

Department of Environmental Horticulture • University of California, Davis

GROWING Points

UC Davis Environmental Horticulture Department Establishes IR-4 Center

by Heiner Lieth, Ron Lane and Linda Dodge



<http://envhort.ucdavis.edu>

The Department of Environmental Horticulture at UC Davis has taken on the task of working with growers and the USDA Interregional Research Project #4 (IR-4) to develop data needed for registration of crop protection materials that are of interest to growers of specialty crops in the Western United States.

IR-4 is the only publicly funded program in the U.S. that conducts research and submits petitions to the Environmental Protection Agency (EPA) for registration of pest control agents on specialty crops. Specialty crops include nursery and landscape plants as well as cut flowers and potted plants (in addition to most vegetable, fruit, nut, herb, and spice crops).

The crop protection industry lacks incentive to pursue registrations on specialty crops for many materials because the low acreage involved means low return on investment. Recognizing this, the state land grant universities and the U.S. Department of Agriculture (USDA) organized the Inter-

regional Research Project #4 in 1963 to address the shortage of pest control options for minor crops. A separate Ornamentals Program was created in 1977 and, since then, over 9000 registrations have been processed for ornamentals. The Biopesticide Program to support research and registration activities on biological pest control agents began in 1982, and 1998 saw the establishment of a Methyl Bromide Alternatives Program.

The IR-4 Program has evolved as a bridge to registration by generating and supplying independent, high-quality research data needed by EPA in order to register compounds for use on specialty crops. Collaborations are the strength of the IR-4 program. Input is sought continually from the commodity production side of agriculture as well as from the crop protection industry, USDA and federal and state regulators.

The Environmental Horticulture Department at UC Davis has made a commitment to develop an IR-4 Center at the Department and we have begun to set up researchable projects. We have established a website at <http://envhort.ucdavis.edu/ir4>. In order to make the program most effective, we need industry input to identify labeling issues that will provide the greatest benefit to growers. Some examples of projects that would be considered for funding include:

Registering a material for a particular application where there is currently no effective, registered product.

Registering a material to provide a different class of chemical to use in a spray rotation.

Registering a material that provides a shorter reentry interval.

Registering a material that is currently registered, but does not contain provisions for commonly used application equipment such as ultra-low volume or electrostatic sprayers.

(Note that "material" refers to insecticides, miticides, fungicides, plant growth regulators, insect growth regulators, as well as various biological pest control agents.)

In addition to industry input, we also seek assistance to help us obtain plants and related resources for the experiments. The expectation of the IR-4 program is that the manufacturers supply the materials and that growers supply plants. The funding provided to us by the IR-4 program is fairly minimal and earmarked entirely for salaries. It is also of obvious interest to the industry to have us work with new plants and fresh materials for each experiment. Both growers and manufacturers benefit from this process in having their products included in the trials.

Our highest priority is to respond to the needs of the California ornamentals industry. We have identified a set of experiments that we will work on for the next few months. In addition, we are seeking industry input to identify experiments that we could begin this summer and fall, or at some time in the future. **GP**



The IR-4 Program facilitates the registration of pest control agents for specialty crops.

In This Issue... Brass Buttons on Golf Courses- page 2, EH Hosts Ag. Science Field Day for FFA

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***Cotula* sp. (Brass Buttons) and Its Control on Golf Courses in the Sacramento Valley** by Dr. Lin Wu, Dept. of Environmental Horticulture

A small, dicotyledonous plant known as Brass Buttons (*Cotula* sp.) has become a noxious weed on some golf greens in California's Sacramento Valley. This low growing weed forms large, rough patches on golf greens (Fig. 1). Broadleaf herbicide control has not been successful because of reoccurrence of the weed after eradication of the existing vegetation. The current method to deal with this problem is to remove it with a cup cutter and replant with bentgrass plugs. This management strategy is laborious but not successful because of the constant invasion of this weed on putting greens. One-third of golf greens on some of the golf courses in the Sacramento Valley are infested. In the summer of 2000, the Department of Environmental Horticulture at UC Davis collected plant samples from the Haggin Oaks Golf Course, which had suffered a large infestation. Samples were collected in May 2000 from golf greens, fairways and roughs and were grown



Figure 1. Dense, low growing patches of *Cotula mexicana* adapted to close mowing found on putting greens in the Sacramento Valley.

