

Update

California State University, Fresno

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Engineers eye mechanisms for planting elephant grass

A perennial forage grass recently introduced into the United States continues to impress researchers with its growth characteristics and performance as a feed supplement for dairy cattle.

With those successes recorded, Center for Irrigation Technology (CIT) research consultant Morton Rothberg is directing a new phase of development for elephant grass this year – finding a cost-effective way to plant it.

Elephant grass (also known as Napier grass, or by its new patent name, Promor A) is a clone of the Pennisetum species, which is grown in tropical climates throughout the world as forage for cattle and other domesticated animals, Rothberg reported from his temporary location in Brazil, where he is working with an equipment manufacturer to design a machine for stalk planting.

Having spent years in Brazil as a livestock management consultant,

Rothberg saw the value of elephant grass there and is leading California research efforts to determine if it can be used here as a cost-effective supplement to alfalfa. Recent feed trials with lactating dairy cows provided positive results.

“Elephant grass can replace 40 percent of the forage without detrimentally affecting fat-corrected milk yield and milk yield efficiency,” Rothberg reported. The study was conducted in partnership with animal science researcher Richard Zinn at the University of California Research Extension Station in El Centro, California.

Promor A irrigation studies, conducted at locations including Fresno

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Above: Cut grass is ready for baling.



Left: Center for Irrigation Technology consultant Morton Rothberg stands in a field to show height of elephant grass grown on Fresno State's university farm.

Winemakers to assess image as marketing tool

Winemakers from the north, south, coastal and inland regions of California will gather in one location next month to discuss the value of their regional images, or “terroir,” in product marketing.

Wine aficionados have coined the French term to refer to the special characteristics of geography–soil type, air temperature, and other microclimate factors—that enhance the quality and distinctiveness of a wine from a given area.

In California, wines from the Napa and Sonoma valleys have long enjoyed the marketing advantage of terroir, but that exclusivity may be changing. Wine companies from other areas of the state such as Lodi and the central coast region are establishing their own “terroirs,” which may eventually come to rival

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C A T I

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Oil from the olive

New planting at Fresno State offers production, research opportunities

More than 100 San Joaquin Valley growers, processors and farm equipment manufacturers gathered at Fresno State's University Farm this past fall to witness a unique event in Fresno County history: the first-ever mechanical harvest of olives for oil.

A few holdups occurred as minor repairs and adjustments were made to the converted grape harvesters used, but by the end of the day observers saw 20 acres of closely-planted olive trees "picked," producing about 20 tons of olives that were processed into Fresno State's first university-brand olive oil.

The purpose of the planting two years ago was to introduce a new cash crop to San Joaquin Valley growers, said field manager Gino Favagrossa, who oversees more than 200 acres of tree crops grown for both production and research purposes on the university farm.

"The climate in the central and southern San Joaquin Valley is proven for olive growing," Favagrossa said. "Companies like Oberti have grown fresh market olives in this area for years." What's new in this case is the tree variety and the production method, featuring close planting and mechanical harvesting.

"We are using an olive bred for high oil content and flavor. These are strictly for oil production," Favagrossa said. The decision to conduct the production trials was made based on recommendations by the university farm advisory committee: with U.S. olive oil consumption steadily increasing in recent years, opportunities



Left: A converted grape harvester machine picks olives on a 20-acre experimental plot on Fresno State's university farm

Below: Olives are conveyed into steel bin for transporting.

exist for local growers to contract with established processors, the committee believes.

One of those companies is California Olive Ranch, which has contracted with Fresno State to process and bottle the university's own labeled olive oil. Based in Oroville north of Sacramento, California Olive Ranch operates the nation's largest olive oil orchard and mill, and is looking for more growers in the San Joaquin Valley as partners in an expansion effort.

The firm has applied a close-planting strategy successfully used in Spain for the past 15 years, Favagrossa said. The semi-dwarf varieties Arbequina and Arbosana can be planted six feet apart and trained like grapevines, allowing modified mechanical grape pickers to be used for harvest. Once they reach their full height of about six feet, the trees require only minimal annual pruning.

In fact, the orchard grid setup is so similar to a vineyard, "you could basically take a vineyard out and put in the orchard. And the harvesting technology is already in place," Favagrossa said.

While the Fresno State plot is primarily for production and demonstration, research opportunities are already being discussed, Favagrossa said. Different strategies for tree spacing, along with other cultivation practices such as thinning and pruning also will likely be explored.

