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SUSCEPTIBILITY OF THE CARMINE SPIDER MITE TO SELECTED ACARICIDES

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The carmine spider mite, *Tetranychus cinnabarinus* (Boisduval), is an important pest of strawberries in all California production areas. Large numbers of mites can reduce plant vigor, leading to decreased yield or plant death. Acaricides have been frequently applied for the mite control, a practice which has rapidly led to acariticide resistance. Failures in chemical control of spider mites caused by the resistance have been reported for various acaricides. The rapid development of resistance in these mites is favored by their high reproductive potential, extremely short life cycle and arrhenotokous mating system. Resistance monitoring is an important component of a resistance management program. We previously reported susceptibility of the two-spotted spider mite to commonly used acaricides on strawberries. Here we report susceptibility of the carmine spider mite to these acaricides.

Material and Methods

Adult carmine spider mites were collected from commercial strawberry fields in Oxnard (Ventura County, CA) and maintained in colonies on strawberry plants in growth chambers. The following acaricides were used: Agri-mek 0.15EC, Oberon 2S, Zeal Miticide, Savey 50DF, and Acramite 50WS. Each of these acaricides was diluted in deionized water and at least 6 concentrations were used to produce a range of 5-90% mortality. Kinetic-1 (a nonionic wetter/spreader) was added to each solution of acaricides at a concentration of 0.1% (v/v). Top label rates of acaricides mentioned in this study are the manufacturer-recommended highest application rates in 200 gallons per acre to control the mite on strawberries in California. Most-recently fully-expanded strawberry leaflets were dipped into a solution containing specific amount of the selected acaricides and Kinetic-1. Control leaflets were dipped into kinetic water solution only. Four to eight replicates were used for each treatment rate and the control. After the leaf surface was dried, 30 spider mite adults were transferred from a colony to the abaxial surface of a treated leaflet in a Munger cell apparatus with a layer of wet paper facing the upper surface of the leaflet. Adult mortality was determined at 72 h after the initial exposure. Mites that were unable to walk at least a distance equivalent to their body length were considered dead. For the mite egg bioassay, 20 female adults were transferred to the abaxial surface of a leaflet hold in a Munger cell. After an oviposition period of 24 h, the adults were removed. The infested leaflets were dipped the above described acaricide solutions. After the leaf surface was dried, the leaflets were returned into the Munger cell apparatus. Egg mortality was determined at 7 days after the initial treatment. For the immature bioassay, the eggs were allowed to hatch. When the immatures reached the deutonymphal stage, they were transferred to the abaxial surface of the treated leaflets in Munger cells. The immature mortality was determined at 6 days post-treatment when the nymphs failed to develop into adults. Bioassay Monger cells were hold at 23 C and the papers were moistened when needed. The mite mortality data were corrected for control mortality and analyzed with probit. LC_{50} and LC_{90} for each acaricide were determined.

Results

Adult carmine spider mites were very susceptible to Agri-Mek (Table 1). LC_{50} of Agri-mek for adult carmine spider mites was 0.11 µg ai/ml, while the LC_{90} were 0.47 µg ai/ml, respectively (Table 1). The LC_{90} of Agri-Mek for adult carmine spider mites were near 24-fold lower compared to the top label rate (16 oz product/acre or 11.25 µg ai/ml). Susceptibility of carmine spider mite eggs and immatures to the selected acaricides is demonstrated

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in Tables 2 and 3. LC_{50s} of Oberon, Zeal, Savey and Acramite for the eggs were 0.32, 0.11, 0.12 and 39.2 µg ai/ml, whereas the LC_{90s} were 0.80, 0.41, 1.69 and 249.2 µg ai/ml, respectively (Table 2). The LC_{90s} were 187.5-, 197.6-, 69.4- and 1.20-fold lower, respectively, compared to their top label rates (Oberon, 16 oz/acre or 150 µg ai/ml; Zeal, 3 oz/acre or 81 µg ai/ml; Savey, 6 oz/acre or 117 µg ai/ml; Acramite, 1 lb/acre or300 µg ai/ml) (Table 2). LC_{90s} of Oberon, Zeal, Savey for the nymphs were 148.5-, 36.2- and 8.23-fold lower, and the LC_{90} of Acramite was 3.5-fold higher than their respective top label rates (Table 3).

Conclusion

Agri-mek, Oberon, Zeal, Savey and Acramite are commenly-used acaricides on strawberries in California. This research showed that Agri-mek was very effective in controlling carmine spider mite adults while Oberon, Zeal and Savey were effective in killing the eggs and immatures. Acramite was effective in killing eggs of the carmine spider mite but was not effective in killing the immatures.

The carmine spider mite, *Tetranychus cinnabarinus* (Boisduval), is an important pest of strawberries in all California production areas.

