



# CalEPPC News

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Exotic Pest Plant Council

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Land imprinting, along with mycorrhizal inoculation, formed the basis of a low-cost and effective restoration system at San Onofre State Beach. *Photo © 1999 Rick Riefner*

# Who We Are

**CalEPPC NEWS** is published quarterly by the California Exotic Pest Plant Council, a non-profit organization. The objects of the organization are to:

- Ψ provide a focus for issues and concerns regarding exotic pest plants in California;
- Ψ facilitate communication and the exchange of information regarding all aspects of exotic pest plant control and management;
- Ψ provide a forum where all interested parties may participate in meetings and share in the benefits from the information generated by this council;
- Ψ promote public understanding regarding exotic pest plants and their control;
- Ψ serve as an advisory council regarding funding, research, management and control of exotic pest plants;
- Ψ facilitate action campaigns to monitor and control exotic pest plants in California; and
- Ψ review incipient and potential pest plant management problems and activities and provide relevant information to interested parties.



## Please Note:

The California Exotic Pest Plant Council is a California 501(c)3 non-profit, public benefit corporation organized to provide a focus for issues and concerns regarding exotic pest plants in California, and is recognized under federal and state tax laws as a qualified donee for tax deductible charitable contributions.

# 1999 CalEPPC Officers and Board Members

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## Submission Dates for CalEPPC News

If you would like to submit a news item, an article, a meeting announcement, or job opportunity for publication in the CalEPPC News, they must be received by the deadlines listed below. Editor reserves the right to edit all submissions. Send your text/disk/email to editor's address above.

### Submission Dates:

<b>Spring...</b>	<b>April 15</b>	<b>Fall...</b>	<b>October 15</b>
<b>Summer...</b>	<b>July 15</b>	<b>Winter...</b>	<b>January 15</b>

The articles contained herein were contributed to the CalEPPC newsletter. These articles represent the opinions of the authors and do not necessarily reflect the views of CalEPPC. Although herbicide recommendations may have been reviewed in contributed articles, CalEPPC does not guarantee their accuracy with regard to efficiency, safety, or legality.

# President's Message

**Mike Pitcairn**

Planning is underway for **CalEPPC Symposium '99** which will be held at the Sacramento Inn on October 15-17, 1999. As before, the symposium will consist of a general session on changes in federal and state weed policies; invasive weed impacts; biodiversity; etc. This year the Program Committee has decided to open up a part of the symposium for oral presentation of submitted papers. I strongly encourage anyone interested in reporting their work on invasive exotic weeds to submit an abstract by April 30, 1999. All authors will be invited to publish a full length paper in the Symposium '99 Proceedings.

I believe this session of submitted papers will be an excellent addition to our symposium and will provide a more open format, allowing any member of CalEPPC an opportunity to highlight their work as well as an excellent opportunity for graduate students to present their research. The directions for abstract submission are discussed later in this newsletter.

CalEPPC is instigating a project that will assist members in their efforts to control invasive weeds. There are several lines of defense against invasive exotic weeds which include hand pulling, mowing, cut and squirt, and foliar herbicide applications. Most methods are costly, time-consuming and usually not 100 percent effective, requiring additional treatments over several years. The most effective and least expensive defense against invasive weeds is early detection and eradication. If an exotic weed can be identified before it has built up high populations, control is much easier, less costly, and more effective. Early detection needs to be

foremost in our efforts against invasive weeds. But the difficulty with detection surveys is that it is difficult to know if the new or unusual weed you observe is actually an invasive, exotic plant species or simply an uncommon native plant that is having a good year. For most of us whose responsibilities are stretched beyond our limit, it is

**“CalEPPC is instigating a project that will assist members in their efforts to control invasive weeds.”**

difficult to allocate the time needed to accurately identify unfamiliar plants, and even when the time is available, most of us would feel better if our plant identifications were confirmed by a specialist. What is needed, then, is taxonomic support; a group of specialists who can provide the necessary plant identifications so a land manager can perform surveys for early detection of exotics and have confidence as to the identity of the new or unusual plants collected.

