

Global Minor Use Priority Setting Workshop

— Information provided by Dan Kunkel, IR-4 Associate Director

At both the 2007 and 2012 Global Minor Use Summits, one consistent theme was the need for data and information sharing that is critical in addressing many minor use issues. Generating data is costly, while data-sharing promotes optimization of scarce resources needed for data generation. Shared information about priority “minor use data gaps” can facilitate partnerships for data generation and reduce overall costs to partners and also strengthen understanding and trust among stakeholders and between trading partners.


The Second Global Minor Use Summit participants recommended the establishment of a Global Minor Use Data



Sharing Subcommittee to create a database to better understand data needs and to promote data sharing. In 2014, the Global Minor Use Data Sharing Subcommittee launched a survey to begin populating a database. The Subcommittee is also taking the lead to address the Global Minor Use Summit’s recommendation for a face-to-face workshop where people could share their countries’ data gap needs.

Plans for a 2015 Global Minor Use Priority Setting Workshop are proceeding and the venue for the workshop is Chicago, Illinois on September 20-22, 2015. It will dovetail with the IR-4 Food Use (23-24) and Biopesticide Workshops (24-25) which will follow. Anticipated attendees will include international crop experts, growers, regulators, and chemical industry representatives. The charge of the group will be to build on a global needs database and to select pilot projects for shared data generation or data sharing. The group will be asked to consider

lower risk products and/or biologically based products to address their needs and in the process address potential trade issues before they arise.

For more information please contact Dr. Daniel Kunkel at kunkel@aesop.rutgers.edu. The Workshop will be chaired by Dr. Jerry Baron, IR-4 Executive Director and Mr. Craig Hunter, Ontario Fruit & Vegetable Growers Association. The Global Minor Use Data Sharing and Global Minor Use Steering committees organizing this meeting consist of over 50 members from 20 countries and organizations. 



Inside this issue...

- 2 Crop Focus: Quinoa
- 3 SOAR Award Winners
- 4 Ornamental Diseases
- 4 10 Year Survey Results
- 5 New QA in NCR
- 6 Transitions in WSR & NER
- 8 SolviNix® LC, is Registered
- 11&13 In Memoriam: John D. Nalewaja, Norman Glaze
- 14 FireQencher for Fire Blight

Dear Friends

Happy New Year and welcome to 2015. It is hard to believe that we are half way through this decade. I traditionally spend a significant amount of time during January and February attending commodity association and scientific meetings as well as completing Annual Reports. This year is no different. This year we are pleased to note that we already know the funding level for 2015. In December, Congress approved funding for IR-4 at fiscal year 2014 levels. This is the earliest they have approved an appropriation bill in recent years. USDA has already released the Request for Applications and we are hopeful that 2015 resources will be received before July. Kudos to our friends at NIFA for some process improvements that will help get the needed funds into the hands of our researchers much sooner than prior years.

Every five years the Directors of the State Agricultural Experiment Stations (SAES) assess IR-4 and decide if they will continue their investment. The assessment is a multiyear process which includes development of an updated strategic plan, drafting of a reauthorization proposal, a formal review of the proposal by stakeholders and the Directors that hopefully results in continued support. We are deep into the process with a reauthorization decision due by October. The monies and support provided by the SAES Directors are critically important to IR-4 and its ability to provide deliverables to farmers and food processors who depend on IR-4 services. If you have an opportunity to visit with your state's SAES Director or senior staff, be sure to tell them how important IR-4 is for specialty crop growers.

There are many transitions happening at IR-4. Diane Infante, the go-to person with data and information, has retired and will be missed. In September we hired Susan Bierbrunner, to take on many of Diane's tasks. Diane and Susan were able to work together for nearly four months and Susan has rapidly mastered many of the position's responsibilities.

The other big change is Cornell University deciding they will not submit a 2015 USDA grant application to coordinate/manage regional IR-4 operations. Regional operations will be co-managed by personnel from Rutgers University and University of Maryland. Marylee Ross, IR-4 Field Research Director (FRD) at University of Maryland's Lower Eastern Shore Research and Education Center will become the IR-4 Northeast Regional Field Coordinator and will manage all technical research operations in the region. IR-4 Headquarters will handle the Region's fiscal and administrative business. Northeast Region Quality Assurance responsibilities will be integrated into IR-4 Headquarters. Marylee will also continue as FRD with a reduced number of field trials. This transition from Cornell to Rutgers/University of Maryland partnership is expected to occur approximately July 1. Until then, all Northeast Region operations remain the responsibility of the IR-4 team at Cornell University/ NYSAES-Geneva, NY.

All the best, Jerry 

Quin-Whaaat?