Table 1 Susceptibility of adult carmine spider mites to Agri-mek on strawberries

n	X^2	Slope ± SE	LC_{50}, µg ai/ml (95% CI)	LC_{90}, µg ai/ml (95% CI)	Top Label Rate (µg ai/ml)
773	90.30	2.02 ± 0.22	0.11 (0.08 – 0.16)	0.47 (0.27 – 1.78)	11.25

Table 2 Susceptibility of carmine spider mite (Tetranychus cinnabarinus) eggs to selected acaricides on strawberries

	n	X^2	Slope ± SE	LC_{50}, µg ai/ml (95% CI)	LC_{90}, µg ai/ml (95% CI)	Top Label Rate (µg ai/ml)
Oberon	712	30.8	3.2 ± 0.3	0.32 (0.25 – 0.40)	0.80 (0.58 – 1.49)	150.0
Zeal	1758	85.2	2.2 ± 0.1	0.11 (0.09 – 0.13)	0.41 (0.32 – 0.56)	81.0
Savey	1105	64.0	1.1 ± 0.1	0.12 (0.05 – 1.19)	1.69 (0.97 – 4.74)	117.3
Acramite	749	52.4	1.6 ± 0.3	39.2 (22.3 – 52.8)	249.2 (140.6 – 1394.9)	299.9

This research showed that Agri-mek was very effective in controlling carmine spider mite adults while Oberon, Zeal and Savey were effective in killing the eggs and immatures.

Table 3 Susceptibility of carmine spider mite (Tetranychus cinnabarinus) immatures to selected acaricides on strawberries

	n	X^2	Slope ± SE	LC_{50}, µg ai/ml (95% CI)	LC_{90}, µg ai/ml (95% CI)	Top Label Rate (µg ai/ml)
Oberon	516	50.9	3.7 ± 0.38	0.46 (0.35 – 0.56)	1.01 (0.82 – 1.43)	150.0
Zeal	417	44.4	2.1 ± 0.3	0.55 (0.40 – 0.72)	2.24 (1.47 – 5.32)	81.0
Savey	669	42.2	2.4 ± 0.22	4.24 (3.46 – 5.10)	14.25 (11.04 – 20.62)	117.3
Acramite	589	50.3	2.0 ± 0.24	241.0 (172.7 – 320.3)	1,042.0 (679.0 – 2406.0)	299.9

CHARACTERIZING RUST OF LEEK

Steven Koike, University of California Cooperative Extension
Les J. Szabo, USDA-ARS Cereal Disease Lab

In 2007, rust of leek was first reported and confirmed in California. At that time rust was found only on commercial leek fields in Santa Cruz County. Since 2007, the disease has occurred to some degree every season, with disease causing significant leaf damage in 2009 and 2010. By 2010, rust was also found in south Monterey County, though the disease continues to be more prevalent and severe in Santa Cruz County.

Initial symptoms on leaves consist of small (less than 1/8 inch long), circular to elongate, white to yellow flecks that later expand into oblong lesions (see photos below). The leaf tissue covering the lesions breaks open and masses of orange to brown orange spores (called urediniospores) become visible as raised pustules. Pustules are mostly found on the top sides of leaves. A second stage of this fungal pathogen, called the teliospore stage, results in the formation of dark brown to black pustules

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(see photo below) in and around the same orange urediniospore pustules. These teliospores tend to form on the older, declining leaves only.

Severely affected leaves were heavily covered with pustules and caused the leaves to prematurely senesce and decline. As with most rusts, rust on leek does not kill the plants but does reduce market quality due to the senescence of older leaves, pustules on younger leaves, and presence of orange spores on the harvested plant.

Rust on leek is a relatively new development on this crop in coastal California.

The leek rust pathogen is *Puccinia allii*. Previous research has shown that *P. allii* is a complicated organism and is not considered a single species, but rather is a "species complex" that is made up of different "types." Our molecular and host range studies indicate that this leek disease is caused by what can be considered as the "leek type" *P. allii*. This "leek type" pathogen can cause rust on leek, elephant garlic, and garlic, but will not infect onions or chives (see Table 1). Similar "leek type" *P. allii* is found in Europe and the Middle East. It is likely that this pathogen was recently introduced into California, though at this point we cannot pinpoint where it came from. We do not believe the California leek pathogen is the same fungus as the one found on leek in Europe and the Middle East. However, in the course of our research we have only examined a limited number of samples from Europe and the Middle East and have not analyzed samples from other parts of the world.

Our research confirms that this leek disease development is unrelated to the devastating garlic rust, caused by the "non-leek type" *P. allii* that affected California garlic in the late 1990s and early 2000s. This "non-leek type" rust pathogen can infect garlic, onion, and chives, but will not cause rust on leek or elephant garlic (see Table 1). This differentiation was further confirmed by numerous field observations in which garlic fields in 1999 through 2001 were severely damaged by rust while adjacent and nearby leek fields were devoid of rust. However, the current rust situation on *Allium* is confusing in that the rust that occurred on garlic in 2009 and 2010 can also infect leek. The current research data suggest that the rust pathogen population in California now consists of the "leek type" that has supplanted and replaced the now absent "non-leek type" found back in the late 1990s.

Note that some previously published articles and current fungicide labels may refer to a rust on Allium as being caused by *Puccinia porri*. This pathogen listing is an old name that is no longer valid. The fungus that used to be considered *P. porri* is now a part of the *P. allii* species complex.

Presently we are unaware of leek cultivars that are resistant to rust. Control of rust on leek will therefore probably rely on preventative fungicides that are applied prior to infection. Against rust on garlic, Quadris and fungicides containing tebuconazole provided excellent control when applied in a timely manner. For leek, possible fungicide choices include Quadris, Quilt XL, and Orius (a tebuconazole product). However, check product labels and consult with your local Agricultural Commissioner's Office for information on California fungicide registrations and allowable usage.

The leek rust pathogen can infect leek and garlic but does not affect onion.