As a result, CalEPPC is currently making arrangements with two plant taxonomic specialists to perform plant identifications for its members: Dr. Fred Hrusa, Curator of the California Department of Food and Agriculture's Herbarium in Sacramento, and Dr. Andrew Sanders, Curator of the Herbarium at the University of California, Riverside. Both taxonomists have

agreed to perform plant identifications for CalEPPC members at no charge as support for our efforts to survey and eradicate exotic invasive plants and we greatly appreciate their willingness to help in this way.

The details of how one can submit plant specimens are being worked out and instructions will be presented in the next newsletter. Roughly, one will be able to send specimens in the mail along with information regarding the date, location, and collector. The identifications will be transmitted back to the sender by either email or regular mail. The specimen identification and information will be entered into a database to record location and spread of these weeds. The location information may be published in the newsletter so that land owners and managers located near these sites will be alerted to watch for these plants on their property. Submission of plant specimens will be important for two reasons: 1) it will add to distribution information of these weeds; and possibly more importantly, 2) surveys by CalEPPC members will provide more eyes looking for these weeds. With more eyes looking, the chance of discovering new weed populations will be greatly increased and may result in better prevention and more effective control. Look for more information in the next newsletter.



# Nitrate Immobilization and the Mycorrhizal Network for Control of Exotic Ruderals

By Ted St. John, Ph.D., Tree of Life Nursery [DoctorTed@mycorrhiza.com](mailto:DoctorTed@mycorrhiza.com)

## ABSTRACT

Healthy native ecosystems resist invasion by ruderal plant species, and successfully restored sites acquire resistance to invasion as they develop. Several mechanisms have been proposed for resistance to invasion, but an argument is made here for rapid removal of soluble nutrient ions by a network of roots and mycorrhizal hyphae in the soil. Although the experimental evidence is as incomplete for this mechanism as it is for the alternative hypotheses, it has better predictive value relative to habitat restoration.

Development of the soil network requires time, during which ruderals can potentially preempt the site and cause project failure. This can be prevented by temporary removal of soluble nutrients through "anti-fertilization": introduction of organic carbon to cause microbial immobilization of nutrient ions. A full version of this and related reports may be found in pdf format at: <http://www.mycorrhiza.com/downloads.htm>.

## INTRODUCTION

Natural systems resist invasion by exotic or ruderal (weedy) species. In spite of a few well-known exceptions, healthy native ecosystems tend to contain only a few relatively stunted ruderal species. Ewel (1987) included resistance to invasion as one of the fundamental properties of a functional ecosystem. If we can understand resistance to invasion, we can use it to

establish native ecosystems without serious weed problems.

## THE MECHANISM

### Zone without weed invasion:

Zones of weed exclusion are very common at the boundary between native and ruderal (weedy) vegetation. Native perennial grassland seems to have the least resistance to invasion of our native vegetation types, and chaparral may have the most. Healthy, diverse coastal sage scrub is quite resistant, but annual grasses commonly invade degraded, species-poor coastal sage scrub. In Figure 1 below, a rather weedy stand of native *Nassella pulchra* meets a stand of chamise chaparral. The weeds (mostly annual grasses, including *Avena* spp.) drop out in a band around the brush. The native bunchgrass grows right up to the brush.

## Previously Proposed Explanations:

**Allelopathy:** Chemical forms of interference competition appear throughout biology, and undoubtedly take place among higher plants (Rice, 1984). The concept has been criticized because allelopathy is often invoked indirectly, by rejecting alternative explanations. There are many potential alternative explanations that are rarely or never addressed in allelopathy experiments (Harper 1977, Williamson 1990).

Without trying to resolve the allelopathy question in general, I would propose that the situation shown in Figure 1 is not adequately explained by allelopathy. There would have to be some means for allelopathy to select between ruderals (weeds) and natives, since the natives shown here have no problem entering the "exclusion zone." The other native



FIGURE ONE

## Nitrate Immobilization, con't.

shrubs likewise are not excluded from this vegetation. A microbe-based toxicity, as proposed by Kaminsky (1981) could explain the bare zone, but would not predict the selective exclusion of ruderals.

**Animal activity:** Herbivory is known to be a potent force in California native vegetation (Mills 1986), and has been proposed as an alternative explanation of some effects previously attributed to allelopathy (Bartholomew 1970; Halligan 1973; Christensen and Muller 1975). If rabbits or other herbivores are responsible for the situation shown in Figure 1, they have developed an unlikely preference for dry weeds over green native grasses.