Many of the visitors to the univer-



sity's first commercial olive harvest responded with a "wait and see" attitude regarding their own investment, Favagrossa recalled. However, industry production and research partners are emerging. The 13,000 trees were donated by Nurstech of Gridley, California, and the oil processing through a special arrangement with California Olive Ranch.

Favagrossa sees the university's role in development as opening a gateway for growers to follow through.

"I think there is a place for olive oil production here in the San Joaquin Valley. We may be on the frontier of something big," he said.

For more information about Fresno State olive oil production and research, contact Favagrossa at 559-278-7945 or by email at ginof@csufresno.edu.

Upcoming event

March. 17-19, 2006 – Central California Agricultural Biotechnology Conference at the Tenaya Lodge in Fish Camp, California. For details, call or email James Prince, Fresno State Biology Department, at 559-278-2559 or jamespr@csufresno.edu.

Center for Agricultural Business

Conference to host top safety official

The nation's top occupational safety official will share insights into the most pressing safety and health issues of these times during the opening session of the 12th annual AgSafe Conference, to be held Jan. 31 through Feb. 2 in Seaside, California.

John Howard, M.D., director of the National Institute of Occupational Safety and Health (NIOSH), is the keynote speaker for this year's event and will address the conference Tuesday morning. NIOSH is the nation's top safety agency charged with conducting research and making recommendations to prevent work-related injury and illness.

Howard was appointed to his current post in 2002, following a term of service in California as chief of the Division of Occupational Safety and Health (CalOSHA) from 1991 to 2002.

Worker safety continues to be one of the top issues facing California agriculture, evidenced by the growing number of participants at annual AgSafe conferences, reported Kimberly Naffziger, director of AgSafe and program development specialist for the Center for Agricultural Business (CAB). Last year's

event drew nearly 500 participants over three days. This year several new classes have been added to address emerging issues, Naffziger said. Among them are three sessions on heat stress.

"Heat stress is one of the big issues in California," Naffziger said. "New technologies are being developed to provide heat stress relief for workers. It will be interesting to see how these new technologies can be applied to agriculture," she said.

In addition to the Tuesday morning keynote presentation, the conference will offer more than 70 workshops, seminars and training sessions address-

The tour will include visits to several successful agricultural operations in the Salinas Valley.

Between workshops there will be networking opportunities as well as vendor displays of safety equipment, services and supplies.

The conference is designed to benefit participants representing all areas of agriculture and agribusiness, including safety professionals, production managers, supervisors, chemical handlers, machine operators and company owners.

Joining AgSafe in presenting the event are the Center for Agricultural Business (CAB) at California State

"New technologies are being developed to provide heat stress relief for workers."

ing everything from ergonomics and confined space to worker transportation and substance abuse.

Courses one through five of the California Agricultural Safety Certificate Program will be offered. In addition, all five certificate classes will be presented in Spanish.

Other key issues to be addressed include workers' compensation, wellness programs, an aging workforce, and injury and illness prevention programs. Due to increased interest in training crew leaders, supervisors and forepersons, many of the classes will again be offered in Spanish.

Back by popular demand is the "Ag Tour" which will be held the afternoon of January 30.

University, Fresno; the National Institute for Occupational Safety and Health; the UC Center for Occupational and Environmental Health; and the UC Farm Safety Program.

Registration fee for the full conference is \$295 for AgSafe members and \$395 for nonmembers. Special discounts and day rates also are available.

For more information about the conference or other AgSafe activities call AgSafe at (559) 278-4404. Additional information, including detailed descriptions of the workshops, are listed on the AgSafe website at <http://agsafe.org> and on the CAB website at <http://cati.csufresno.edu/cab>.

Upcoming events

Jan. 30 – 12th Annual AgSafe Conference Ag Tour. Meet at the Embassy Suites Hotel & Conference Center in Seaside, California. For details, call 559-278-4404.

Jan. 31-Feb. 2 – 12th Annual AgSafe Conference at the Embassy Suites Hotel & Conference Center in Seaside, California. For details: 559-278-4405.

March 21 – Farm Labor Contractor Education Institute at the Radisson Hotel in Stockton, California. Presented in English and Spanish. For details, call 559-278-4677.

April 13 – Farm Labor Contractor Education Institute at the Embassy Suites San Luis Obispo, California. Presented in English and Spanish. For details, call 559-278-4677.