Table 1. "Leek" and "non-leek" types of the *Puccinia allii* rust fungus on alliums

Type and source	non-leek from CA	leek from CA	leek from Europe	leek from Mid. East
CA situation	garlic outbreak in 1990s, early 2000	leek outbreak in 2007-2010	not known in California	not known in California
Teliospores? (dark spore stage)	yes	yes	no	yes
Infect onion?	yes	no	no	no
Infect garlic?	yes	yes	yes	yes
Infect leek?	no	yes	yes	yes
Infect chives?	yes	no	no	no
Infect elephant garlic?	no	yes	?	?

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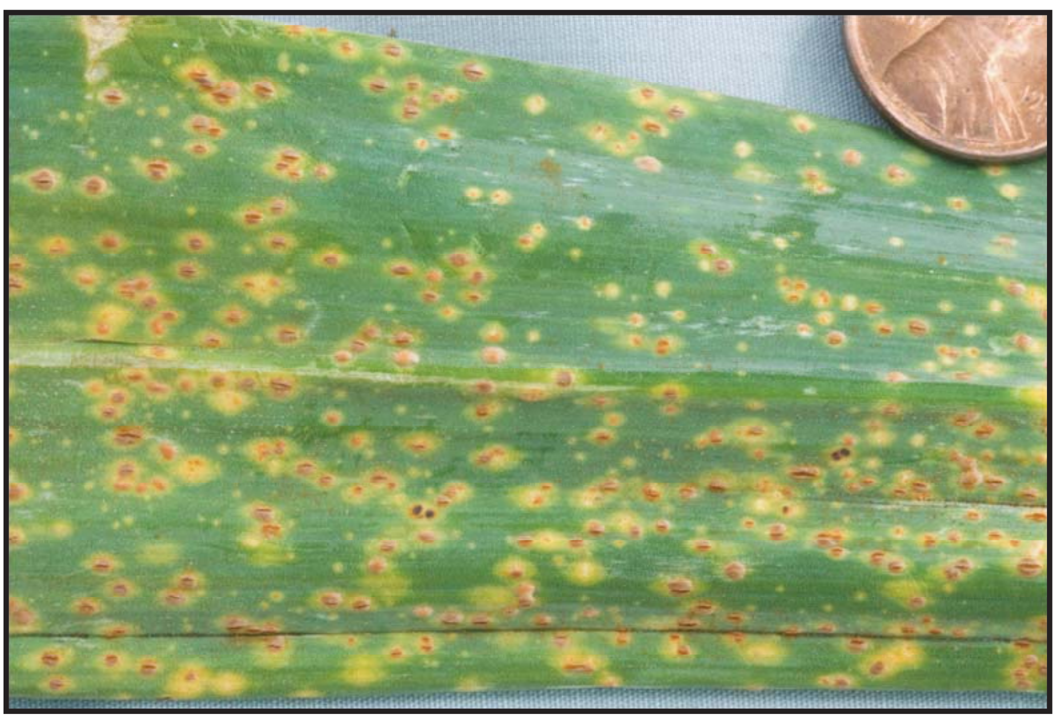
Rust pustules releasing urediniospores on a leek leaf.



Leek leaf showing profuse numbers of pustules caused by rust.

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Leek leaf infected with rust, showing the black teliospore stage of the disease.

SUMMARY OF NITRIFICATION INHIBITOR TRIALS

University of California Cooperative Extension, Monterey County
Richard Smith, Tim Hartz and Aaron Heinrich, Vegetable Crop and Weed Science Farm Advisor, Extension Vegetable Specialist and Staff Research Assistant

Nitrification inhibitors slow the conversion of ammonium to nitrate by temporarily disrupting the activity of the bacteria Nitrosomonas and Nitrobacter (Figure 1). These species are responsible for converting ammonium to nitrate, a process called nitrification.

Due to the issuance of the Agricultural Order by the Central Coast Regional Water Quality Control Board on November 19, 2010, there is greater urgency to finding ways of complying with the proposed restrictions on the quantities of nitrogen that can be applied to leafy vegetables. The nitrate quick test is the most effective tool for measuring residual nitrogen in the soil and reducing fertilizer applications accordingly. In 2010 trials we reduced nitrogen applications to 6 lettuce fields by 31% over the standard fertilizer program. The vegetable industry is also looking at other technologies to reduce nitrogen fertilizer rates of lettuce such as slow release fertilizers, foliar nitrogen applications and other technologies. In this article we discuss a promising technology, nitrification inhibitors, that has the potential to reduce nitrate leaching losses and improve nitrogen use efficiency.

Nitrification inhibitors slow the conversion of ammonium to nitrate by temporarily disrupting the activity of the bacteria Nitrosomonas and Nitrobacter (Figure 1). These species are responsible for converting ammonium to nitrate, a process called nitrification. Ammonium has a positive charge and is attracted to the cation exchange sites in the soil and is therefore less prone to leaching than the negatively charged nitrate molecule. Nitrification inhibitors are commonly used in the corn belt and have been shown, under certain conditions, to improve yield and reduce nitrate losses to leaching and denitrification. Instinct™ (formerly called N-Serve) is the most commonly used nitrification inhibitor in the corn belt and has been extensively studied for many years; however, it is not registered for use on lettuce.

Dicyandiamide (DCD) is the only nitrification inhibitor available for use on lettuce. The commercial fertilizer additive 'Agrotain Plus' contains DCD as well as a urease inhibitor to reduce ammonia volatilization; since ammonia volatilization is mostly an issue when fertilizer is surface broadcast (not a common practice in lettuce production), our interest in evaluating Agrotain plus was for the action of DCD. Data from a trial conducted at UC Davis on corn illustrates the potential benefits that nitrification inhibitors

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can provide to crop production (Figure 2). In this trial the yield of the 100 and 200 lbs N/A treatments were improved with the addition of Agrotain Plus. In response to this positive data we conducted a laboratory soil column study and three field trials with lettuce.