### The Mycorrhizal Network:

Natural plant communities usually develop an extensive network of mycorrhizal fungi that interconnects the root systems of most plant species. This network performs and mediates numerous important ecosystem functions, and its destruction is the most far-reaching effect of soil disturbance (Brundrett 1991). Among the effects attributed to the network is the suppression of ruderal species (Francis & Read, 1994), an effect that depends upon close proximity of active hyphae to the roots of ruderal seedlings. The scene shown in Figure 1 could be readily explained by a network of mycorrhizal mycelium associated with the root systems of the shrubs.

### A Nutrient-based Explanation

An alternative to these explanations (but compatible with an association with the mycorrhizal network) is based on soil nutrient availability. While a rather unexciting mechanism, it stands up to the criticisms leveled at the mechanisms listed above. It depends

upon two well-established generalizations: that mechanical disturbance of the soil is, in effect, a "fertilization," and that ruderals are highly responsive to soluble nutrients, especially ionic forms of nitrogen.

There is no claim that this discussion presents an experimental test of these alternative mechanisms for resistance to invasion. However, the view proposed here has a great deal of predictive value. That is, it successfully predicts a way to suppress ruderals while encouraging natives. I present it for its practical utility, recognizing that the underlying mechanisms may be disputed or refined by future research.

**Mechanical Disturbance Liberates Soluble Nutrients:** A key reason that disturbed soils have a higher concentration of available nutrients is that while decomposition continues, vegetation is no longer continuously removing nutrients. St. John (1988) reviewed other factors contributing to this fertilization effect.

**Ruderals Respond More Strongly than Natives to Soluble Nutrients:** Perennial native plant species tend to require a lower rate of nutrient uptake than ruderals for a range of reasons: slow growth, evergreen leaves, and greater relative root growth are among these (St. John 1988). When we install a restoration project on disturbed ground we have already set the stage for disaster by creating the best possible conditions for ruderals and the worst conditions (lack of mycorrhizal fungi) for natives. Unless we intentionally inoculate the site with mycorrhizal fungi, the natives do not have the advantage of their natural means of absorbing nutrients. If we should double the insult by fertilizing (the usual way to compensate for a lack of mycorrhizal fungi) the odds

against the natives are often insurmountable.

## THE PROCEDURE

This mechanism of resistance to invasion is of use in restoration and weed control if we understand how it works and how to reduce the availability of nutrients at the restoration site. For the short term, soluble nutrients may be immobilized in microbial biomass through the addition of organic material on the surface of the soil. For the long-term, a healthy native ecosystem, with its network of roots and mycorrhizal hyphae, removes soluble nutrients through plant and microbial uptake, followed by their storage in live biomass and recalcitrant organic fractions.

**Short-term Immobilization with Organic Additions:** A decade ago (St. John 1988), I made what I believe to be the first suggestion of intentionally immobilizing nutrients as a part of habitat restoration "anti-fertilization." At that time, the restoration field in California was dominated by a landscaping approach that included fertilization, and the idea of intentionally making nutrients unavailable was unpalatable to all but the few restorationists at that time who were trained in plant ecology. Since that time the field has become populated with talented ecologists, and the topic has been the subject of experimental study (McLendon and Redente 1992, Morgan 1994, Zink and Allen 1998) and practical application (Claasen and Marler 1998). Questions that have not yet been fully resolved include the circumstances in which the procedure may be appropriate, the relative advantages of "hard" and "soft" organic materials, and alternatives that minimize the cost and labor required to carry out "anti-fertilization" on large areas.

*Continued page 10*

# CalEPPC Symposium '99

CalEPPC Symposium '99 will be held October 15-17 in Sacramento. The theme for this year's symposium is "Taking it to the Field; from Prevention to Management." The format will be somewhat different from previous years with a more open program.