Center for Irrigation Technology

Air injection goes global

Positive results from San Joaquin Valley trials draw international attention

A new form of air-injection irrigation technology under evaluation by the Center for Irrigation Technology (CIT) is beginning to draw international attention.

CIT soil scientist Dave Goorahoo, who has directed the work since small-plot trials were initiated in 2000, recently traveled to Japan, by special invitation, to explain to farming industry and university representatives there the details of a system that has brought significant yield increases to vegetable crops in production trials in California's San Joaquin Valley.

Initial results, released by Goorahoo's team following the 2000 study, revealed yield increases of 33 percent count and 39 percent weight in bell peppers using an experimental system for injecting air into the crop root zone.

"We know that well-aerated soil favors root respiration," Goorahoo said. "Oxygen favors microbial activity and is also needed for large groups of fauna such as insects and earthworms, which improve the soil physical, biological and chemical properties."

Such improvements in soil character also make plants very happy, researchers have learned. Since the original test trials with peppers on Fresno State's University Farm, researchers have found industry cooperators to sponsor additional trials on full-sized commercial fields. The results have been similar: consistent increases in count and weight for peppers, honeydew and cantaloupe melons, tomatoes, as well as for broccoli and corn.



Above: Typical greenhouse method of growing strawberries in Japan is one possible application for AirJection® technology. Left: CIT soil scientist Dave Goorahoo explains system during invited presentation at University of Hokkaido in Sapporo, Japan.



CIT has partnered with the Mazzei Corporation of Bakersfield, California in testing several methods for injecting air into plant root zones. It is not done simply by pumping air through subsurface drip irrigation lines, Goorahoo explained.

"Injecting air alone resulted in a chimney effect, reducing the aerated soil volume to that area directly above the emitters," he said. Rather, the now-

patented system, developed by Mazzei and termed "AirJection® irrigation," uses high-efficiency venturi injectors. At a manifold

next to the field, the injector system creates a mix of fine air bubbles in the water, which is then pumped into the subsurface lines. From there the oxygenated water is emitted into the soil and percolates throughout the root zone.

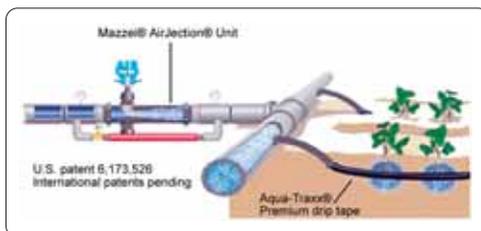
In a commercial field of honeydew melons grown in 2003, rows treated with the air injection system showed a 14 percent increase in number harvested and an average 16 percent increase in

weight per melon. Based on the price of melons that year, the increase translated into a gross sales profit increase of \$260 per acre, Goorahoo said.

It is that kind of data which has drawn the interest of international observers, including the Japanese company that funded Goorahoo's recent visit there. In Japan, where farm acreage is a premium commodity, there is high interest in using the technology for small farm and greenhouse application, Goorahoo said.

Based on current product pricing estimates, upgrading an existing subsurface drip system for air injection would cost somewhere between \$200-\$300 per hectare. The system is essentially permanent, as the lines and manifold can remain in place for years, Goorahoo noted. And because the

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Upcoming events

Feb. 14 – Agricultural Pumping Efficiency Program Chemigation Seminar from 8:30 to noon during the World Ag Expo, at Southern California Edison AgTac in Tulare, California. Call 559-278-2066 for details.

Viticulture and Enology Research Center

Industry partner's support will bolster education, research

Fresno State viticulture research will receive a boost this year through the direct financial support of a major wine industry partner.

Bronco Wine Company, owned by Fred T., Joseph S. and John Franzia Jr. and ranked fourth largest U.S. wine company by *Wine Business Monthly*, recently agreed to provide support for a chair within Fresno State's Department of Viticulture and Enology.

The 10-year pledge establishes the Bronco Wine Company Chair of Viticulture and provides a faculty position for undergraduate and graduate instruction and research, with emphasis in vineyard mechanization and precision management practices. As competition for grape and wine sales from other states and around the world increases, mechanization and improved management practices for producing better grapes at lower prices is becoming increasingly important.

The Bronco Wine Company Chair of Viticulture will work closely with wine and grape growers to continue improving production efficiency and quality in the vineyards of the San Joaquin Valley.