At UC Davis columns of soil were fertilized either with a coated urea fertilizer, or with coated urea together with Agrotain plus. These columns were incubated for six weeks at room temperature; at two week intervals they were thoroughly leached, and the amount of nitrate in the leachate was determined. The Agrotain Plus did suppress nitrate leaching through the first two leaching cycles (Fig. 3), with the effect wearing off thereafter. One reason for the short duration of activity is that DCD is reasonably soluble, and can itself be leached with excessive irrigation.

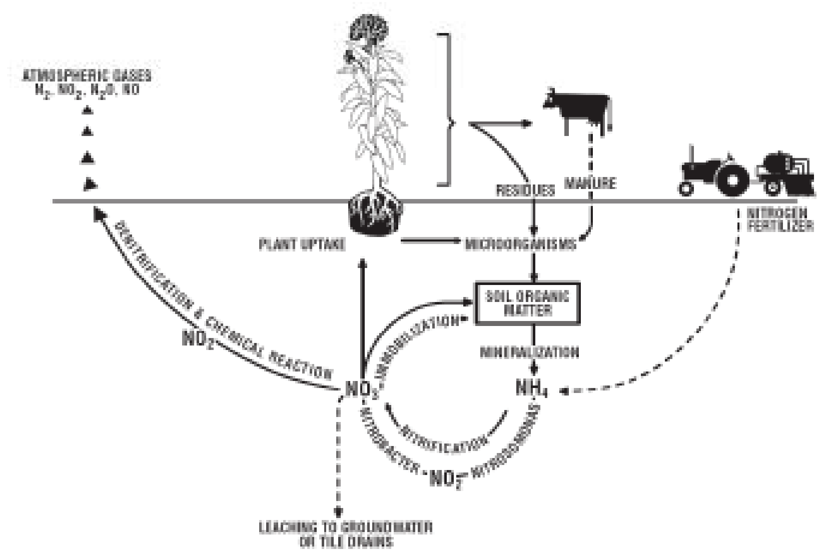
In all the lettuce field trials an untreated and standard treatments were compared with a low and moderate level of nitrogen with and without DCD. Agrotain was mixed with UN32 at the rate of 15 lbs Agrotain Plus per ton of UN32 (wt/wt) and injected in the drip irrigation system at thinning and 7-10 days following thinning (Figure 4). In all trials mineral nitrogen was monitored each week following thinning, biomass N and tissue nitrate were monitored 2-3 times per season and yield evaluations were conducted.

In 2008 we conducted an on-farm trial and one at the Hartnell East Campus Research Station. In these trials, no statistically significant improvements in yield or the nitrogen status of the soil were observed. In the on-farm trial, residual soil nitrogen levels were high and no yield response was observed in any treatments (Table 1). In the Hartnell trial, yield response between all fertilizer treatments and the untreated control was observed, but no differences between fertilizer treatments were observed (data not shown).

In 2010, we applied irrigation water at 120% of crop ET. Soil nitrate levels were low (app. 10 ppm nitrate-N) at the time of the first fertigation on June 15 (28 days after germination water DAGW) (Figure 5). The first soil nitrate evaluation following this fertigation on June 25 (37 DAGW) showed a clear separation between the 160, 110 and 60 lbs N/A rates. However, there were no differences between the 60 and 110 treatments with or without Agrotain Plus on this date. On the July 9 (52 DAGW), there was significantly higher nitrate-N in the soil of the 60+Agrotain Plus treatment than in the 60 lbs N/A alone.

Lysimeter data clearly shows an N rate response (Figure 6). There are no statistical differences between N rates with or without Agrotain Plus, but trends were observed that may be cause for optimism and clearly point the need for further research. Biomass, biomass N, leaf N and yield data show a clear N rate response (Table 2). No statistical differences were observed between N rates with or without Agrotain.

Conclusion: Nitrification inhibitors have potential to reduce nitrate leaching and increase nitrogen use efficiency. However, measurable agronomic or environmental improvement will not be seen in all field conditions. We believe that additional work is justified to develop ways to effectively utilize nitrification inhibitors in lettuce production.



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Nitrification inhibitors are commonly used in the corn belt and have been shown, under certain conditions, to improve yield and reduce nitrate losses to leaching and denitrification.

Nitrification inhibitors have potential to reduce nitrate leaching and increase nitrogen use efficiency. However, measurable agronomic or environmental improvement will not be seen in all field conditions.