— by Bill Barney, IR-4 Senior Coordinator and Martha Lamont, Quinoa Consultant

Quinoa (keen wah) is a nutritious and potential new high value crop in the US. Development of new varieties suitable for US climatic conditions and sufficient pest control products may be necessary for quinoa to reach its full potential.

Quinoa (*Chenopodium quinoa* Willd.) is a pseudocereal in the Chenopodiaceae family. Quinoa will be proposed for inclusion in the revised Cereal Grains crop group 15. A gynomonocious plant (both female and hermaphrodite flowers on the same plant), quinoa has an erect stem that may be branched or unbranched with alternate leaves. Planting to seed maturation varies from five to seven months depending on variety and the environment. The small, flat circular shaped seed varies in color from black, brown, red, gray, yellow, orange to purple. Quinoa has a high level of resistance to frost, drought, hail, wind, salinity and pests. Most quinoa is grown in Peru and Bolivia on the altiplano (high plain), a vast cold, windswept and barren 14,000 foot Andean plateau. More recently, quinoa crops have been successfully adapted to the coastal plains of Peru. Archeological evidence indicates that quinoa was important in the diet of the Inca civilization, with cultivation in Peru originating some 3,000 years ago. Quinoa, revered by the Incas as sacred, was considered as *chisiya mama* or "mother grain".

continued on pg 12

IR-4 SOAR Award

Winners

In 2011, IR-4 Headquarters created the IR-4 SOAR award to recognize those who promote and support IR-4 through their Service, Outreach, Altruism and Research. Meg McGrath and Joe DeFrancesco are the winners of the 2014 IR-4 SOAR award.

Meg McGrath has actively participated in IR-4 efficacy trials for over 15 years. Meg's nomination included comments from her peers on her expert knowledge of plant disease and on her work on biopesticides to manage these diseases. Meg provides consistent representation for growers in the Northeast region at the IR-4 Food Use Workshop and participates in conference calls to discuss stakeholder priorities. She has conducted numerous IR-4 biopesticide research trials. The data and results generated through these trials are sought out by growers and research and extension colleagues



throughout the U.S. Meg was nominated for her outreach efforts that included presenting her research results to growers and professional groups in NJ, RI, PA and NY. Examples of her altruism include giving her time to promote agriculture and its support structure outside of normal working hours, helping Master Gardeners and giving presentations at weekend farm events. A person who supported Meg's nomination stated, "She is a true champion of the IR-4 Project, and regularly explains IR-4's mission and goals in presentations to stakeholders so they understand how the program is working to support the development and registration of products that help to expand their pest management toolbox." Meg truly demonstrates all the attributes that make her worthy of the being recognized for the IR-4 SOAR Award. Congratulations Meg.

The second SOAR Award goes to Joe DeFrancesco. Some of Joe's list of service to IR-4 and the Pacific Northwest (PNW) growers includes: serving as State Liaison for Oregon, participating in the Global Capacity Development Residue Data Generation Project, working with commodity groups in Oregon and the PNW to develop Pest Management Strategic Plans, and informing several Oregon commissions of pesticide registration and pest management issues that may affect production of their crops. Joe is a consistent vocal supporter of IR-4 with growers,

ir4.rutgers.edu



lawmakers and university administration, highlighting the contributions that IR-4 makes to regional agriculture. Joe was instrumental in convincing his university's college of agriculture how important it was to maintain financial support of the NWREC IR-4 Field Research Center. Joe also gives many presentations to PNW growers describing the mission and vision of IR-4. Joe's altruism is exemplified by his becoming certified as an "English as a Second Language" teacher and his volunteering to teach migrant farm workers in Woodburn, OR. For 25 years, Joe has conducted IR-4 research where he consistently produces stellar and timely data that is relevant to the needs of PNW growers. He is currently evaluating sprayer technologies to better understand how spray coverage may affect persistence of pesticide residues and potential MRL violation in exported products. Congratulations Joe.

IR-4 is proud to present the SOAR Award to these deserving candidates. 🌱

A Decade: What has Changed and what has Stayed the Same for Diseases?

Second of three retrospectives on the IR-4 Ornamental Horticulture Survey.

— by Cristi Palmer, IR-4 Ornamental Horticulture Manager

Over the last decade, the IR-4 Ornamental Horticulture Program has conducted a survey of growers, extension personnel and people allied with the “Green Industry”. While the survey is not perfect, it has given a snapshot of the major pests, pathogens, and weeds with which growers battle. The intent is to find the holes in the management tool box – those issues where control options are limited or non-existent – so that we can address problems where our limited resources would have the most regulatory impact. This update focuses on diseases along with being a call for participation in the 2014/2015 survey.