in the greenhouse. When the plants reached flowering stage, they were checked for taxonomy, flower morphology and vegetative growth habits. Three species having similar growth patterns were identified. They were *Cotula australis*, *Cotula mexicana*, and a species in the same family

(Asteraceae), *Solvia sessilis*. *Cotula mexicana* was found on golf greens as well as on fairways and rough areas. *Cotula australis* and *Solvia sessilis* were only found on fairways and rough areas. Twenty samples collected from the golf greens all were *C. mexicana*. *Cotula mexicana* is a perennial herb, rhizomatous and stoloniferous, with prostrate branches and glabrous leaves aggregated at branch tips. It can reproduce both by seeds and vegetatively by short rhizomes and stolons (Fig. 2).

Plant samples of *C. mexicana* were grown in the greenhouse (Fig. 3) and plugs collected from the golf course were transplanted onto the experimental green in the Department of Environmental Horticulture at UC Davis. Both the

greenhouse-grown and transplanted plants were treated with the herbicide Weed-B-Gon, which contains 10.60% mecoprop, 3.05% 2,4-D and 1.30% dicamba. The rate of application was diluted 25 times with deionized water. Both greenhouse-grown and transplanted plants were killed after two weeks of herbicide application. However, seedlings emerged from the killed spots after four weeks of herbicide application (Fig. 4). The emergence of weed seedlings after the eradication of the existing weeds suggests that seeds produced by the weeds under low mowing conditions were able to reestablish themselves after killing of the existing plants.

Plant species in the family Asteraceae, such as *C. mexicana*, *C. australis*, and *Leptinella filicula*, are genetically variable

and both erect and prostrate phenotypes have been found adaptive to different field habitats (Lloyd, 1981). *Cotula dioica* and



Figure 2. Individual tillers of *Cotula mexicana* from sod samples collected on a Sacramento Valley putting green. At left, a tiller with attached rhizome and roots; center, a single tiller; and right, a vegetatively reproduced secondary tiller.

C. maniototo have been used for bowling greens in New Zealand, but weed control is difficult compared with grass (Evans, 1984). Infestations of *C. mexicana* on golf greens in California seem to be increasing. This plant is capable of out competing a low-cut bentgrass sod. Without appropriate management, Brass Buttons can become a serious pest on putting greens in the Sacramento Valley.

Management recommendations

1. Remove existing large weed patches on the golf green using a cup cutter and replace them with bentgrass plugs. Apply broadleaf herbicide over the golf green to control small weed spots and seedlings.
2. To prevent introduction of weeds by foot and equipment from fairway and rough onto the golf greens use broadleaf herbicides to control the weed sources on the fairway and rough areas.
3. Brass Buttons seed begin germinating in late March. Apply broadleaf herbicides on golf greens in April to kill the infesting seedlings. Monitor golf greens through the year and apply herbicide if weed seedlings appear.

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EH Hosts Ag. Science Field Day for Local FFA Students

Early on Saturday morning, March 1st, thirty high school students descended on the EH department wearing the bright blue jackets of FFA and representing several local chapters of this agricultural education and leadership organization including Livingston, Selma, Woodland, West Valley and La Sierra. Their objective was to participate in the Ornamental Horticulture competition as part of Ag. Science Field Day.

Students began the day with a written exam on general horticultural knowledge with questions derived from CAN's Retail Nurseryman's Manual. They were then judged on their transplanting skills, transferring marigold liners to one-gallon pots. Next came the judging competition where students were required to rank four plants in each of the categories of trees, shrubs and flats of impatiens. They then appeared individually before judges for each category and explained the reasons for their rankings.

The final task of the day was to correctly identify 100 items set out on greenhouse benches including species names of annuals, perennials, houseplants, shrubs, trees,

vines and groundcovers (see photo). In addition, various tools and budded or grafted material had to be correctly identified. After a break for lunch, results were tabulated and individual and team awards were given out.