Symposium '99 will include a general session with discussions of biodiversity, changes and news in federal and state invasive weed policies, and funding opportunities and grant writing. Other sessions will include talks on the biology and management of aquatic weeds and invasive annual grasses. Much of the Saturday program will focus on fieldwork related to prevention, eradication, and management of invasive weeds. Similar to last year's symposium, there will be two working group sessions and an update session with brief discussions of recent newsworthy items. Four field trips are being planned for Sunday including two full-day trips: one to Cache Creek to view saltcedar; the other to the Sacramento Delta to focus on aquatic weeds. The half-day trips will travel to the Consumnes River for perennial pepperweed, and to the Sierra Nevada foothills for Spanish broom and pampasgrass

Working groups for Symposium '99 will be artichoke thistle, Arundo, Cortaderia, yellow starthistle, Spartina, perennial pepperweed, fennel, saltcedar, brooms, veldt grass, Cape ivy, and volunteers. Please email Joe DiTomaso at <ditomaso@vegmail.ucdavis.edu> if you are interested in participating in one of these groups. We are considering adding new working groups of annual grasses, desert grasses, and/or a Weed Alert group if there is significant interest. We welcome suggestions for other potential working groups.

## Call for Abstracts

We strongly encourage members, colleagues, or students to submit an abstract for poster or oral presentation for CalEPPC Symposium '99. Graduate students are encouraged to present their research. All accepted abstracts will be requested to present a 15 minute oral presentation.

Topics of interest could include, but are not limited to, aspects of the biology, ecology, impacts, and prevention or management of noxious weeds. (Weed management issues include the use of volunteers, and development or implementation of control techniques or strategies.) Topics associated with restoration of weed-infested rangelands or wildlands are also welcome. Authors will have the option of submitting a full-length paper which will be published in the Symposium '99 Proceedings.

Abstracts should be no more than one page long. Indicate the title, all authors with their addresses and phone numbers, email address of presenter, and text. Use scientific names for all species at the first mention. Indicate preference for a poster or oral presentation.

Send abstracts by mail to: Joe DiTomaso, Weed Science Program, Robbins Hall, University of California, Davis, CA 95616, or through email to <ditomaso@vegmail.ucdavis.edu>. As an extra incentive, students presenting a research paper or poster will receive a 50 percent discount on their registration fee. The deadline for submitting abstracts is Friday, April 30th, so please get the word out to your colleagues, friends, and students that CalEPPC has a CALL FOR PAPERS!

## CalEPPC Symposium Proceedings Available

Proceedings from CalEPPC Symposiums 1995, 1996 and 1997 are still available for a nominal cost of \$10. Proceedings for the 1998 Symposium, which will be available in the summer, may be ordered for the same price from Sally Davis, 32912 Calle del Tesoro, San Juan Capistrano, CA 92675. Please make check payable to CalEPPC.

## Arundo/Saltcedar Workshop Proceedings Available

The Proceedings of the 1998 Arundo/Saltcedar Workshop is now available. This proceedings is 153 pages, contains 17 papers on Arundo donax and saltcedar, and includes extensive reviews of biocontrol prospects for both weeds. Copies have been mailed to all workshop participants. The Arundo/Saltcedar Workshop Proceedings may be purchased. Send a check in the amount of \$10, payable to the Ag Extension Trust Fund. Mail to Carl Bell, UC Cooperative Extension, 1050 E. Holton Road, Holtville, CA 92250-9615. Sorry, no purchase orders or credit cards. A few copies of the 1996 Saltcedar Management Workshop are still available, from the same source at the same price. Please identify which proceedings you desire. For further information, call Carl Bell at 760.352.9474 or email <cebell@ucdavis.edu>.

# Biocontrol of Saltcedar Update

**Ray Carruthers, Research Leader, Exotic and Invasive Weed Research Unit, USDA-ARS, Albany CA**

1). The US Fish and Wildlife Service has recently (December 28, 1998) submitted a letter of concurrence to the USDA-ARS proposed experimental release of two saltcedar biological control agents at 13 sites in several western states. This includes three release areas in California [Cache Creek (Yolo County), San Antonio River/ Salinas River (Monterey County) and Owens River (Inyo County)], and one site with three subsites (Lovelock, Walker River, and Humboldt River) in Nevada.

The other sites are in Texas, New Mexico, Colorado, and Wyoming. The project is maintaining a 200 mile buffer around sensitive willow flycatcher (*Empidonax traillii*) areas, and will be monitoring the impact of

the biological control agents on the vegetation to determine if any remediation (revegetation, etc.) will be necessary in the flycatcher areas once the insects have been released.

2). USDA-APHIS is now drafting a public notice for the Federal Register that will require a yet to be determined comment period (maybe 30 days) after which all comments will be evaluated and answered if appropriate and then a determination made as to the granting of a FONSI (Finding of no Significant Impact).