In general, the types of pathogens impacting ornamental horticulture crops have been relatively consistent (Table 1). Water molds

Phytophthora & Pythium (oomycetes), crown & root rots (non-oomycete), powdery mildews, bacterial diseases, and leaf spots & anthracnose have been in the top 7 in every survey. There are a couple of interesting trends. First, the *Phytophthora & Pythium* category initially was ranked higher than all the others year in and year out. Starting with the 2010/2011 survey, this category dropped in ranking. This change may be due to several new products being registered allowing for rotation strategies among the new chemical classes to manage resistance development. IR-4 contributed to a number of these new products including Insignia (pyraclostrobin), Fenstop (fenamidone), Segway (cyazofamid), Stature SC (dimethomorph), Adorn 4F (fluopicolide), Micora (mandipropamid), Root-

Shield Plus WP (*Trichoderma harzianum* T-22 + *Trichoderma virens* G-41), Taegro (*Bacillus subtilis* var *amyloliquifaciens* strain FZB24) and Orvego (ametoctradin + dimethomorph). Another interesting trend is that bacterial disease management is becoming more of a concern. IR-4 has screened a number of potential bactericides over the years (Figure 1), but the best performing products still are the copper-based compounds.

Since 2005 (Figure 1), IR-4 has sponsored research on the top seven disease categories along with studying management of rusts and *Botrytis*. Much of the efforts have been examining oomycetes. These pathogens cause root rots, foliar blights and downy mildews. Active ingredients for *Phytoph-*

continued on next pg

Table 1. Ranks of the disease categories from the annual and biennial grower and extension surveys from 2005 through 2013.

#	2005	2006	2007	2008/2009	2010/2011	2012/2013
1	Phytophthora & Pythium	Phytophthora & Pythium	Phytophthora & Pythium	Phytophthora & Pythium	Crown & Root Rots (non-oomycete)	Bacterial Diseases
2	Powdery Mildews	Crown & Root Rots (non-oomycete)	Powdery Mildews	Crown & Root Rots (non-oomycete)	Bacterial Diseases	Powdery Mildews
3	Leaf Spots & Anthracnose	Leaf Spots & Anthracnose	Leaf Spots & Anthracnose	Bacterial Diseases	Phytophthora & Pythium	Crown & Root Rots (non-oomycete)
4	Botrytis	Bacterial Diseases	Crown & Root Rots (non-oomycete)	Leaf Spots & Anthracnose	Leaf Spots & Anthracnose	Downy Mildews
5	Bacterial Diseases	Botrytis	Botrytis	Powdery Mildews	Powdery Mildews	Leaf Spots & Anthracnose
6	Crown & Root Rots (non-oomycete)	Powdery Mildews	Bacterial Diseases	Nematodes	Botrytis	Phytophthora & Pythium
7	Downy Mildew	Downy Mildew	Downy Mildews	Downy Mildews	Canker	Nematodes

NCR Welcomes New QA Auditor

The IR-4 North Central Region is pleased to announce Ms. Lisa B. Latham is the new quality assurance auditor who started on October 1, 2014. Lisa is native to Kentucky and got her B.S. in Biology from University of Kentucky. Before joining IR-4, she has over twenty years of experience in the biopharmaceutical industry, encompassing analytical method development, lab data and information systems, and compliance roles in cGMP regulated environ-

ment. She worked at GlaxoSmithKline Research and Development in Pennsylvania, then briefly at Emergent BioDefense Operations in Lansing, MI when her family was relocated to MSU.

Lisa succeeds the position of Mr. Brian R. Bowman who departed IR4 in June 2014 to pursue his personal interests. We greatly appreciate Brian's contributions to IR-4 and wish him the best in whatever he chooses to do!

Lisa's direct phone number is 517-336-4607 and email address is lathaml2@msu.edu. Please join us to welcome Lisa! 🌿



thora and *Pythium* diseases have been screened every year since 2004 either as national or regional priorities. Downy mildew diseases were studied in 2007 – 2009 and then again in 2013 – 2014 with the advent of *Impatiens* downy mildew. Starting in 2009, IR-4 started examining tools for the non-oomycete crown and root rots, most notably, issues caused by *Fusarium sp.* And, in 2010, Botrytis efficacy became a regional project followed in 2013 by be-

