or a hot water dip are effective treatments. Dursban WP applied as a liquid drench and Marathon G are effective against root mealybug. Watering plants prior to drench application will significantly reduce problems with phytotoxicity. Consult the Cooperative Extension Service, Hawaii Department of Agriculture or a reputable agrochemical professional for a specific product registered for use. Submerging potted *Rhapis* palms in 120° F (49° C) hot water until the internal root ball temperature reaches 115° F (46°C) is 100% effective in killing root mealybugs. Hot water at 120°F does not significantly affect potted *Rhapis* palms.

For more information or a detailed report contact Arnold Hara in Hilo at Ph: (808) 974-4105, Fax: (808) 974-4110 or e-mail: [arnold@hawaii.edu](mailto:arnold@hawaii.edu).

## Fungal Disease Control for Orchids

Ken Leonhardt and Wayne Nishijima  
CTAHR Extension Specialists

This is a favorable time of the year for fungal diseases on orchids. Transmission of fungal spores is usually by wind, water, contaminated equipment and plant parts, and occasionally carried by insects and nematodes. Rain and high-humidity conditions contribute to fungal spore germination and infection.

Fungal diseases of orchids include flower and foliar spots and blights, pseudostem and root rots, and damping-off of seedlings.

The first level of defense is to start out with pathogen-free planting material and employ high levels of sanitation in all cultural practices. This includes removal of dead and infected plant parts including fallen leaves which can be a source of inoculum. Use new pots or

disinfest pots to be reused. Always use clean new media. Orchid media should be very well drained and freely aerated. When an organic medium breaks down water retention becomes excessive and aeration inadequate. Fungal diseases of the root system are almost certain to follow. Flame or surface disinfest tools that come in contact with plant tissues.

Irrigate plants early in the day to allow for leaves to be dry at night. Ensure that greenhouses have adequate ventilation and/or air circulation to minimize still, humid conditions that are favorable to disease development. Inspect roofs and gutters to ensure that there are no leaks that might splash onto plants.

Fungicides can be used to prevent infection. Proper equipment calibration and fungicide application are essential. Follow application instructions and precautions on the bag. The following is a list of fungicides available for use by orchid growers in Hawaii.

### Fungicides for Orchids

(Prepared Nov. 14, 1997) Disclaimer: This list was prepared as a guide for general use by orchid growers in Hawaii. Because of frequent changes to registrations, this list may be inaccurate. Always consult the label for proper use and registration of the fungicide. Current registrations can be found on the World Wide Web at: <http://pestworld.stjohn.hawaii.edu/cfdocs/test/hpirs.htm>

#### Crop registered under / Fungicide

Type\* Remarks  
\*P=Preventive; C=Curative

#### **Dendrobium**

Bayleton 25 T/O	P/C	Fusarium, anthracnose, others
Dithane F-45, M-45 DF, WF; Fore, Fore Flowable; Manzate 200	P	Mancozeb; all fungi
Metam, Vapam, Nemasol	n/a	General-purpose soil and media fumigant
Ornalin Contact Fungicide	P/C	Botrytis; contact

#### **Orchids**

Turban, Terrazole	P	Phytophthora and pythium
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#### **Flowers**

Aliette WDG Fungicide	P/C	Phytophthora and pythium
Bayleton 25 T&O	P/C	Fusarium, anthracnose, others
Botran 75W Fungicide	P	Botrytis
Champion WP, Kocide LF	P	Copper hydroxide
Clearys 3336 G, WP; Domain FL; Fungo Flo,	P/C	Botrytis, anthracnose, phylosticta, others
Cooke Daconil Lawn & Garden, Ortho Daconil 2787	P	Most fungi
Ford's Procide Systemic	P/C	
Metam, Vapam, Nemasol	n/a	General-purpose soil and media fumigant
Protect T&O	P	Mancozeb; most fungi
Rubigan 50WSP, EC	P	Botrytis
Subdue 5G	P/C	Phytophthora and pythium
Terraclor 400 Flowable Ornamental Soil Fungicide;		
Turficide 10% Granular T&O; Revere	P	Rhizoctonia, sclerotium, etc.