Bronco Wine Company produces wines under the Forest Glen, Coastal Ridge, ForestVille, Charles Shaw and

Fox Brook brands, among others.

Bronco controls in excess of 30,000 acres of California vineyards, processed approximately 350,000 tons of grapes during the 2005 season and will bottle more than 20 million cases of wine. The Franzia family has grown grapes and produced wines in California for more than 100 years.

This is the first step in a long-range plan to enhance education and research support for the San Joaquin Valley's grape and wine industry through the Viticulture and Enology Department and the Viticulture and Enology Research Center (VERC), reported VERC Director Robert Wample. More than 50

percent of the grapes used for wine in California are grown in the San Joaquin Valley, he noted.

Within the past five years, the faculty, staff and students at

Fresno State have demonstrated that high quality wines can be produced from

San Joaquin Valley grapes. Under the direction of winemaker John Giannini and winemaster and professor Ken Fugelsang, students have produced wines that have won more than 150 gold and silver awards at national and international competitions. For more information about Fresno State's winery, visit www.fresnostatewinery.com.

April conference to address wine microbiology

International experts in wine microbiology and winemaking will gather to discuss the latest industry and research issues at the International Wine Microbiology Symposium, to be held at the Tenaya Lodge in Yosemite April 4 and 5.

The event is sponsored by Fresno State's Viticulture and Enology Research Center (VERC). Leading the preparations is VERC research scientist and wine microbiologist Roy Thornton.

"This event will bring together key industry figures, supply companies, yeast and bacteria manufacturers, and academic researchers," Thornton said. "We have a very strong lineup."

One issue drawing attention is the presence of biogenic amines in wine, Thornton said. These natural products of fermentation can be a cause of headaches to wine drinkers, some believe. In fact, European governments are currently considering regulating biogenic amine levels.

To address the issue for California growers, he has invited a key researcher from France – Aline Lonvaud-Funel of University Victor Segalen Bordeaux, to report on research there. Other issues to be discussed include "Emerging Developments and Patterns of Microbes in Wine" and "What's Important—the Genotype or the Phenotype?"

Industry representatives will have a chance to address researchers during a session titled, "Wish List: What We Would Like to Have."

For program and registration details, visit the VERC website at <http://cati.csufresno.edu/verc> or call 559-278-2089.

Upcoming events

Jan. 24-26 – Unified Wine & Grape Symposium Exposition in Sacramento. For details, visit: <http://www.unifiedsymposium.org/>

Feb. 1 – 2nd Annual Viticulture & Enology Career Fair at Fresno State. For details, contact Manuel Olgin at 559-278-2381.

Feb. 23-24 – 9th Annual Central Coast Viticulture and Enology Issues Conference in San Luis Obispo. For more info, visit <http://>

cati.csufresno.edu/verc or call 559-278-2089.

March 3-5 – Fresno State Winemaker's Weekend at the Tenaya Lodge in Yosemite.

For more info, visit <http://www.tenayalodge.com> or call 559-278-2089.

April 4-5 – International Wine Microbiology Conference at the Tenaya Lodge in Yosemite. For details, visit the VERC website at <http://cati.csufresno.edu/verc> or call 559-278-2089.

JANUARY 06



CIMIS

California
Irrigation
Management
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System

CIMIS data quality control revisited: Solar radiation

If you have ever visited the CIMIS web site and retrieved data, you may have noticed letters such as A, H, M, etc. next to the data column. Most CIMIS data users already know what these letters stand for because they are explained in the legend at the bottom of each report. Our intention here is, therefore, to briefly describe how these flags are derived for one of the most important weather parameters – solar radiation.

The quality of a measured solar radiation data is normally evaluated by comparing it to a clear sky solar radiation. A clear sky solar radiation is the amount of solar radiation that can be observed at a given location and time under conditions of a cloud free sky. A measured solar radiation that is greater than the clear sky solar radiation is considered erroneous. Although there are many empirical equations to estimate clear sky solar radiation, CIMIS

Visit the CIMIS home page at
<http://www.cimis.water.ca.gov>

uses historical data to derive the maximum possible solar radiation at a given location and time. These historical limits will then be taken as the clear sky solar radiation.

After maximum values were extracted from the historical archives for each day of the year, optimization procedures were used to fit the maximum upper bound curve. This curve is then used to evaluate the quality of measured data.