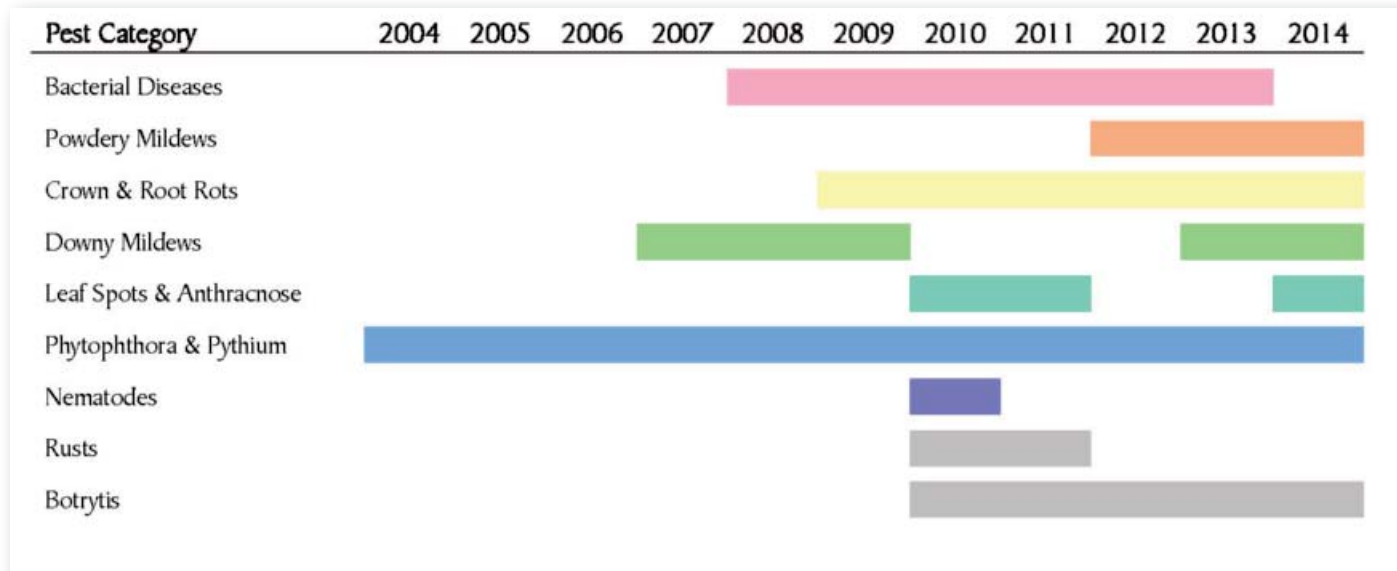
coming a national project to identify new tools to augment resistance management programs.

Throughout the years, IR-4 data have contributed to label development. In addition to the products already mentioned, IR-4 has aided in the registration of Cease (*Bacillus subtilis* strain QST 713), Compass (trifloxystrobin), Endorse (polyoxin D), Aliette WDG (fosetyl Al), Subdue MAXX (mefenoxam), Disarm 480SC (fluoxastrobin), Pageant

38WG (boscalid + pyraclostrobin), Verando O (polyoxin D), Palladium (cyprodinil + fludioxonil), Regalia O5 (Extract of *Reynoutria sachalinensis*), Strike Plus (triadimefon + trifloxystrobin), and Trinity (triticonazole).

To maintain our success, we need input on research priorities. What should we be studying? What diseases cannot be managed with the current set of tools? Only you can tell us. Take about 10 minutes and participate in the survey today. Find the survey at ir4.rutgers.edu.

Figure 1 Annual timing for national and regional research priorities



Transitions out West

— by Stephen Flanagan, WSR
Assistant Regional Field Coordinator

The Western Region is experiencing field researcher changes at both New Mexico State University and University of California, Davis. Maury Craig is headed off into the sunset after twenty-eight years at New Mexico State and Don Stewart is moving full time to work with the Ag Economics crop research arm of UC Davis.



Maury Craig came to NMSU in 1985 after completing his MS degree at the University of Missouri. Maury's MS degree focused on black flies and their biology in association with horses. This background led to his work as a Senior Lab Coordinator in medical/veterinary entomology at NMSU.

Maury's familiarity and experience with GLP research protocols for FDA studies led to his cross over from animals to plants in 2002. Anyone who's interacted or worked with Maury knows he managed to keep perspective and especially his sense of humor throughout his IR4

tenure. Maury particularly wanted everyone to know he has purchased his requisite Hawaiian print shirts, plaid shorts and knee high black socks.

Rumor has it Maury is now sporting his new duds and wandering the hills of New Mexico. Before he gets to his retirement wish list he's assisting with finishing field data notebooks and training his IR4 replacement. Once Maury's done with his wrap up operation in New Mexico (including a few delayed home projects) he has Ecuador and Alaska high on his travel agenda.



Cary Hamilton comes to NMSU from New Mexico Department of Ag where he worked on pesticide registrations so he has familiarity with EPA rules and regs from a different perspective. Cary will assume Maury's roles of both field research director and state liaison representative.

Our thanks to Maury for his consistent and high quality field work and his support for New Mexico growers as the State Liaison Representative for New Mexico.

Welcome Cary; we look forward to a long and fruitful (as well as veg-

etable) participation in the IR-4 program.



Don Stewart came to the IR-4 UC Davis Field Research Center as a research associate working with Tom Lanini. Don's experience with California specialty crops also included his student projects growing beans and sunflowers at Chico State. At UC Davis Don also worked with the Regional Cereal Grains Project.