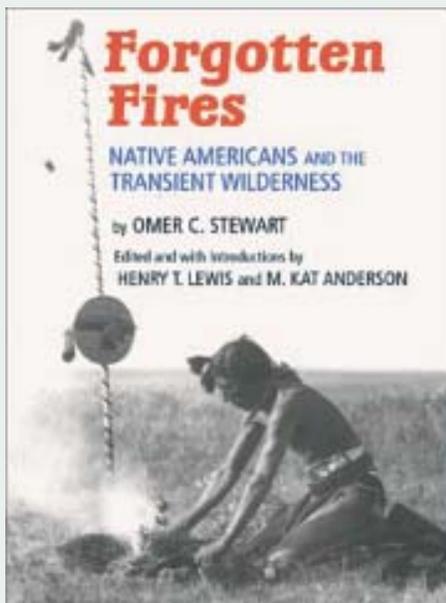
Mary Rowan, an undergrad in the Agricultural Management and Rangeland Resources program, served as the overall coordinator of the event. EH grad students Shannon Still and Neil Mattson along with several volunteers assembled the plants and other materials for the competition, much

of which was donated by Sacramento's Capitol Nursery. Grad student Jesse Hoekstra and SRA Linda Dodge served as reasons judges for the plant judging portion of the contest.

The mission of FFA is to make "a positive difference in the lives of young people by developing their potential for premier leadership, personal growth and career success through agricultural education." There are nearly 500,000 student members from all 50 states, Puerto Rico and the Virgin Islands. Originally founded in 1928, the organization changed its name in 1988 from Future Farmers of America to the National FFA Organization to reflect its evolution in response to expanded agricultural opportunities encompassing science, business and technology in addition to production farming.

FFA functions as one component of the overall agricultural education programs in the nation's schools. Classroom teaching with a practical approach and hands-on supervised agricultural career experience are the other components of the program. For more information, visit FFA's website at: www.ffa.org GP

Kat Anderson is Co-Editor of Important Work on Habitat Burning by Native Peoples



A common misconception about the native peoples of North America is that they lived in harmony with nature in a wilderness that remained pristine until the arrival of Europeans. Omer C. Stewart, an anthropologist at the University of Colorado, was one of the first to recognize that Native Americans made significant impacts across a wide range of environments. They regularly used fire to manage plant communities and associated animal species through varied and localized habitat burning. In the 1950s, he summarized his findings in a manuscript entitled *Forgotten Fires: Native Americans and the Transient Wilderness* that has remained unpublished until now.

Editors Henry T. Lewis, retired professor of anthropology at the University of Alberta, and M. Kat Anderson, ethnobotanist with the National Plant Data Center of the USDA's Natural Resources Conservation Service (based in UCD's EH department), were given access to Stewart's work and have presented his findings in the context of current knowledge about native hunter-gatherers and their uses of fire. Stewart's research shows that the North American landscape has been regularly shaped and renewed by the land and fire management practices of native peoples for thousands of years.

Forgotten Fires: Native Americans and the Transient Wilderness by Omer C. Stewart was published by the University of Oklahoma Press in November 2002 and can be ordered at their website: www.oupress.com GP

Popular New Plants for Your Garden by Linda Dodge

Visit any local garden center these days and you're likely to be overwhelmed by the variety of colorful container plants, perennials and bedding plants offered for sale. The fact that home gardening is now America's favorite pastime has motivated seed companies and vegetative propagators to develop a dizzying array of new cultivars in the past several years. At last year's California Pack Trials, over four hundred new varieties were introduced to growers and garden center managers to add to their palettes of plants consumers can't live without. In addition, the World Wide Web now allows producers to make detailed cultural information easily available to the general public to ensure gardening success and repeat business.

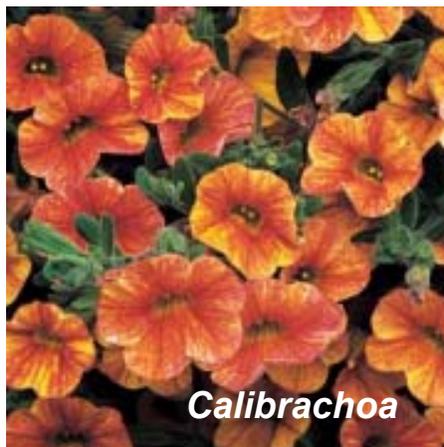
Three such genera of plants introduced to the gardening public in the 1990s that have become wildly popular are *Angelonia*, *Calibrachoa* and *Sutera* (bacopa). With the help of many talented plant breeders, these humble wildland plants have developed into garden treasures in a selection of forms and flower colors. One horticulturist who always has his finger on the pulse of new plant development is Dr. Allen Armitage of the University of Georgia. Much of the information here is taken from his excellent 2001 reference, *Armitage's Manual of Annuals, Biennials and Half-Hardy Perennials* published by Timber Press. This is a fun read, by the way, as Dr. Armitage has a great sense of humor.