3). Based on a FONSI for the National Environmental Policy Act, APHIS will then grant a formal release permit to ARS. Based on the

issuance of this permit, ARS will work with cooperators to release and evaluate these agents, as soon as the Spring and Summer of 1999.

4). An organizational meeting was held on the 10-11 of February in San Diego to establish working groups to oversee important aspects of this project on a national scale and to assess interest and involvement at the local level. Jack DeLoach of USDA-ARS in Temple, TX is the project coordinator. The meeting addressed methods of release, natural enemy assessments, natural enemy dispersal, impacts on target plant, associated wildlife impacts, overall project coordination, and other relevant topics.

## Employment Opportunities

### Campaign Coordinator

The California Wilderness Coalition (CWC), a nonprofit environmental organization based in Davis, California, seeks a coordinator for the Wildlands 2000 campaign. Wildlands 2000 is a dynamic statewide campaign aimed at protecting millions of acres of California's publicly owned wildlands as legally designated wilderness. The campaign coordinator will be responsible for building support for the campaign among the public, media and policy-makers.

Specific duties will include: organizing support for local wild areas; securing favorable coverage in California media outlets; assisting in volunteer recruitment and supervision; and

building support for wilderness among elected officials at the local, statewide, and national level.

Full time position. Benefits included. Salary up to \$20,000/yr. For more information or to apply, contact: Paul Spittler, California Wilderness Coalition, 2655 Portage Bay East, Suite 5, Davis, CA 95616, (530)-758-0380, <paul@calwild.org>

### Temporary Field Biologist

The Santa Clara Valley Water District is seeking a person to assist their revegetation biologist in a wide range of indoor and outdoor duties including revegetation plan/specification preparation, seed scouting/

collection and vegetation monitoring/reporting. Work schedule is flexible and demand is variable but estimated to be 2-3 days per week. Starting April 1999.

Skills: Computer capability; familiarity with native, weed and ornamental flora; hands-on revegetation or landscape installation experience desired.

Minimum Qualifications: Bachelors degree or equivalent experience in plant biology/ecology or horticulture preferred.

Contact: Send resume to Linda Spahr, Environmental Resources Management Unit, Santa Clara Valley Water District, 5750 Almaden Expressway, San Jose, CA 95118-3686.

# Weed Scientists and Resource Managers Need to Begin Lobbying for a Center to Combat Biological Pollution in the United States

**Don C. Schmitz, Florida Department of Environmental Protection, Bureau of Aquatic Plant Management**

When the public perceives environmental issues, it generally concerns itself with how these issues directly affect human health and welfare. For example, after a series of local and national news reports about the dire effects of dumping hazardous waste in U.S. landfills and public lands during the 1970s, the U.S. Congress, reacting to public outcry, quickly passed legislation to manage materials harmful to public health. Likewise, air and water pollution concerns have received substantial legislative attention during the past thirty years and great strides in cleaner air and water have been achieved. Non-game wildlife issues, however, have not been a priority in the public's mind when it comes to environmental protection and legislative attention. The woefully inadequate funding for managing U.S. national parks is a good example. Even wildlife game interests may be on the decline in many states as their wilderness areas are converted to agricultural lands and urban centers. Sales of hunting and fishing licenses in Florida have declined during the last 13 years as Florida's human population has dramatically increased.

With the exception of "warm and fuzzy" endangered species like manatees, public interest in wildlife matters is usually focused on some perceived threat to humans. Cougar and bear attacks on humans receive national news attention. Africanized bee

attacks also attract the news media. Many of television's most successful wildlife documentaries are those that show predator-prey relationships; i.e., a lion chasing and catching a gazelle on the Serengeti Plains, and not those focusing on broader ecological issues such as habitat loss and degradation. Consequently, when a new environmental problem like invasions of non-indigenous plant species is recognized by weed scientists as a serious threat to the biological heritage of the United States, it is difficult to generate the needed public support to manage these problem species. Plants simply are not perceived to be a threat to human welfare. No matter how many symposiums and meetings weed managers hold, invasive plant species

**“With the exception of ‘warm and fuzzy’ endangered species like manatees, public interest in wildlife matters is usually focused on some perceived threat to humans.”**

seem to always take a public back-seat to critters, especially those that crawl, sting, or bite.