During his years as the Field Research Director at UC Davis Don completed studies on such diverse crops as barley, wild rice, endive, figs, pomegranates, kiwis, almonds, radishes and recently sesame. Among Don's challenging trial work was his contribution to the mosquito helicopter application studies. Don is now working with Karen Klonsky at UC Davis developing Crop Cost and Return Studies for the Agricultural Economics department. Our best wishes to Don as he pursues his career along a new path.

At UC Davis, the IR-4 field research responsibilities will be shared by two new IR4 researchers, Seth Watkins and Guy Kyser. Both Seth and Guy work with the weed science group at UC Davis. Seth




has been conducting GLP-IR4 studies this last year. Guy Kyser has worked for over 20 years as a Staff Researcher and recently as a Specialist in pasture management and invasive weeds. He has published a number of useful weed management documents for managing invasive species such as medusahead and smutgrass.

Brad Hanson (Extension Weed Specialist) is heading up the Davis IR4 Field Research Center and coordinates the specialty crop research efforts. Seth and Guy both have extensive experience running efficacy trials which will continue to be an integral part of the Davis effort.

The IR4 Western Region is pleased to welcome Cary, Seth and Guy to their new roles in filling the research needs of Western specialty crop growers. 

eNewsletter

We launched our first eNewsletter with our last edition. We will continue publishing print and digital versions throughout the year.

Please let us know which version you wish to receive or if you want both. Contact Sherri Novack at novack@aesop.rutgers.edu or 732.932.9575 x 4632. 

Transitions in the NER


— by Edith Lurvey, NER
Regional Field Coordinator

Dr. Brian Nault has agreed to take on the responsibilities of State Liaison Representative for New York. Brian is a Professor in the Department of Entomology at Cornell University's NYS Agricultural Experiment Station in Geneva, NY. His research focuses broadly on vegetable entomology and landscape ecology. He continues to study the ecology and management of insects that attack vegetable crops as well as those that transmit viruses to these crops, especially onion thrips in onion. Brian also investigates the ecological services that native and managed bees provide for vegetable crop production, such as bee pollination in cucurbits. Based on information generated from his basic ecological research, he develops and refines innovative pest management and crop production strategies that benefit growers and other stakeholders. Brian replaces William Harvey Reissig, an applied entomologist who worked on apple pest management. Although Harvey retired from Entomology last spring, he will continue to administer the Pesticide Management Education Program (PMEP), which manages the commonly used Pesticide Product, Ingredient and Manufacturer System (PIMS) databases. Harvey served as the New York State Liaison for several years and will be missed. Thank you for your service Harvey and Brian.



Robert Wick, from the University of Massachusetts, Amherst has accepted the State Liaison Representative responsibilities for Massachusetts. Rob is plant pathologist in the Department of Plant, Soil and Insect Sciences working with diseases in floriculture



and vegetable crops, as well as plant parasitic nematodes in turf grass. His current research focus on late blight in potatoes, downy mildew in basil and Phytophthora blight in cucurbits, all important problems in the northeast and elsewhere. He also supervises the UMass Diagnostic Lab and runs the Nematode Assay Lab. Rob and his students have contributed efficacy and crop safety data data to IR-4 in both the Biopesticides & Organic Support and Ornamental Horticulture programs, including studies to screen products for the control of *Fusarium* wilt in sweet basil, *Pythium aphanidermatum* in geranium and organic management of basil downy mildew. He replaces Nicholas Brazee, a forest pathologist and ecologist at UMass, another contributor to IR-4 as SLR and ornamental tree and shrub researcher. Thank you both for your contributions to the program Nick and Rob. 

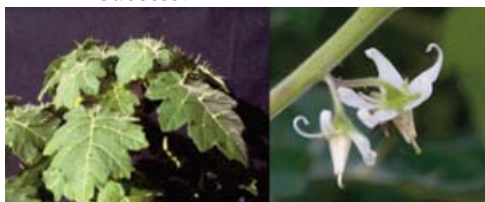
SolviNix® LC: A Plant Virus

— by Raghavan “Charu” Charudattan, Ph.D. and Ernest Hiebert, Ph.D.
 Florida-Institute of Food and Agricultural Sciences and President & C

On December 11, 2014, a historic milestone was set when the U.S.

Environmental Protection Agency granted FIFRA Section 3 registration for a bioherbicide containing a plant virus as the active ingredient. The registration marked the first time a plant virus was registered as an herbicide active ingredient anywhere in the world.

The long process of registration, which began in 2005, was finally successful thanks to the guidance and able navigation of the registration effort by Dr. Michael Braverman, Manager, IR-4 Biopesticide and Organic Support Program. Collaboration of several UF-IFAS research and extension faculty, staff, and students as well as the support and encouragement from the Florida Cattlemen’s Association, the Tropical Soda Apple Taskforce, and the Florida Department of Agriculture and Consumer Services-Division of Plant Industry were also key to our success.