Angelonia angustifolia- summer snapdragon

Angelonia is a genus in the Scrophulariaceae (snapdragon family) and



Angelonia



Calibrachoa

consists of thirty species but only selections of *A. angustifolia* and *A. integerrima* have been developed for home gardening. In their native tropical and subtropical South America, plants are found naturally in damp areas and are cultivated as perennials and shrubs. In the Northern Hemisphere, angelonia is hardy in USDA zones 9 and 10 but should be treated as an annual elsewhere. It is known by the common names "summer snapdragon", "angelonia" and "angel flower".

Angelonia plants reach a height of 18 to 30 inches and spread 1 to 2 feet across. The stems are upright with simple, entire leaves in an opposite arrangement. About a dozen flowers occur in a terminal spike-type inflorescence and each is up to 1 inch across and slightly two-lipped resembling a small snapdragon. Flower color ranges from white, pink and lavender to blue and purple.

The most appealing feature of angelonia is its tolerance of summer heat (and drought). It performs well in garden beds in full sun and will flower continuously under warm conditions. These bushy, upright plants also work well in large containers. Plants may require cutting back at some point during the summer and can tolerate a 12 inch pruning, after which they will branch and rebloom in two weeks.

Angelonia plants require good drainage and benefit from one or two fertilizer applications during the growing season. Because plants produce little or no viable seed, they are not likely to become weedy. Plants can be propagated by vegetative cut-

tings. Angelonia can also be used as a cut flower and is reported to have a soft scent.

Calibrachoa x hybrida- trailing petunia

Calibrachoa is a genus in the Solanaceae (nightshade or tobacco family) that was separated from the genus *Petunia* in 1985, when it was shown to contain four more chromosomes. There are about 25 species of *Calibrachoa* now recognized, mostly native to South America. Since 1988, Japanese plant breeders have developed several cultivars suitable for home garden use and gardeners have eagerly grown these plants since the mid 1990s.

Calibrachoa plants are winter hardy in USDA Zone 7 so they can be planted in fall as well as summer in southern gardens.

As the common name "trailing petunia" suggests, *Calibrachoa* plants are smaller, more prostrate versions of their familiar relative. Flowers are funnel-shaped and up to one inch in diameter, occurring profusely at nodes of the low-growing stems which can be up to twenty inches in length. Flower color ranges from white and yellow to pink, cherry, rose, red and blue. A variety with

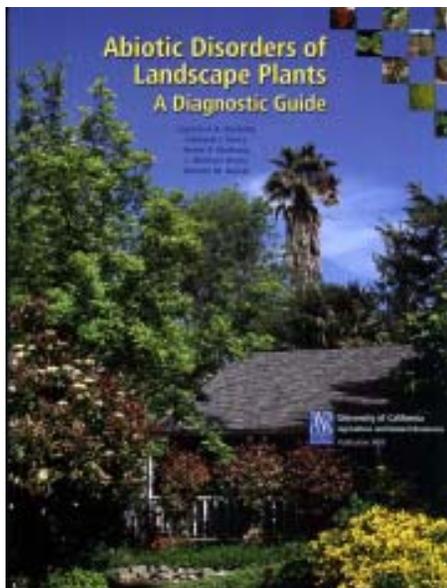


Sutera (Bacopa)

terra cotta colored flowers is also available. Full sun and long days are needed for maximum flowering. Little or no viable seed is produced.

Calibrachoa plants are suitable for rock gardens and the front of planting beds. Their trailing nature and smaller scale make them excellent for use in containers and

New Diagnostic Guide for Abiotic Disorders of Landscape Plants Available from ANR by Linda Dodge



Do you know if the plants around you are suffering from aeration deficit, specific ion toxicity, sunscald, girdling roots, graft incompatibility or herbicide phytotoxicity? These and other abiotic plant disorders, caused by environmental or physiological factors, can be responsible for as much damage to landscape plants as biotic (living) agents such as pests and diseases.