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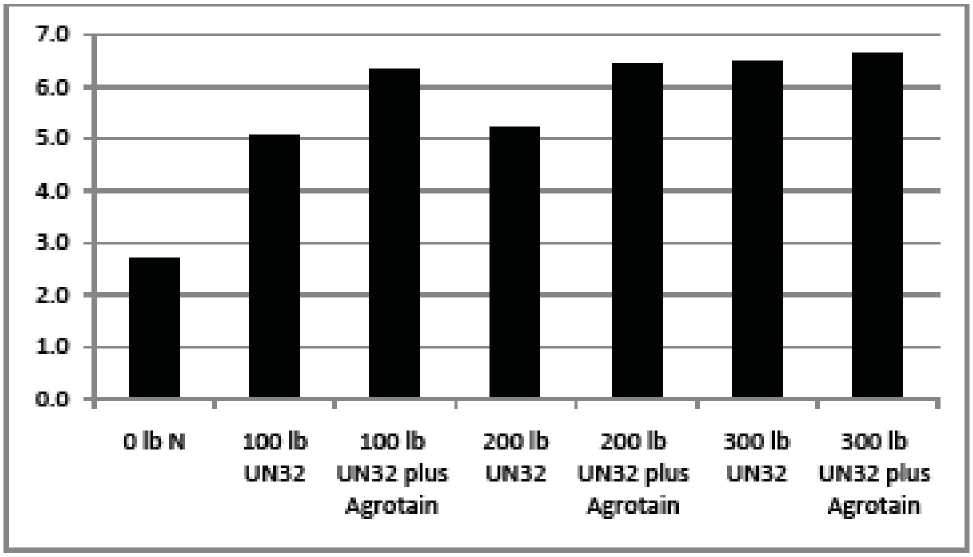

Figure 2. Corn yield in various fertilizer and fertilizer + Agrotain treatments (From J. Mitchell)

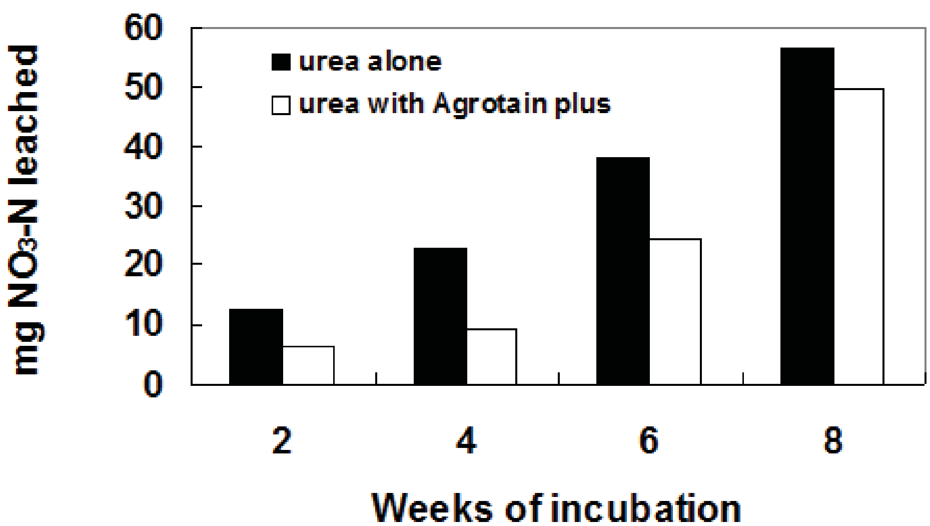

Fig. 3. Effect of Agrotain plus on nitrate leaching loss in UCD column study.

Figure 4. Fertilizer/nitrification inhibitor injection manifolds and fertilizer + Agrotain mixture

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Table 1. 2008. On-farm trial. Harvest evaluation on May 24.

Treatment total lbs N/A applied	Untrimmed yield lbs/A	Nitrogen in tops percent	Nitrogen in tops lbs/A	Trimmed head weight lbs/A	Mean head weight Untrimmed lbs/head	Mean head weight Trimmed lbs/head	Percent marketable after trimming
198.1 (Standard)	89,022.5	3.9	115.7	51,929.2	2.9	1.7	58.5
146.6+ Agrotain Plus	82,495.7	3.4	113.9	54,344.5	2.8	1.8	65.6
146.6	81,075.5	3.7	118.5	49,199.5	2.7	1.7	60.6
119.1+ Agrotain Plus	82,420.1	3.4	104.6	50,070.0	2.7	1.6	60.7
119.1	89,207.2	3.6	134.1	47,205.1	2.8	1.5	53.2
Untreated	83,229.3	3.4	112.0	46,262.1	2.7	1.5	55.2
Pr>F treat	0.0634	0.0027	0.7350	0.8129	0.1561	0.6673	0.5166
LSD 0.05	NS	0.2	NS	NS	NS	NS	NS

Table 2. 2010. Biomass and biomass N on two dates, % N in leaf tissue on one date and harvest evaluation on July 21

Treatments	T/A Biomass	Lbs N/A Biomass	% N in leaf	T/A Biomass	Lbs N/A Biomass	T/A Untrimmed	Lbs N/A Biomass	T/A Trimmed
	June 24		July 2	July 8		July 21		
Untreated	1.8	8.6	3.03	8.5	26.1	15.1	35.5	12.4
160 lbs N/A	2.2	14.6	4.62	15.5	72.4	35.1	112.0	28.7
60 lbs N/A	1.9	12.0	4.05	11.9	45.1	24.4	68.6	20.5
110 lbs N/A	2.2	14.3	4.47	14.3	61.3	32.1	95.8	27.5
60 lbs N/A + Agrotain Plus	2.0	11.2	3.92	12.2	45.9	26.0	72.0	22.7
110 lbs N/A + Agrotain Plus	2.3	15.0	4.40	15.0	62.7	33.0	99.6	28.1
Pr>F treat	0.242	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Pr>F block	0.079	0.041	0.011	0.281	0.239	<0.001	0.012	<0.001
LSD 0.05	NS	3.2	0.24	0.2812.4	9.3	3.8	13.7	3.4