#### **Ornamentals**

Banner	P/C	Rhizoctonia, anthracnose
Chipco 26019	P	Many fungi
Clorox	n/a	Disinfectant, benches, etc.
Metam, Vapam, Nemasol	n/a	General purpose soil and media fumigant
PT 2000 Greenshield	P	General purpose disinfectant
Rubigan EC	P	Botrytis
Terraguard	P/C	Rhizoctonia, cylindrocladium, other fungi
Triathlon	n/a	General purpose disinfectant

## Look at Maintenance *Before* Planting

David Hensley, *Extension Landscape Specialist*  
CTAHR Department of Horticulture

Did you know that much more money is spent maintaining a landscape than on planning, designing, the plants, and contract installation combined? Evaluating a proposed design for "maintainability" before it is installed will save money and time. Eliminate maintenance problems before they are installed and reduce the frustration level of the people that must keep up with the demands of a poorly planned landscape.

Look for problems on site and planting plans and correct them before they come back to haunt the designer, the contractor, the maintenance personnel, the owner, and the property manager. Consider these changes to sites to save headaches.

1. Avoid turf strips that are narrower than one and one-half times the width of the smallest mower or the mower used in that area.
2. Change small enclosed areas of turf that are hard to reach with a mower.
3. Eliminate small needless turf areas (that aren't walked on) scattered throughout the site. Fill these with groundcovers, flowers, or mulch.
4. Smooth bed lines to eliminate tight curves and squiggles that will be difficult to mow and edge.
5. Do not plant low-branching trees in small turf areas unless you plan for a mulch ring to prevent trimming.
6. Incorporate obstacles (lights, signs, poles, etc.) into planting beds rather than in the middle of the lawn area. Use mulch rings or mowing strips around those items in the turf to eliminate trimming.
7. Make sure that signs are not obstructed by low branched trees, large shrubs, or other plantings.
8. Keep benches and other site furniture are located in convenient locations for users. Are benches in safe locations? Are they in open, visible spots or are they in areas hidden by dense plantings?
9. Are the plants in parking lots appropriate? Will they soon be encroaching into the parking spaces or have to be trimmed continually? Do they block visibility?
10. Give plants room to grow. Do not jam too many plants just to make the beds look full. Give shrubs in a beds about one-half of the natural spread to grow and pruning and pest problems are reduced.
11. Make sure trees have adequate space around the roots and select trees carefully. A 4 foot by 4 foot square cut in a walk or parking lot will not accom-

modate a large-growing shade tree. The street, wall, or curb will buckle eventually.

15. Eliminate individual shrubs spotted around the lawn areas. The shrubs are maintenance intensive and also visually distracting. Every plant needs a reason to be where it is.

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## Copper Hydroxide Repels Slugs

Arnold H. Hara  
CTAHR Dept. of Entomology, Hilo, Hawaii

Copper hydroxide is usually used as a fungicide but also formulated as a root growth regulator that prevents root-bound containers. Recently, CTAHR discovered that the copper hydroxide coating is very repellent to the two-striped slug, *Veronicella cubensis*. Plastic pots, grow bags and weed mats coated with a special formulation of copper hydroxide (Spinout™, Griffin Corporation, <http://www.lerio.com>) significantly repelled slugs. For example, in one test, pots were placed in a contained area (15 sq ft) with 500 slugs; copper hydroxide coated pots harbored an average of 0 slugs per pot while uncoated pots harbored an average of 24 slugs per pot.

Presently, copper hydroxide coated products are NOT registered for use as a molluscicide but registered only as a root growth regulator.

For more information or a detailed report contact Arnold Hara in Hilo at Ph: (808) 974-4105, Fax: (808) 974-4110 or e-mail: [arnold@hawaii.edu](mailto:arnold@hawaii.edu).

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## A Technique for Acclimatizing Plants from Tissue Culture

Susan P. Martin<sup>1</sup>, Carol A. Bobisud<sup>1</sup>,  
and Terry T. Sekioka<sup>2</sup>

<sup>1</sup>Research Associate, <sup>2</sup>Kauai CES Administrator

Tissue culture plantlets sometimes do not survive when transferred out of the vessel into harsher greenhouse environments. Major changes involve humidity, light, nutrient source and the presence of pathogens. Plantlets in the flask range from larger to smaller, weaker plantlets. Many times it is the smaller, weaker plant that dies. A technique to increase the chances of survival of these plants has been developed by our laboratory. A "terrarium-like" plastic bubble is used to acclimatize and grow the plants from the flask prior to transferring to the greenhouse. Presently, the technique used to step-acclimatize the small cultured plants is in a plastic bag

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## Mulch is a Tool

*David Hensley, Landscape Extension Specialist  
CTAHR Department of Horticulture*

In landscape maintenance, mulch is a tool to be used by professionals. It is as important as a mower or a pruner in keeping the plants healthy and for reducing labor. Mulch reduces water loss, controls weeds, moderates soil temperatures, and reduces soil compaction. Some of us, however, forget how many landscape maintenance problems can be solved by mulching.