Now available from UC's ANR Communications Services as Publication 3420, *Abiotic Disorders of Landscape Plants- A Diagnostic Guide* is sure to be the definitive reference for landscape professionals and avid horticulturists on plant disorders caused by nonbiological factors. Among the authors are four UC Cooperative Extension landscape farm advisors- Larry Costello,

Ed Perry, Mike Henry and Pam Geisel. EH alum and horticultural consultant Nelda Methany completes the team of expert authors.

Illustrated with over 300 color photographs, most of this publication focuses on the occurrence, symptoms and diagnosis of 20 specific abiotic disorders affecting landscape plants. Problems related to environmental conditions include low and high temperature injury, sunburn, sunscald, high and low light, wind, air pollution, and lightning and hail injury. Cultural problems consist of water and aeration deficits, nutrient deficiencies, salinity, specific ion toxicity, pH, girdling and kinked roots, and graft incompatibility. Man-made problems include natural gas injury, mechanical injury and herbicide and other chemical phytotoxicities (see photo). Many helpful tables are included summarizing symptoms and causes. Tolerance of plant species to individual abiotic disorders is also outlined in table format.

Several other useful chapters are included to supplement the information on specific disorders. Methods used in the process of diagnosing plant disorders are summarized including tools to aid in examining plants and taking samples. A step-by-step diagnostic strategy is outlined to systematically ask the right questions and acquire the facts needed to render a good diagnosis. Guidelines for collecting soil, water and tissue samples and interpreting laboratory test results are included. Descriptions of naturally occurring plant char-

acteristics commonly mistaken for disorders are outlined. Case studies of actual problems, including their diagnoses and treatments, are also presented to illustrate the process and challenges involved in plant disorder diagnosis.

Abiotic Disorders of Landscape Plants- A Diagnostic Guide is the perfect companion to ANR Publication 3359 *Pests of Landscape Trees and Shrubs*. Make room on your bookshelves and order this comprehensive publication from ANR Communications Services by calling 800-994-8849 or log on to <http://anrcatalog.ucdavis.edu>.

GP



Distorted leaves on rose (Rosa sp.) caused by winter application of glyphosate (Roundup). Normal shoot is on the right.

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hanging baskets. At their peak, plants bloom so prolifically that the foliage is barely visible.

Sutera and Jamesbrittenia- bacopa

This trailing plant from South Africa first came on the market identified as a species of *Bacopa* or water hyssop in the Scrophulariaceae (snapdragon family). Further study revealed it, and subsequently developed varieties, to be

in the closely related genera of *Sutera* or *Jamesbrittenia*. Today's cultivars are identified taxonomically as *Sutera grandiflora*, *S. cordata*, *Jamesbrittenia breviflora* or *J. hybrida*. The name "bacopa" has stuck, however, and is now generally used as the common name for these species.

Used as an annual, bacopa has trailing, wiry stems with heart-shaped, toothed leaves. The flowers bloom from late spring through to frost, are star-shaped with five petals and usually less than one inch across.

Flowers can be white, lavender, scarlet or deep blue. Bacopa plants display best in containers, patio pots, window boxes and hanging baskets where the masses of small flowers can be readily seen. They work well as fillers in mixed container plantings and can also be used as flowering groundcovers. Give bacopa partial or afternoon shade and keep well watered. In hotter climates, plants may lose vigor and not flower as well. Plants are cold hardy to 28° F. GP



Notes From the Chair...by Heiner Lieth

EH Club Hosts Career Night

The Environmental Horticulture Club, made up of undergraduate and graduate students, held their "Career Night" event in early February, inviting a distinguished group of guests to speak about job opportunities in various horticultural fields. **John Anderson** of Hedgerow Farms in Winters talked about the field of habitat restoration and the growing demand for nurseries specializing in producing plants for restoration. **Kathleen Socolofsky** of the Davis Arboretum spoke of her experiences in the field of public garden management. EH alum **John Lichter** (MS 1990) related his adventures as a consulting arborist. **Don Shor** of Redwood Barn Nursery in Davis (EH grad in 1980) spoke of the trials and tribulations of the retail nursery business. Another EH grad **John Nitta** (1975) of High Ranch Nursery in Loomis talked about the challenges of running his large wholesale nursery business in an area experiencing rapid urban development. A question and answer session followed and the students' thoughtful questions revealed their

keen interest in the prospects for horticulture as their life's work. The common thread derived from all the presentations was that a genuine love of plants is the key to success in any horticultural profession.