Unfortunately, the quality control procedure described above can only flag if measured values are higher than clear sky value. This is so because it is difficult to discriminate between low values due to clouds and low values due to sensor errors. The solution to the latter

case is comparing measured values to either similar values from nearby stations or to previously recorded values by the same station. In the absence of patchy clouds, the spatial variability of solar radiation is small over a reasonably short distance. Therefore, if a data from a station stands out when compared to the corresponding values from nearby stations, it is a sign of a sensor problem. Also, if solar radiation at a given station remains the same for three or more consecutive days, it is a sign of a sensor malfunction.

CIMIS's automated quality control does not compare with nearby stations. However, the CIMIS staff regularly scan the data and manually run the comparison if they suspect them to be too low.

Quality control procedures for the other weather parameters are different from that of solar radiation. We will be presenting other methods in the future issues of Update.

For more CIMIS information...

CIMIS information is published quarterly in the CATI *Update* newsletter. Articles are provided by the California Department of Water Resources, CIMIS program staff.

For more information about CIMIS or its programs, contact any of the following representatives at these offices:

Northern District
Jamie Dubai
(530) 529-7367
dubay@water.ca.gov

Central District
Mark L. Anderson
(916) 227-7603
marcla@water.ca.gov

San Joaquin District
Steve Ewert
(559) 230-3334
sewert@water.ca.gov

Southern District
Sergio Fierro
(818) 543-4652
sergiof@water.ca.gov

If you are unable to reach a CIMIS representative near you, call the CIMIS Helpline at 1-800-922-4647.

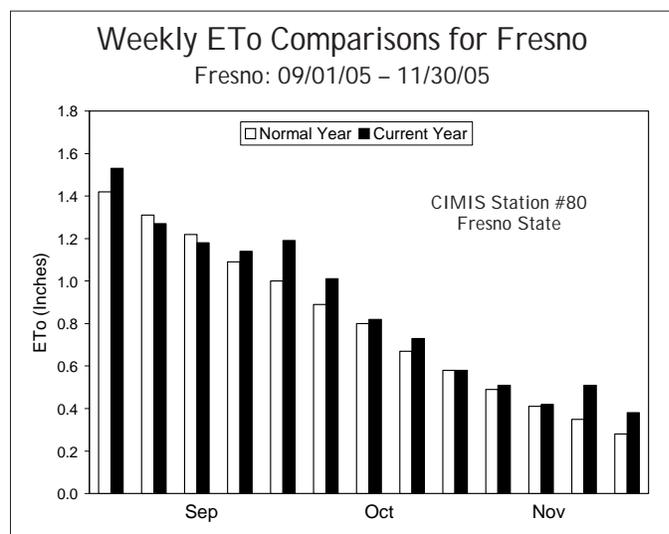


Chart shows ETo variation from normal over last three months.

Air: System may work in organic applications

from Page 4

system uses ambient air, it also could be well-suited for organic farming, he added.

Funding for this project has been provided by the California State University Agricultural Research Initiative (ARI), with additional funding from the California Department of Food and Agriculture's "Buy California Initiative" Specialty Crop Program. Continuing work will focus on water use efficiency, soil respiration, plant photosynthesis, insect/pest resistance, and rooting characteristics of various crops, Goorahoo said.

For more information on this research, contact Goorahoo through CIT at 559-278-2066 or via email at gooraho@csufresno.edu.

ARI/CATI on the Web!

The California State University Agricultural Research Initiative (ARI) oversees applied agricultural, agribusiness and natural resources research on behalf of California agriculture. For information on our research and project results, visit our website at <http://ari.calstate.edu>.

The California Agricultural Technology Institute (CATI) administers ARI funding and oversees additional applied agricultural research. For more information about CATI and its research centers, visit us at <http://cati.csufresno.edu>, or at our centers:

Center for Agricultural Business (CAB) – <http://cati.csufresno.edu/cab>

Center for Food Science and Nutrition Research (CFSNR) – <http://cati.csufresno.edu/cfsnr>

Center for Irrigation Technology (CIT) – <http://cati.csufresno.edu/cit>

Viticulture and Enology Research Center (VERC) – <http://cati.csufresno.edu/verc>

Agricultural Technology Information Network (ATI-Net) – <http://www.atinet.org>

Promor A: Stalk cutter design trials to continue with focus on billet cutter

from Page 1

State's university farm, have shown the forage to be "a highly-efficient user of water," with a Kc of 0.8 -1.0 and superior agronomic characteristics such as drought tolerance. It has thrived under irrigation by wastewater from dairy lagoons and other high-nitrogen-containing wastewater sources, Rothberg noted.