Mulch is any material used to cover the soil. I prefer organic mulches (bark or compost) to inorganic materials such as stone. While inorganic mulches provide the same benefits and do not require periodic replacement, they do nothing to improve the soil. Organic mulches break down yielding humus that improves the soil's physical and chemical properties. Organic appear more natural and be less formal than stone. Organic mulches, however, must be replenished annually.

Mulching a planting bed with three inches of a quality mulch reduces weed growth by up to 90 percent. Budget limitations sometimes reduce the amount of mulch that is actually applied and may limit the amount replaced. This is "voodoo economics." It saves a little money up front and spends more than saved later to remove weeds and deal with problems. The owner will be money ahead to be spend the amount needed for organic

material to be incorporated into the bed and used as a mulch. Unfortunately, most maintenance people have little say in this.

Replacing the grass and soil around a tree, sign, or other objects in the lawn with mulch eliminates trimming and speeds mowing. Creating a mulch barrier around trees also protects them from string "trimmer-itus."

Organic mulch can be used as a *construction cushion* when the landscape or turf must be crossed with heavy equipment. The layer of organic mulch cushions the soil and greatly reduces compaction. The mulch can be tilled in as a soil amendment when replanting the turf or landscape after construction.

Mulching a very cost effective means of conserving water. Mulching is one of the basic tenets of Xeriscaping®. It eliminates water loss through evaporation and by preventing competing weeds. Water percolation into the soil is improved by the mulch so greater benefit is received from irrigation.

Organic mulches are *not* fertilizers, however. Organic mulches provide a small amount of minor nutrients as they break down, but do not supply significant amounts of nitrogen, phosphorus, potassium, or other major nutrients. In fact, organic mulches can compete for nitrogen with landscape plants. The organisms that breakdown organic matter need nitrogen to grow and live. The microbes are more efficient nitrogen scaven-

## Organic Landscape Mulches

	Replacement life (seasons)	Availability	Notes
Leaves	< 1	high	Unattractive, tend to mat, can harbor mice, blow, and be a fire hazard. Longevity depends on species, but all are short.
Manure	<1	med. to high	Not in my landscape! Source of weeds and odor unless composted. Composted manure makes a high quality pleasing mulch.
Lawn clippings	1	high	Unsightly, smelly, pack and tend to repel water, can damage tender plants during decomposition and because of herbicide residues.
Shredded bark	1 – 2	high	Usually excellent and preferred material—texture depends on processing, color goes to dark brown or gray with time; select composted material if possible; fir, redwood last several seasons; pine can float. Hardwood bark also works well.
Sawdust or shavings	1	medium	Will require additional nitrogen unless composted or "fortified". Can float and blow. Redwood sawdust common as an amendment and lasts longer.
Pine needles	1 – 2	medium	Widely used in South. medium to fine texture, brown color. Acid.
Peat moss	1 – 2	high	Expensive as a mulch! Can float. Fine texture, brown color. Holds a lot of water—avoid in wet areas.



gers than trees and shrubs. This is not a problem unless (1) the fertility of the site is very low and no there is no fertilizer program to supply nitrogen, or (2) if the mulch is "raw" or will decompose rapidly. I have seen nitrogen deficiency symptoms when raw or uncomposted bark or sawdust were used.

Mulches are a valuable resource and tool for the professional landscape manager. Select and use them to reduce labor and save money.



Mulch reduces labor. The cost of the labor to pull weeds would have bought quite a bit of mulch.



When the money runs out. This landscape is not a prize-winner to begin with. However, now it is a maintenance nightmare. If only the owner or designer would have budgeted enough for mulch.

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of moistened sphagnum. After the plantlets are planted, a mist of water is sprayed into the plastic bag; air is blown into the bag to form a big bubble, and the opening of the bag is twisted and taped closed. Bags of plants are then placed on illuminated shelves. Plants are kept in this bag until they are of adequate size and/or hardi-

ness is attained. Three experiments were conducted to investigate suitable planting media for this technique. Plants used were pineapple clones t-132, t-0, t-155, and ttl-8, all obtained from the USDA ARS Plant Germplasm Repository, Hilo, Hawaii. Potting media used were perlite, sphagnum and peat-lite in experiments 1 and 2; sph-

continued on page 12

Table 1. Mean increase in fresh weight per plant, mean number of surviving plants per bag, and mean final dry weight per plant of pineapple clones grown in closed plastic bags in three experiments.