Picnic Day Set for Saturday, April 12

The EH Department will once again participate in this annual event showcasing the UC Davis campus for student families and the public. Several guided tours of our research greenhouses will take place from 12:30 to 3:30 pm. The mini-seminars by faculty and staff are back by popular demand. The EH Club will be selling T-shirts and giving away bedding plants. We hope to see you there!

Student Accomplishments

Michael Barbour has had two of his graduate students pass their oral qualifying exams to advance to candidacy for the degree of Doctor of Philosophy this winter. **Fabrice De Clerck** is in the Geography Graduate Group and **Tom Rambo** is a member of the Ecology Gradu-

ate Group. Tom is co-advised by **Malcolm North**.

Kathren Murrell Stevenson, a doctoral student in Plant Biology studying with **Michael Barbour**, was recently awarded a Chancellor's Teaching Fellowship. The purpose of this program is to give outstanding graduate students valuable experience in a variety of teaching activities. Kathren will assist Dr. Barbour with the Trees and Forests course next fall. *GP*



Career Night host Shannon Still (in front) passes out EH T-shirts to the evening's speakers (from left to right) John Nitta, John Anderson (behind Shannon), Don Shor, Kathleen Socolofsky and John Lichter.

Environmental Horticulture Seminar Series, Spring Quarter 2003

Mondays 4:10 pm to 5:00 pm, Environmental Horticulture Dept. Room 146

DATE	TITLE	SPEAKER
Mar 31	Damage and Recovery of Sierra Nevada Conifers from Surface Forest Fire	Ed Royce Environmental Horticulture, UC Davis and Kennedy Meadows Field Station
Apr 7	Micropropagation, vitrification, and free radicals	Luis Pedro Barrueto Cid Environmental Horticulture, UC Davis and EMBRAPA, Brazil
Apr 14	Vegetative Propagation of Alstroemeria Species: Some Success but Mostly Failure	Roy Sachs Professor Emeritus Environmental Horticulture, UC Davis
Apr 21	Developing New Technology to Solve Perennial Insect Problems in Floriculture	Michael Parrella Professor, Department of Entomology and Associate Dean, CAES, UC Davis
Apr 28	Update on Nematode Management on Ornamentals	Becky Westerdahl Nematology, UC Davis
May 5	Biogeography of the Korean Peninsula - An Ancient and Diverse Flora	Woo-Seok Kong Professor and Chair, Geography Kyunghee University, Seoul, Korea
May 12	High-nitrogen, disease-suppressant compost as a medium for container-grown crops	Michael Raviv Head, Neve Ya'ar Research Center, ARO, Israel
May 19	Sensor systems for counting and sizing trees in commercial nursery fields	Michael Delwiche Bio. and Ag. Engineering, UC Davis
May 26	(no seminar)	Memorial Day
June 2	Comparative Genomics in Conifers	Kostya Krutovskii Institute of Forest Genetics, USDA/FS; Environ. Hort., UC Davis

News from the Center for Urban Forest Research

by Jim Geiger

10th Anniversary Celebration

The Center will hold a ceremony on Monday, April 7, 2003 to mark ten years of providing research on urban forest issues for the USDA Forest Service. The festivities will begin at 12:30 pm with a short ceremony to recognize the vision and inspiration of those that made the success of the Center possible. Light refreshments will then be served.

Urban Heat Island Presentation Coming Soon

Dr. Greg McPherson has been invited by the U.S. EPA to make a presentation during an urban heat island conference call scheduled for March 18, 2003. Greg's presentation will cover several topics regarding the mitigation of urban heat islands including "Strategically Planting Trees to Conserve Energy" and "How to do Parking Lots Right."

The call usually attracts 40-50 people working in environment or energy offices, non-profits, and industry (cool roofing, asphalt and concrete). Typically 3-4 main speakers participate and then some time is set aside for people to voluntarily provide updates.

To participate in the call contact Eva Wong, Heat Island Reduction Initiative (HIRI), U.S. Environmental Protection Agency, 202-564-3528.

Redesigned Website

The Center's website has a new look. Be sure to check it out at <http://cufr.ucdavis.edu>. The website contains descriptions of current research, many publications available in PDF format, staff information and a calendar of upcoming presentations along with much more of interest to urban forest issues.