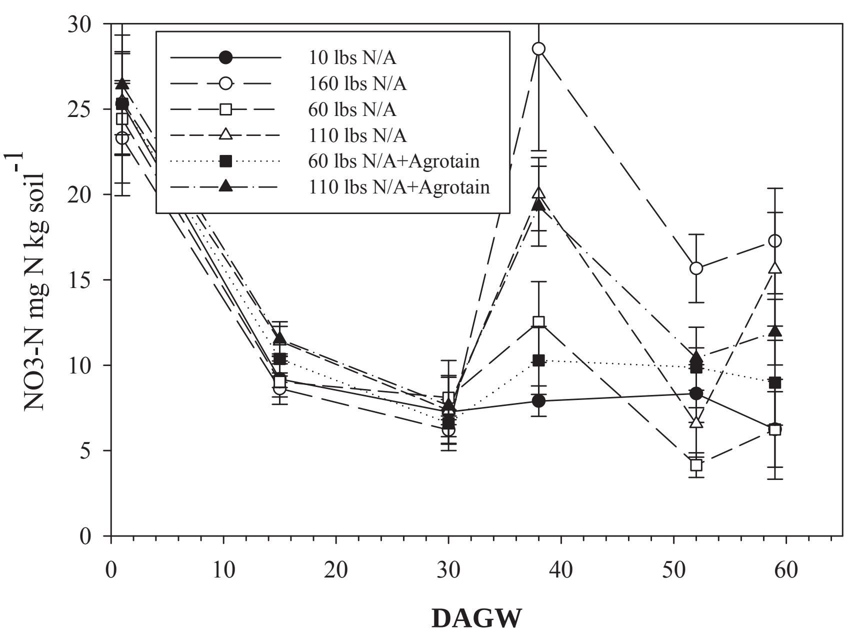

Figure 5. 2010. Soil nitrate-N over the growing season (DAGW = days after germination water). Error bars represent SE (n=3)

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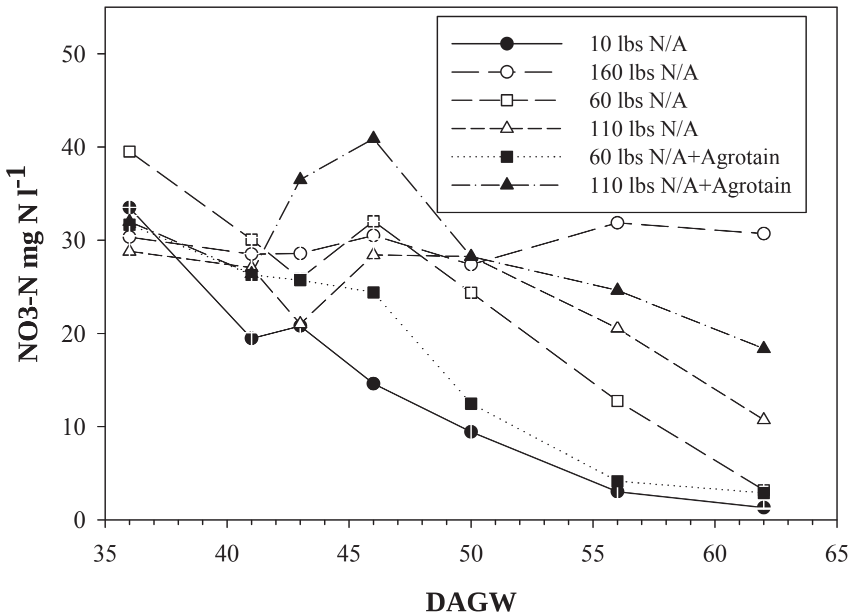

Figure 6. 2010. Nitrate-N concentration in leachate of various treatments

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NAMING OF A NEW RACE (RACE PFS 12) OF THE SPINACH DOWNY MILDEW PATHOGEN

Jim Correll, University of Arkansas
Steven Koike, University of California Cooperative Extension

Race 12 of the spinach downy mildew pathogen is now officially recognized.

Yet another new race of downy mildew (*Peronospora farinosa* f. sp. *spinaciae*) on spinach has been identified in California's Salinas Valley. The type, or original, strain was initially designated as UA2209 and was first detected in May 2009. Subsequently, it was found in an increasing number of locations throughout California in 2009 and 2010. This race breaks the resistance of several important cultivars. The race has been characterized on a set of differential cultivars and was designated as race Pfs 12 by the International Working Group on Peronospora (IWGP). The working group is located in the Netherlands and is administered by Plantum NL.

Race Pfs 12 poses a threat to the spinach industry because it is particularly well-adapted to most modern hybrids with resistance to race 1-11, which have been widely planted in the past few years. Race 12 is distinct from race 11 because of its virulence on the differentials Campania and Avenger. The appearance of a new race is not completely unexpected because hybrids with resistance to races 1-11 have been planted on a large scale. Similar developments have taken place when races Pfs 5 (1996), Pfs 6 (1998), Pfs 7 (1999), Pfs 8 and 10 (2004), and Pfs 11 (2009) were identified and named. The occurrence of Pfs 12 will create strong interest for Pfs 1-12 resistant spinach cultivars from both growers and breeders.

The IWGP is a working group of Plantum NL consisting of spinach seed companies (Pop Vriend, Monsanto, Rijk Zwaan, Nunhems, Takii, Sakata, Bejo, Enza, Syngenta, Advanseed), Naktuinbouw, and the University of Arkansas. The efforts of the group are supported by research activities at the University of Arkansas and the University of California Cooperative Extension—Monterey County. The aim of the IWGP is to monitor and designate new races of downy mildew in spinach, and to promote a consistent

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and clear communication between the seed industry, researchers, and growers about all resistance-breaking races that are persistent enough to survive over several years, occur in a wide area, and cause a significant economic impact.