Clone	Medium		Increase in plant fresh weight (g)	Number of plants that survived per bag	Final plant dryweight (g)
Experiment 1	t-132	perlite	0.01	39.7	—
		sphagnum	0.10	49.7	—
		peat-lite	0.22	38.3	—
	t-160	perlite	0.01	39.3	—
		sphagnum	0.16	36.3	—
		peat-lite	0.28	35.0	—
Experiment 2	t-132	perlite	-0.06	31.3	0.03
		sphagnum	0.40	49.3	0.09
		peat-lite	0.24	49.3	0.09
	t-155	perlite	0.01	36.7	0.02
		sphagnum	0.37	40.0	0.10
		peat-lite	0.39	43.0	0.09
Experiment 3	ttl-8	vermiculite/perlite	0.05	49.7	0.03
		sphagnum	0.43	50.0	0.09
		peat	0.42	50.0	0.11

### Some Sources of Horticultural Books, Videos, and Software

Write, phone, or fax for free catalogs. Please let us know of others—thanks.

A.C. Burke & Co. 2554 Lincoln Blvd., Suite 1058, Marina Del Rey, CA 90291, Ph (310) 574-2770, Fax (310) 574-2771

American Nurseryman. 77 W. Washington St. Suite 2100, Chicago IL 60602-2904, Ph (800) 621-5727, Fax (312) 782-3232

Ball Publishing. P.O. Box 247, St. Charles, IL 60174-0247, Ph (888) 888-0013, Fax (888) 888-0014

C&P Press, Inc. 888 Seventh Ave., 28th floor, New York, NY 10106, Ph (212) 621-4601, Fax (212) 399-1122

Creative Educational Video. 1020 SE Loop 289, Lubbock, TX 79404, Ph (800) 922-9965, Fax (800) 243-6398

Edward R. Hamilton Bargain Books. P.O. Box 5005, Falls Village, CT 06031-5005

Forestry Suppliers, Inc. P.O. Box 8397, Jackson, MS 33284-8397, Ph (800) 647-5398 Fax (800) 543-4203

Grower Talks Bookshelf. 415 Bennett Rd., Elk Grove Village, IL 60007, Ph (888) 888-0013, Fax (888) 888-0014

Iowa State University Press. 2121 S. State Ave., Ames, IA 50014-8300, Ph (800) 862-6657, Fax (515) 292-3348

Prentice Hall. One Lake St., Upper Saddle River, NJ 07458, Fax (201) 236-7758

San Lius Video Publishing. P.O. Box 6715, Los Osos, CA 93412, Ph (805) 528-8322, Fax (805) 528-7227

The Haworth Press, Inc. 10 Alice St., Binghamton, NY 13905-1580, Ph (800) 342-9678, Fax (800) 895-0582

Thompson Publications. P.O. Box 9335, Fresno, CA 93791, Ph (209) 435-2163, Fax (209) 435-8319

Timber Press. 133 S.W. Second Ave. Suite 450, Portland, OR 97204, Ph (800) 327-5680, Fax (503) 227-3070

### New CTAHR Publications

*Dale Evans, CTAHR Editor*

A new group of publications for the landscape industry began with the one produced on page 11, *Selecting a tree care professional* (Landscape category publication L-1). Two other titles in the series are *Watering trees* (L-2) and *Mulching for healthier landscape plants* (L-3). These publications are designed to be of interest to homeowners as well as landscape professionals.

Some technical publications written for professionals in the landscape, ornamentals, and floriculture industries are included in the CTAHR publication category *Horticulture Research Notes*. Two recent titles are *Substitutions for peat in Hawaii nursery production* (HRN-11) and *Substituting Hawaiian composts for peat in growing media for hibiscus* (HRN-12).

These new publications are available on-line at the CTAHR website—direct the browser to:

<http://www.ctahr.hawaii.edu>

and go to "Publications."