Worse, invasive weeds don't respect jurisdictional boundaries. A weed invasion within a natural area can encompass city, county, state, and federal jurisdictions. Although efforts to keep such species out of the U.S. are among the largest federal programs, and at least 20 federal agencies have regulatory oversight concerning research, use, prevention, or control of non-indigenous species, the results of these efforts have been fragmentary at best. In fact, this patchwork of agency involvement has often prevented a prompt and timely reaction to the introduction of harmful non-indigenous species, thus allowing their establishment and subsequent spread. In western states, invading weeds can quickly spread from state to state.

If weed managers are to be successful in obtaining the funding and attention this problem deserves, weed scientists must form alliances with other groups that deal with non-indigenous animal invasions. People and politicians generally have more concern with Africanized bee spread than with kudzu covering more than 2 million acres of the southern states. Other examples of non-indigenous animal invaders in North America include zebra mussels, the ruffe fish, gypsy moth, and the Chinese clam.

## Biological Pollution (Cont'd)

All of these animal invasions have, or will have, an enormous economic impact. In addition, the brown tree snake is poised to invade Hawaii, and possibly even Florida, threatening tourist dollars. That means that weed scientists should no longer hold the narrow view that the problem of non-indigenous weeds can stand on its own. Though plants form the biological matrix of most communities and invasions of foreign plants can seriously disrupt and/or destroy endemic ecosystems and render productive range lands useless, the public simply doesn't buy the concept that weeds are a serious threat to the environment of the United States.

Efforts must be undertaken to create positive change in our war against non-indigenous invaders! First, the concerns about plant and animal invasions need to be linked under one term: biological pollution. This is a term the public and politicians can understand and will likely respond to. Second, there is a U.S. governmental coordinating body that already exists which deals with prevention of new invaders, monitors existing outbreaks, conducts research, develops and advocates good management practices, implements prevention strategies, deals with state and local governments, and provides leadership and training that we can use for a model; the Center for Disease Control and Prevention (CDC). Although the invaders are different, diseases and non-indigenous plants and animals, the problem is essentially the same. The CDC has to coordinate prevention and management efforts with foreign governments, numerous federal agencies, 50 state agencies, and countless local governments and private organizations. Why not copy the CDC concept in our war against biological pollution in the United States?

**“Doing the same thing the same way and expecting change is a good definition of insanity.”**

I propose weed scientists and resource managers begin lobbying their Congressional Representatives for the establishment of a small National Center for Biological Pollution Control and Prevention using employees from existing federal agencies. If private foundation funds could be found, we might be able to avoid the Congressional route altogether and establish and operate the center as a non-profit institute near a major university. In either case, establishment of a National Center for Biological Pollution Control and Prevention is essential if we ever expect to stem the tide of non-indigenous invasions in North America. The benefits of such a center would be immense. This new center would support surveillance, research, prevention efforts, and training on how to deal with new infestations before they become a permanent fixture of the landscape. This center would work to help coordinate federal, state, and local efforts to remove problem species. A worldwide database could be established on invasive plant and animal species that could help alert various agencies to potential future problems. This center would be a single source where federal, state, and local governments, private organizations, and the news media could obtain current information and educational materials on biological pollution in the United States. More importantly, the center

could provide the leadership that is critically needed in our fight against non-indigenous species invasions. No war has ever been won without clear and decisive leadership.

The environmental problem of biological invasions has been recognized as a serious issue only during the last ten years or so. It is up to scientists and government officials to meet this onslaught with new and innovative ideas. Although the establishment of a Center for Biological Pollution Control and Prevention won't solve all of our problems, it will provide structure and an important step in our battle with biological invasions. Remember, doing the same thing the same way and expecting change is a good definition of insanity. Don Schmitz can be contacted at 850.488.2725 or <schmitz\_d@epic6.dep.state.fl.us>.



## Letters to the Editor

I am looking for information regarding false caper/Geralton carnation weed (*Euphorbia terracina*). Reported to be a Mediterranean dune plant. It was recently noted in Los Angeles, and spreading aggressively, forming monocultures. It has naturalized in Mexico.