Left: Thorny leaves of tropical soda apple plant. Right: Flowers.



Tropical soda apple fruit. Left: Partially mature, green fruit (this picture is from Bugwood, U. Ga. collection). Right: Fully mature, yellow fruit.

The bioherbicide, with the trade named *SolviNix® LC*, is labeled for use as a post-emergent foliar herbicide to control *Solanum viarum* (tropical soda apple), a South American plant that has become invasive in pastures and conservation areas in the southeastern United States.

Tropical soda apple is a Noxious Weed in the United States and a Class 2 Regionally Prohibited Weed across New South Wales, Australia. It is as well an invasive or problematic weed in several other countries, including Brazil where it is native. Besides pastures and conservation areas, it is reported to affect crops in some countries.

The active ingredient of *SolviNix® LC* is a strain of Tobacco mild green mosaic virus (TMGMV). Known for nearly 70 years, TMGMV is a pathogen of tobaccos (*Nicotiana* spp.), peppers (*Capsicum* spp.), and about 20 other species in the Solanaceae. It was first described as a mild strain of Tobacco mosaic virus (TMV) and later named variously as Green tomato atypical mosaic virus, Para-tobacco mosaic virus, Tobacco mosaic virus-South Carolina mild mottling strain, Tomato atypical mosaic green mottling strain, Tobacco mosaic virus strain U2, and Tobacco mosaic virus strain U5. It is now classified as a distinct Tobamovirus species, *Tobacco mild green mosaic tobamovirus*, with two naturally occurring strains, U2 and U5. An isolate of the U2 strain is used as the active ingredient in *SolviNix® LC*.

TMGMV is believed to occur worldwide in tropical and subtropical regions where *Nicotiana glauca* (tree tobacco), a natural host to this virus, is distributed. Normally, TMGMV is found infrequently in *N. glauca* and some cultivars of tobacco and pepper but is not known to cause serious economic losses.

Typically, it causes a mild, green, systemic mosaic symptom in susceptible hosts but in tropical soda apple it elicits a lethal hypersensitive response expressed as systemic necrosis and plant death. Just one application of the virus (e.g., as high-pressure foliar spray) to a few physiologically active leaves on a plant is sufficient to infect and kill the entire plant, including the root system. *SolviNix® LC* has performed consistently in field trials yielding > 85% weed kill in about 3-6 weeks following a high-pressure foliar application. So far, no natural resistance to TMGMV U2 has been found among tropical soda apple plants in the United States. Also, several tropical soda apple accessions from New South Wales, Australia, have been found to be equally susceptible as the Florida plants to the virus.

The discovery that TMGMV-mediated lethal



Tropical soda apple infestation in



Reaction of TSA to SolviNix® L
 SolviNix® LC treated plant on d

Virus Based Bioherbicide

D., Emeritus Professors, Plant Pathology Department, University of
CEO and Vice-President, respectively, BioProdex, Inc., Gainesville, FL

hypersensitive response could be used as a novel method of weed control was made in 1999 in Dr. Charudattan's biological control of weeds program at the University of



in a pasture (left) and a conservation area



C treatment. Left to right: An untreated TSA plant and days 13, 23, and 33 after treatment.

Florida-Institute of Food and Agricultural Sciences (UF-IFAS). The project was subsequently moved forward and industrially developed by BioProdex, Inc., the *SolviNix*® LC registrant. With funding from USDA-National Institute of Food and Agriculture-Small Business Innovation Research (USDA-NIFA-SBIR) Phase I and II grants, the company developed a scalable industrial process to mass produce the virus and formulate it into a commercial product, and assembled a registration data package.

Registration of *SolviNix*® LC exemplifies an effective collaboration in research and technology transfer involving a land-grant university (UF-IFAS), USDA-NIFA-SBIR, IR-4, and a private enterprise (BioProdex, Inc.).


It can be reasoned that the time it took to register *SolviNix*® LC, was nearly 10 years from our pre-registration consultation with the EPA in 2005, is due to the fact that this was the first proposal to register a virus as a bioherbicide agent. With no prior example to draw from, much effort went into data gathering, particularly nontarget plant host range, field efficacy, and label parameter data. In the end, it is the uniqueness of the tropical soda apple-TMGMV U2 system coupled with several well-known features of the virus that assured that the virus can be used safely as a bioherbicide.

First and foremost, TMGMV U2 kills the tropical soda apple plant quickly, completely, and consistently, which is a rare feature among plant viruses. Typically, plant response to virus infection is expressed as immunity (no visible plant response), resistance (necrotic local lesions in infected leaves only), or susceptibility (systemic mosaic, foliar mottling, plant stunting, and other debilitating yet nonlethal symptoms). Relatively rarely, as in the TMGMV U2-tropical soda apple system, the resistance response is expressed as lethal, hypersensitive, systemic necrosis.