Also, quite a few of the *Ornamentals and Flowers* fact sheets on plants useful for landscapes, including native Hawaiian species, have been revised during the past year. The most current versions are available to be downloaded from the CTAHR website. The subjects covered include wiliwili, Kauai white hibiscus, naio, ohia lehua, ma'o (Hawaiian cotton), aalii, hala, southern magnolia, wedelia, beach naupaka, Oahu white hibiscus, akia, hapuu (Hawaiian tree fern), monstera, oleanther, ruellia, coromandel, hemigraphis, and bamboo.

New or revised CTAHR fact sheets are often posted on the website before printed versions become available.





## Selecting a Tree Care Professional

Homeowners, property managers, and everyone working with plants can greatly extend the life and health of trees by practicing good gardening and maintenance techniques. Some tree maintenance jobs, however, are best handled by professionals.

*Arborists* are specialists in the care of individual trees. Arborists have the proper equipment, skills, and training to do work in large trees, around power lines, and at heights. Hiring an arborist should be a careful and detailed procedure. Safe and proper tree care is important not only as an investment but to minimize injuries and liability and extend the use and beauty of trees.

An arborist can provide services that include pruning, removal of entire trees, emergency tree care, root pruning, and cabling or bracing of branches. Many arborists also provide recommendations on tree selection and planting, fertilizer application, and insect and disease control.

How do you find an arborist? Check the Yellow Pages of the phone book under "Tree Service" or "Arborists."

How do you select a qualified arborist? Anyone can trim trees. Qualified and trained arborists, however, follow a set of professional, legal, and ethical guidelines.

1. Verify that the tree company is licensed. In Hawaii, arborists should hold a C-27 B license.

2. Ask if there is an International Society of Arborists (ISA)-certified arborist in the company, and whether the tree workers are certified by ISA. Voluntary certification of arborists is self-regulated to maintain standards of competence and up-to-date knowledge in the science and art of tree care. Certified arborists and tree workers must pass written and field tests to prove their knowledge and skills.

3. Ask for proof of insurance. Insurance should include personal and property damage coverage, as well

as workers' compensation. General liability coverage should be no less than \$1 million per occurrence. Hiring underinsured or uninsured workers could result in your personal responsibility for damages and injuries.

4. Request references from other, similar work done by the company. Always check the references, and, when possible, visit some of those sites. This is an important step. Would you buy a car sight unseen?

5. Unless you know or are comfortable with the arborist or the company, get more than one estimate. Do not always take the low bid. Check the credentials and the written specifications accompanying the bid or estimate. Determine the best combination of price, work to be done, skill, and professionalism.

6. Get it in writing. There should be a written, detailed contract specifying the work to be done and the cost. It is wise to include start and completion dates. Determine who is responsible for cleanup and disposal. Ascertain that the company has the proper tools and manpower to complete the job. Ask other questions.

Use caution and common sense. Be wary of door-to-door bargains for tree work. Most professionals will not operate on this basis, and choosing a nonprofessional can prove costly, dangerous, and ugly. Insist on proper and approved techniques. Some examples of unacceptable practices are tree topping, excess removal of live wood, and removing or disfiguring living trees without good cause.

Invest some initial time before you spend money, to be sure you obtain the best possible care for your trees. The result will be trees that are healthy, long-living, and increasingly valuable.

*Ginny Meade and David L. Hensley*  
*CTAHR Department of Horticulture*

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agnum, peat and a vermiculite-perlite mixture were used in experiment 3. A random sampling of fifty plants were selected for each bag of medium. There were three treatments with three bags per treatment for each experiment. Fresh weight of the plants was taken before and after the growth period of the experiment. Dry weight was also recorded at the end of the experiment, as was the number of surviving plants in each bag.

Because of small numbers of data and the non-normality of the data, the analysis of variance was not utilized. Means were evaluated. It appeared that in all of the experiments perlite or a perlite-vermiculite mixture was a poorer medium for plant growth, but not necessarily for survival. This could be because it is not as good a nutrient source. Survival may be more dependent upon factors other than medium (such as moisture in the bag, size of the plants, etc.). Peat, sphagnum, or a peat-lite medium all showed to be adequate and suitable media for growth using this technique. The advantage of this technique is the higher survival percentage of the smaller, weaker plants in the transition from the flask to pot. However, the additional step of planting in the plastic bag prior to planting in pots requires a longer time interval.

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*Caution: Pesticide use is governed by state and federal regulations. Read the pesticide label to ensure that the intended use is included on it, and follow label directions.*

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*Thank you.* We hope you've enjoyed this issue of *Landscape, Floriculture, and Ornamentals News*.

David L. Hensley

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Extension Specialists in Horticulture

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