IWGP is monitoring new races continuously by testing field isolates on a fixed, common host differential set of cultivars that contains the full range of available resistances. Researchers all over the world are invited to join the IWGP initiative and use the common host differential set to identify new isolates. For California, the Correll-Koike team will continue to receive and test spinach downy mildew samples for growers, pest control advisors, and seed companies.

For more information on this subject you can contact Steven Koike (stkoike@ucdavis.edu), Jim Correll (jcorrell@uark.edu), Diederik Smilde (d.smilde@naktuinbouw.nl), or IWGP chairperson Jan de Visser (JandeVisser@popvriend.nl).

Cooperative Extension regularly tests downy mildew samples for spinach growers.

Downy mildew is the most damaging disease of spinach in California and causes yellow and tan leaf lesions.

To identify downy mildew races, a series of spinach cultivars is grown and inoculated; races are identified based on which cultivars become diseased.

UC IPM Green Bulletin

The UC Statewide IPM Program and its Urban Pesticide Mitigation Outreach and Education Committee are pleased to announce the latest issue of the UC IPM Green Bulletin, posted at www.ipm.ucdavis.edu/greenbulletin. This issue features articles on Ground Squirrel Management (including a Management Calendar in English and Spanish), Trapping to Manage Pocket Gophers, an invasive pest alert regarding the Red Palm Weevil, and answers to common vertebrate pest management questions in our continuing column, Ask the Expert.

The Small Business Administration has funded Barich Business Services (BBS) (Alan Barich and Susan Arcady Barich) of Santa Cruz to build an Industry Cluster of Advanced Agricultural Technology companies -- that is, companies that dovetail technology into agriculture to help increase the bottom line for growers and shippers. BBS calls this initiative Project 17 after the 17th Congressional District that includes Monterey, Santa Cruz and San Benito Counties.

The Big Picture is that the Obama Administration is leveraging different agency and administration funds by identifying regional industry clusters across the nation and directing diverse federal funds into those clusters. Project 17 is one of 10 that was chosen from 173 responses nation wide, and it is the only federally recognized Agricultural Regional Innovation Cluster in the nation.

The Project's aim is to apply the technology oozing over the hill from Silicon Valley and in the region's many research institutions, like the Naval Postgraduate School and UCSC, to the area's powerful agricultural presence and tradition, and build a cluster of technology companies that emerge as the advanced agricultural technology center of the world.

Initiatives that are in the works for Project 17 include:

* Think Tank Sessions to create understanding of growers and shipper's challenges and issues
* An Advanced Ag-Tech Investment Fund
* An Advanced Ag-Tech Association for knowledge exchange, education and technical standards setting
* Ag-Tech Grant Support to bring grant capital to the region
* Agricultural Robotics
* Monterey Bay Regional Resource and Asset Inventory
* Monterey Bay Regional Business Plan Competition

Information can be found at http://www.Project17-MontereyBay.com

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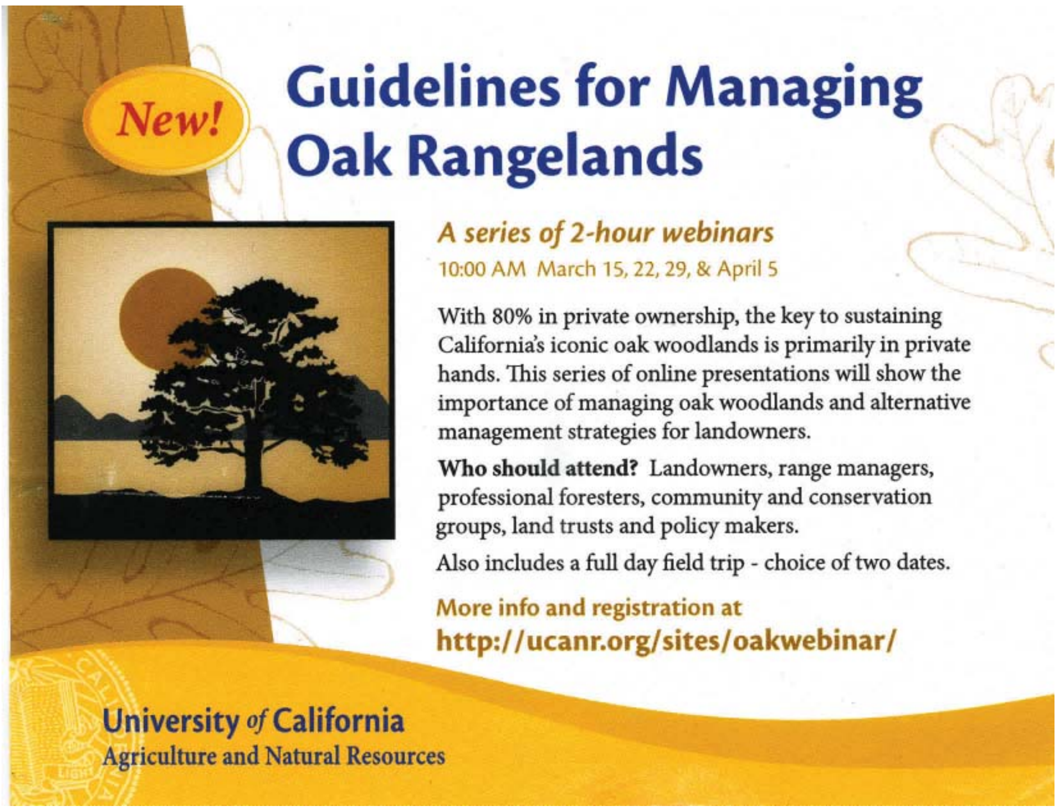
EDUCATIONAL OPPORTUNITY