Michael O'Brien  
<mobrien@planning.ci.la.ca.us>

## Nitrate Immobilization (cont'd)

### Long-term Immobilization by the Establishment of Nutrient Cycling:

Since organically-bound nutrients are re-released as the organic matter decomposes, any immobilization with organic matter is temporary. To maintain resistance to invasion over the long term, a network of roots and mycorrhizal hyphae, along with a growing vegetation, must be established by the time the organic matter begins to release soluble nutrients. This requires rapid and effective establishment of a densely-rooted vegetative cover. The decomposition rate of the organic material must be rapid enough to allow fast microbial growth, but not so rapid that nutrients are released before the native vegetation is ready to absorb the nutrients. The vegetation must include rapidly growing native species to serve as a sink for soluble nutrients, and good mycorrhizal hosts to rapidly build a network of mycelium in the soil. Clearly, timing is critical, but the case studies reviewed in the next section provide evidence that these requirements can be met.

### CASE STUDIES

Land imprinting, along with mycorrhizal inoculation, formed the basis of a low-cost and effective restoration system at San Onofre State Beach (Riefner et al. 1998). This imprinter is equipped to place commercial inoculum in the soil as part of a one-pass ground-preparation and seed placement system. The effectiveness of the method depends heavily on the quality of the imprints and selection of appropriate plant species. If the imprinting is done well, mycorrhizal inoculation has a large effect on the diversity of plant species that succeed on site, and on the severity of the weed problem.

This method was described in the

trade literature by Riefner et al (1988), who successfully used it at San Onofre State Beach (see cover photo). This large and low-cost project made use of land imprinting and mycorrhizal inoculation on about 33 acres of weedy annuals (mostly *Brassica nigra*). Between 70 and 90% of the area has now become coastal sage scrub or a native grass-dominated intermediate vegetation of a type that has been steadily turning into coastal sage scrub. The organic material at San Onofre State Beach was the dry stalks of *B. nigra*. The last paragraphs of that publication summarize the sequence used at San Onofre. I have used the method on several smaller trials. These have now proven quite consistent, and the method apparently can be used at will to control *B. nigra* and annual grasses. Its utility against other invasive species remains to be verified, but most will likely be amenable to the method.

In the smaller projects, sources of organic matter included chopped weeds, green leaves and branches of *Baccharis pilularis*, straw, and litter from a stand of chaparral. I have used both commercial inoculum (VAM80) and native topsoil as sources of mycorrhizal fungi.

Readers may wish to try a small test plot. Wait until the soil is moist, then use a spading fork to break up soil compaction. It is not necessary to turn the soil, just insert the fork and rock it backwards. While the holes are open, toss in some granular inoculum or crumbled top soil (be sure it came from high quality, diverse native coastal sage scrub, grassland, or riparian woodland). Then repeat an inch or two away. This is slow going and appropriate only for small areas—on a big plot, use equipment to decompact the ground and incorporate the inoculum. When the area has been treated, broadcast your seeds

and the organic matter that will be the temporary “anti-fertilization” agent. The seeds should include some good net-building natives, such as *Bromus carinatus*, *Eriophyllum confertiflorum*, *Isocoma menziesii*, or other fast-growing, shallow-rooted, short-lived native perennial grasses and composites. Other species may be in the mix as well, but it is essential to have the net builders.

Once the straw or other organic matter is down, walk over the site to press the seeds and organic matter into firm contact with the soil. Try to walk in such a way that you leave “imprints” in the soft soil. Imprints are depressions that will hold water and help protect new seedlings.

It will not do any harm to water in moderation if you want to get things started, but do not make the mistake of treating this like a garden. Let nature do the work. Unless you have a very high nitrate content (too high for the organic matter to absorb it all), or a weed that is unaffected by nitrate, you will become a believer in nitrogen immobilization and the mycorrhizal network.

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# CalEPPC New Members

**CalEPPC would like to welcome the following individual and institutional members who have joined CalEPPC in the months from December through February:**

Edith Allen  
Noah Booker  
Molly Boyes  
Lucy Chamberlain

Marin Conservation Corps  
Ellen Hamingson  
John Herr  
Jones & Stokes Associates

Rosemary Leen  
Callie Mack  
Raj Prasad

## News and Announcements

### Want to sell your Blue Gum?

California Woodfiber Corporation is currently looking for thousands of tons of eucalyptus, provided it fits into their price range. If you are a land-owner, manager, or agency that wants some *Eucalyptus globulus* removed and are at a standstill on what to do with all the wood, they are definitely interested in hearing from you. Contact Richard Stevens, Resource Manager, California Woodfiber Corporation, 1890 Parkway Blvd., West Sacramento, CA 95691, 916.371.3682, (fax) 916.371.5060, <michihiko-tamaki@email.msn.com>