Since infected tropical soda apple plants are completely killed, no infected but still living plants are left in the field to serve as a virus reservoir. Moreover, as the virus is mechanically transmitted and has no known, confirmed, vector capable of disseminating it, it can be used in targeted applications without the risk of secondary spread.

Despite its worldwide occurrence, TMGMV is genetically stable, as evidenced by the low frequency of emergence of new strains in nature. Furthermore, in nature TMGMV has a restricted host range compared to the moderately broad host range reported from artificial manual inoculations in the laboratory/greenhouse.

Unlike fungal foliar bioherbicides that require optimum moisture and humidity for performance, the virus infectivity and disease development are not constrained by microclimatic conditions. Consequently, field application of *SolviNix*® LC is generally unencumbered by the weather.

Finally, from the literature it seemed possible to mass produce the virus on an industrial scale to meet the market needs. We have now confirmed this through our production process. The manufactured virus end-product, when stored properly, is stable for many years, which makes the industrial production cost-effective and expedient. So, in retrospect, TMGMV U2 is an ideal viral agent for development as a bioherbicide. 

This new section of the IR-4 Newsletter called 'New Product Corner' was suggested by grower stakeholders as a way for IR-4 to help inform specialty crop growers about new pest management tools recently registered by EPA. This is for informational purposes only as IR-4 does not endorse a particular product or registrant.

Kasugamycin Bactericide – Arysta LifeScience North America)

Introduction: Unconditional registration for the new active ingredient (AI) kasugamycin was granted by the EPA in September 2014 for use in pome fruit (apple and pear). This new AI registration provides growers with the first new bactericide in many years. It provides a new, effective way to help growers manage fire blight, including streptomycin-resistant strains, as it targets a different site of action from other bactericides. The unique AI kasugamycin makes it an effective preventative disease management tool for fruit growers, who have a limited number of control options for fire blight. The AI has been classified by the Fungicide Resistance Action Committee (FRAC) as a Group 24 fungicide.

Other global registrations:

Argentina, Brazil, Canada, Columbia, Japan, Korea, Mexico, Romania, Vietnam

US trade name/formulation:

Kasumin® 2L (contains 0.168 lb AI/gal of product)

US labeled crops*: pome fruit (apple and pear)

Kasumin® 2L labeled bactericide pest spectrum: fire blight (*Erwinia amylovora*)

Other IR-4 residue projects (PR#)

pending EPA decision: 2007 – pepper, field and GH (09802), tomato, field and GH (09797), walnut (09772)

IR-4 residue projects (PR#) in progress: 2009 - cherry (10230); 2015 – almond (11461), olive (11137), peach (09888)

FLUENSULFONE (Nematicide – ADAMA)

Introduction: Following a global review, registration for the new active ingredient (AI) fluensulfone was granted by the EPA in September 2014 for various food uses. This new AI registration provides growers with the first new chemical nematicide to be developed in more than 20 years. It is a highly effective, broad-spectrum, non-fumigant nematicide (highly specific to plant-parasitic nematodes) that provides lower-risk (favorable toxicological and ecotoxicological profiles) chemical control of nematodes than methyl bromide and other restricted-use soil fumigants. Belonging to the heterocyclic fluoroalkenyl sulfone class of chemistry, fluensulfone has a novel mode of action, characterized by killing nematodes upon contact, causing irreversible nematicidal activity. Fluensulfone eliminates complex fumigant processes such as Fumigant Management Plans, 24-hour field monitoring and restricted buffer

zones – it has a 0-hour re-entry interval (REI), "CAUTION" signal word and requires minimal protective equipment (PPE).

Other global registrations: The process for MRLs has been initiated for the export of produce. CODEX tolerances are scheduled for June 2015. ADAMA expects to obtain further registrations in more countries and crops.

US trade name/formulation: for food uses - NIMITZ™ 480 EC Nematicide (4 lb gallon, 40% AI by weight)

US labeled crops*: food uses on NIMITZ™ label - cucurbit vegetables in Crop Group 9, including cucumber, melon (cantaloupe, watermelon, honeydew), squash and other cucurbit vegetables; fruiting vegetables in Crop Group 8-10, including tomato, okra, eggplant, peppers (bell, non-bell) and other fruiting vegetables

NIMITZ™ labeled nematode pest spectrum: root-knot (*Meloidogyne* spp.) and lesion (*Pratylenchus* spp.) nematodes

Ongoing IR-4 residue projects

(PR#): 2012 – carrot (10907), potato (10904 – will cover sweet potato [10905] and yam [11127]); 2013 – sugar beet (10908)

Other IR-4 database requests:

caneberry (11428), kiwifruit (11509), strawberry (10906 – ADAMA objective) 🌱

*See labels for specific use patterns and other general directions for use.