Seed Biotechnology Center takes the Classroom to the Professionals – Seed Business 101™
Seed Business 101 was created with input from industry executives to accelerate the careers of promising new employees. It offers invaluable insights and perspectives to employees of seed producers, seed dealers and companies offering products and services to the seed industry, including seed treatments, crop protection, seed enhancement and technology, machinery and equipment. The purpose of this course is to shorten the learning curve for new employees teaching them what every employee must know about the main functional areas of a seed company in order to perform optimally in the team as quickly as possible and avoid mistakes. The course is designed to focus on optimum operations of the five major functional areas of a seed company: Research and Development, Production, Operations, Sales and Marketing and Administration.

Participants will acquire a broad understanding of the major aspects of a seed company's operations and cross-departmental knowledge of best practices for profitability. Case studies are designed to immerse participants in the decision-making roles in all five functional areas of a seed company.
Dates and locations for two new sessions planned for December 2011 and January 2012 will be announced soon. For more information contact Jeannette Martins, jmartins@ucdavis.edu or go to: http://sbc.ucdavis.edu/education/seed_business.html.

Joint Meeting of the **57th Annual Conference on Soilborne Pathogens** (formerly Soil Fungus Conference) and the **43rd California Nematology Workgroup**, March 21-23, 2011, University of California, Davis. This meeting has a relatively informal and highly interactive format that allows for provocative, short oral presentations on research and development discoveries, new or increasing disease problems, new applications, products and equipment, and other subjects. Participants come from universities (research, teaching, extension), private industry and technical service organizations, private practice/ consulting, municipal and state agencies, crop production and other areas.
For more information see http://soilfungus.ars.usda.gov.



2010 HEAD LETTUCE COST STUDY AVAILABLE

The head lettuce cost study for production on 40 inch beds under sprinkler irrigation was updated in 2010 and is now available at the Agriculture and Resource Economics Website at UC, Davis. The study can be downloaded at:

http://coststudies.ucdavis.edu/files/2010Lettuce_Wrap_CC.pdf

The study has a new format which is more aligned with the accounting formats commonly used by growers. For further information on this study contact Laura Tourte at 831-763-8005 or Richard Smith at 831-759-7357.

EDMUND G. BROWN JR.
GOVERNOR

MIKE DAYTON
ACTING SECRETARY

Cal E·M·A
CALIFORNIA EMERGENCY
MANAGEMENT AGENCY

January 31, 2011

Ms. Jane Parker, Chairperson
Monterey County Board of Supervisors
168 West Alisal St. 3rd Floor
Salinas, California 93901

Dear Chairperson Parker:

Pursuant to President Obama's January 26, 2011, major disaster declaration FEMA-1952-DR-CA, the processing of U.S. Department of Agriculture Farm Service Agency emergency loans for physical and production losses has been authorized for the primary counties of **Inyo, Kern, Kings, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Tulare** and the contiguous counties of **Fresno, Imperial, Los Angeles, Mono, Monterey, Ventura**. This disaster is due to damages caused by severe winter storms, flooding, and debris and mudflows that occurred December 17, 2010, through January 4, 2011.

The California Emergency Management Agency (Cal EMA) is providing the enclosed information regarding this designation. Please inform potential applicants throughout your county of this designation and information.

Sincerely,

KARMA HACKNEY
Program Manager

Enclosure

c: Monterey County OES
Monterey County Agricultural Commissioner
County Liaison Director, California Department of Food and Agriculture
Cal EMA Director, Office of Statewide Operations
Cal EMA Regional Administrator
Cal EMA Individual Assistance Section

3650 SCHRIEVER AVENUE • MATHER, CA 95655
OFFICE OF STATEWIDE OPERATIONS • RECOVERY DIVISION • INDIVIDUAL ASSISTANCE
(916) 845-8506 • (916) 845-8511 Fax

U.S. Department of Agriculture (USDA)
USDA #M1952 – severe winter storms, flooding, and debris and mudflows

Declaration Information

The following table illustrates the declaration information.

Eligible Primary County(s):	**Inyo, Kern, Kings, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, Tulare**
Eligible Contiguous County(s):	**Fresno, Imperial, Los Angeles, Mono, Monterey, Ventura**
Event:	Pursuant to President Obama's January 26, 2011, Major Disaster Declaration (DR-1952) as a result of severe winter storms, flooding, and debris and mudflow that occurred December 17, 2010 through January 4, 2010.
Assistance made available by designation:	• Emergency farm loans for actual losses as a direct result of the disaster • Up to a maximum of $500,000 • Interest rate 3.75 percent
Application deadline:	**September 26, 2011**
Who may apply:	Farmers and ranchers who conduct family-sized farming operations
How to apply:	• Contact local Farm Service Agency (FSA) office listed in the local telephone directory under U.S. Government, Agriculture • Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD)
USDA website for additional information:	www.fsa.usda.gov/pas/disaster/assistance1.htm