**Collecting Blooms:** Tamarix will soon be in bloom. John Gaskin of the Missouri Botanical Garden is looking for volunteers to collect some population samples this spring or summer. The samples will help in understanding the population structure of invasive Tamarix. Any escaped Tamarix will be of interest. Please reply by email with your mailing address. John will send a packet with silica bags for collecting and complete instructions. Email: <gaskin@mobot.mobot.org> or call John at 314.577.5100 ext. 6207.

**Web Sites:** The CalEPPC web site is in the process of undergoing a series of upgrades. We will appreciate all instructive comments after you check it out at <<http://www.caleppc.org>>. Another web site which features a list of various invasive plant lists compiled from around the United States is located at <[www.taunton.com/fg/features/plants/invsive/index.htm](http://www.taunton.com/fg/features/plants/invsive/index.htm)>.

**New Invasive Update:** I was recently informed of a new invasive plant that occurs in Glen Canyon, in the East Bay, by Roy Buck, a professional botanist, named *Maytenus boaria*, Mayten tree. We don't know if it is in the park (Golden Gate National Park) or not, but it's likely to be planted in the vicinity by homeowners.

It's evergreen and grows slowly to moderate to 30-50 feet. 20 feet tall at 12 years is typical and it has the look of a small scale weeping willow. It suckers if the roots are disturbed, it will root voraciously near surface of soil and invade planting beds. It prefers good drainage but will thrive with ample water. Flowers and fruit are inconspicuous. *From Western Garden Guide*, submitted by Maria Alvarez.

### ERRATA

CalEPPC News, Volume 6 Number 3, should have been designated Fall 1998 edition.

# 1999 CalEPPC Membership Form

If you would like to join CalEPPC, please remit your calendar dues using the form provided below. All members will receive the CalEPPC newsletter, be eligible to join CalEPPC working groups, be invited to the annual symposium and participate in selecting future board members. Your personal involvement and financial support are the keys to success. Additional contributions by present members are welcomed!

## Individual

- Low Income \$15.00
- Regular \$25.00
- Family \$40.00
- Contributing \$50.00
- Sustaining \$100.00
- Lifetime \$1000.00

## Institutional

- N/A
- Regular \$100.00
- Contributing \$250.00
- Patron \$500.00
- Sustaining \$1000.00

Name \_\_\_\_\_

Affiliation \_\_\_\_\_

Address \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Office Phone \_\_\_\_\_

Home Phone \_\_\_\_\_

Fax \_\_\_\_\_

email \_\_\_\_\_

Please make an additional contribution in my name to:

Student/Low Income membership: \$ \_\_\_\_\_  
Cape Ivy Biocontrol Fund: \$ \_\_\_\_\_

Please make your check payable to **CalEPPC** and mail with this application form to:

CalEPPC Membership  
c/o Sally Davis  
32912 Calle del Tesoro  
San Juan Capistrano, CA 92675-4227

\* Students, please include current registration and/or class schedule



## Calendar of Events

May 18 - 21

**Fourth Annual Short Course on Constructed Wetlands for Water Quality Improvement**, Arcata. Sponsored by HSU. Cost \$800. Contact: Barbara Smith, 707.826.3619, <[http://www.olawai.org/short\\_course\\_1999.html](http://www.olawai.org/short_course_1999.html)>

September 7 - 11

**The Wildlife Society, 6th Annual Conference**, Austin, TX. Contact: 301.897.9770, <<mailto:tws@wildlife.org>>

October 15 - 17

**CalEPPC Symposium '99, Taking it to the Field: From Prevention to Management**, Sacramento. Cost \$80. Contact: Sally Davis, 949.487.5427, <[sallydavis@aol.com](mailto:sallydavis@aol.com)>

January 27 - 29

**2000 Annual Conference TWS: Field Biology in the New Century: Changing Roles of the Public and Private Sector**, Riverside. Sponsored by the Western Section of the Wildlife Society. Contact Mike Morrison, <<mailto:wildmlm@worldnet.att.net>>



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