A key obstacle to Promor A use by dairy farmers is planting costs. The broad-leafed grass does not grow from true seed and is propagated by vegetative cuttings of the stalk. Because there is no existing mechanized propagation process, the stalk must be cut and replanted by hand in order to expand growth area.

However, that problem is simply the next challenge to be overcome, Rothberg said. In partnership with a Brazilian company, Rothberg is overseeing custom design work on a billet cutter that will enable it to cut or chop the Promor A stalks from mature stands and retrieve them for planting.

"Our goal is to develop a fully-mechanized system that will include a stalk cutter and an auto planter," Rothberg said. Initial trials with the billet cutter will be conducted in Brazil, while Rothberg is pursuing additional grant funds and industry support to



Baled elephant grass is ready to supplement traditional alfalfa forage mix.

develop an auto-planter here in California, he said.

Initial funding support for this research was provided by the California State University Agricultural Research Initiative (ARI). Project details are available in reports located on the ARI website at <http://ari.calstate.edu>. Use the search function to find projects featuring Rothberg's work with elephant grass, or contact him through CIT at 559-278-2066 or at morton@thetranslators.com.

Image: Wine blending to be discussed

from Page 1

that of their competitors to the north.

In an effort to help the state's entire wine industry explore and enhance marketing strategies, Fresno State's Viticulture and Enology Research Center (VERC) will host this year's Central Coast Viticulture and Enology Issues Conference with the theme, "The Economics of Terroir."

The conference will be held Feb. 23-24 in San Luis Obispo, California. Specific topics to be addressed include what is terroir, the economics of terroir for vineyards and wineries, the process for establishing an American Viticultural

Area, or AVA, and the legal aspects of wine blending.

Several discussions will take place over the two-day event, including "AVA's – Why & Why Not?" and "Promoting an AVA."

Keynote speaker Dan Berger, a syndicated wine columnist, will discuss the importance of AVA's to today's modern wine business.

For more information about the issues conference, including registration fees and deadlines, visit the VERC web site at <http://cati.csufresno.edu/verc> or call 559-278-2089. The preregistration deadline is February 2.

Study team aims to halt spread of pitch canker

A team of researchers has recently begun to conduct long-term Monterey pine forest management studies in an effort to learn more about pitch canker disease and how to prevent it from spreading.

This project, which comprises the initial phases of a larger effort, took place at California Polytechnic State University, San Luis Obispo's Swanton Pacific Ranch in Santa Cruz County, California. Nearly 50 acres of native Monterey pine from the Ano Nuevo stand are on this property, with approximately 35 artificially created Monterey pine plantations that suffer from pitch canker.

Researchers led by professor Douglas D. Piirto, chair of Cal Poly's Department of Natural Resources Management, collected pine cones from 14 Monterey pine trees with known pitch canker resistance ratings, then took the seed collected from them and planted it in greenhouse nurseries. The resulting seedlings were planted in cleared study sites and will be analyzed for their resistance to pitch canker by Dr. Tom Gordon at University of California, Davis.

Dr. Sauli Valkonen from the Institute of Finnish Forest Research has developed a growth model for Monterey pine, which



Research team members inspect Monterey Pine seedlings that will be planted in forest stands.

will help researchers to visually characterize the influence of pitch canker on Monterey pine stands. The growth model provided supporting documentation on the lack of suitable Monterey pine regeneration in native Ano Nuevo stands, which has validated the need for the larger Monterey pine/pitch canker regeneration study that is now under way.

Also, an evaluation of pitch canker rating systems and spread of pitch canker has been completed with reports made to the California Pitch Canker Task Force by Cal Poly personnel. A

GIS database has also been created, and maps have been developed.

This was the first study to characterize the structure and dynamics of Ano Nuevo Monterey pine stands.

To view and/or obtain a complete copy of the final report for this project, titled "Silvicultural and Management Strategies for Pitch Canker Infected Ano Nuevo Stands of Monterey Pine" (ARI project # 00-3-033), visit the ARI website at <http://ari.calstate.edu>. Go to "Funded Projects" and click on the Research Focus Area: "Natural Resources."

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Director of Operations: Joe Bezerra

Publications Editor: Steve Olson

Assistant Publications Editor: John Norton

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