Demo of New Computer Fire Tool is a Big Hit

The Center's new ecoSmart Design Software FireWise Tool was a big hit at the New Orleans National Fire Plan meeting in January. Dr. Greg McPherson demonstrated the tool—stressing the interactive capability of the computer-based tool that allows users to test various firewise techniques. A fire-

danger warning indicator rewards implementation of good landscape and structural practices. ecoSmart is a web-based software program designed to evaluate trade-offs between different landscape practices on residential parcels. It quickly displays buildings and landscape features on a graphical user interface. Components include FireWise, WaterWise and EnergyWise.

The FireWise component allows users to assess the threat of fire. They can place their home on a lot and interactively add, remove, grow, and prune trees. A fire-danger indicator warns them of the likelihood of structural ignition by changing from green (low), to yellow, to red (high) in response to changing amounts of radiant heat on the house. The FireWise tool is in the beta-test stage, and could be used to train those conducting residential fire risk evaluations or as a web-based self-evaluation tool in conjunction with work by local FireWise councils. Field testing will begin this spring in various locations in the West.

New Tree Guide in the Works

The newest in the series of community tree guides will be available by Arbor Day of 2003 (April 25). Titled *Northern Mountains and Prairies Community Tree Guide*, this new publication is designed for the Cold and Snowy climate region covering the northern tier of states from eastern WA, OR and AK to ND, SD and NE. Portions of KS, CO, NM, UT, NV and CA are also included. The tree guide will answer a number of questions about the benefits community trees provide. What is their potential to improve environmental quality, conserve energy and add value to communities? Where should residential and public trees be placed to maximize their cost-effectiveness? Which tree species will minimize conflicts with power lines, sidewalks and buildings?

This will be the fifth in the series of tree guides that already includes the Rainy Northwest climate region of western WA and OR, and the Inland Empire, South Coast and San Joaquin Valley climate regions of Califor-



nia. These publications can be viewed on the Center's website: <http://cufr.ucdavis.edu>.

Assessing Tree Canopy Cover

A recently completed study of tree canopy cover in Davis, CA by Scott Maco and Greg McPherson suggests that 25% tree canopy is an appropriate long-term target for Davis street and sidewalk surfaces, and may be applicable to other communities where the goal is to achieve a mix of ages and species. The study demonstrates a simple and efficient way to quantify a city's total canopy cover as well as the amount of cover over streets and sidewalks. The process is a starting point for managers who wish to make informed decisions regarding the benefits provided by street trees. The full article can be viewed at the Journal of Arboriculture website (<http://joa.isa-arbor.com>) in the November 2002 issue (Vol. 28, No. 6).

Staff Changes

Leaving – Dr. Lisa deJong's last day at the Center was February 7th. She was a fire research scientist who did pioneering work in South Lake Tahoe. She was with the Center only 18 months, but made significant contributions in furthering the understanding of the human side of fire management in the urban/wildland interface. Some of her work is available on the Center's website at <http://cufr.ucdavis.edu>.

Leaving – Sabrina Mathis, an ecology intern, is also leaving the Center. Her last day was February 21st. Sabrina was hired under the 1890 Scholarship Program in 1995 and completed her undergraduate work before coming to us in 1998. She recently fulfilled her contractual obligations under the Scholarship Program and has decided she needs a new focus in her life. Sabrina's long-term goals include law school in the fall of 2004, and some foreign travel. GP

Continued from page 2

Figure 3. Plants of *Cotula mexicana* grown in a greenhouse exhibiting a prostrate growth habit with glabrous pinnate leaves and small flower heads (2 mm in diameter).

References

Lloyd, D.G. 1981. Evolution of prostrate and erect habits in *Cotula* section *Leptinella* and other New Zealand plant groups. *New Zealand Journal of Botany* 19: 247-253.

Evans, P.S. 1984. The use of *Cotula* for bowling greens in New Zealand. *Journal of Sports Turf Research Institute*. 60: 37-44.

Acknowledgements

Mr. Larry Johnson, Superintendent of North Ridge Country Club in Fair Oaks, and Mr. Daniel A. Giammona, Superintendent of Haggin Oaks Golf Complex of Capital City Golf in Sacramento assisted in the survey of the weed infestations and sample collections on the golf courses. Ellen A. Dean and Jean Shepard of the UC Davis Herbarium provided assistance in plant identification. GP



Fig. 4. Occurrence of seedlings of *Cotula mexicana* on the experimental putting green after the existing vegetation was eradicated by a broadleaf herbicide.



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