In Memoriam John D. Nalewaja



Dr. John D. Nalewaja of Fargo, ND and Osakis, MN, 84, passed away peacefully on November 11, 2014 in San Tan Valley, AZ. Dr. Nalewaja was IR-4's first State Liaison Representative (SLR) from North Dakota. He served as SLR until his retirement in 1998.

John Dennis Nalewaja was born October 7, 1930 to Anthony and Hattie on a farm near Browerville, MN. After high school, he graduated in Vocational Agriculture from the University of Minnesota, served in the US Army, taught Ag education at Boyd, MN and obtained a Doctor of Philosophy in Agronomy from the University of Minnesota. He married Donna Lou Speer December 26, 1959. They moved to Fargo in 1962 and raised four children-Stephen, Susan, Gregory and Anne. Dr. Nalewaja taught classes and conducted research in Weed Science at North Dakota State University until he retired.

Dr. Nalewaja was major advisor to 24 Ph.D. and 34 Masters of Science students, major supervisor for 30 visiting scientists from various countries (mainly Poland) and post doctorate research associates. He served as President and in

other offices for various regional and national Weed Science

Societies. He was chairman and editor for American Standard Testing Method Symposium on Pesticide Formulations and Applications Systems and was a member of the National Pesticide Impact Assessment Program. Dr. Nalewaja discovered and developed methylated seed oil (MSO) as an adjuvant for herbicides now commonly used throughout the world. Also, he determined the chemical basis of salt antagonism of certain herbicides (like Roundup) and how to overcome the antagonism of many herbicides that helped many weed scientists focus in this new area of surfactants and adjuvants.

He received several awards including an Honorary Doctorate from Poznan Agriculture University in Poland, the Fargo Moorhead Chamber of Commerce Distinguished NDSU Professor Award, Honorary Member North Central Weed Science Society, Fellow of the Weed Science Society of America for Outstanding Teacher and Outstanding Researcher.

After retirement, Dr. Nalewaja served as Emeritus Professor at NDSU, continued to review research papers and gave presentations on weed control.

Dr. Nalewaja will be missed. 🌱

The IR-4 Newsletter Vol 46 No.1 Winter 2015

The IR-4 Newsletter is published quarterly for distribution to cooperators in our partner State/Federal/Industry research units, State and Federal officials, commodity groups, and private citizens. Material from the IR-4 Newsletter may be reproduced with credit to the publication. Major funding for IR-4 is provided by USDA-NIFA and USDA-ARS in cooperation with the State Agricultural Experiment Stations. New Jersey Agricultural Experiment Station Publication No.P-27200-14-03, supported by state, US Hatch Act, and other USDA funds.

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Small Farm in Huacho, near Lima, Peru with grain ready for threshing



Quinoa continued from pg 2

Quinoa is a highly nutritious gluten-free food with higher protein content than most cereals and a better balance of amino acids that is similar to casein, the protein of milk. Quinoa is rich in lysine, a limiting essential amino acid in most cereals. Calcium, magnesium and potassium are also found in quinoa in sufficient quantities for a balanced human diet. However, quinoa also contains saponins (detergent-like properties) which can give a bitter taste to quinoa products. Saponin content ranges from high to low (sweet quinoa varieties). Traditionally saponins have been removed by washing before cooking and recently by abrasive mechanical dehulling. Quinoa can be processed into flour, flakes, breakfast cereals, bread, cookies, cakes, porridge, beer, soups, fermented drinks, vegetable milk, pasta, livestock feed, colorants and industrial uses. Leaves and sprouts can also be eaten raw or cooked.

The United Nations declared 2013 as the “International Year of Quinoa” in recognition of the ancestral practices of the Andean people and its role in promoting food security and eradication of hunger, malnutrition and poverty. Based on FAO data, the major

producing Andean countries include Bolivia, Peru and Ecuador. Farms vary in size from small growers to large organic producers. Production (tons) increased 57% in Peru and 92% in Bolivia from 2000 to 2012. Peruvian quinoa exports have increased from \$15 million USD in 2010 to \$83 million in 2013. In 2014, conventional quinoa prices at farm gate ranged from \$4000 and \$4500 per MT (metric ton) while organic quinoa was \$5,200 per MT. There is also production of quinoa in Brazil, Chile, Colombia, Argentina, India, Canada (Saskatchewan and Ontario) and Europe. While climatic conditions and pests are barriers to production in many areas of the US, there is small acreage of quinoa production in Colorado, Washington, Oregon, Idaho and Montana.

Important pests encountered in the Andes include downy mildew (*Peronospora variabilis* Göum) *Rhizoctonia* damping off, *Fusarium* wilt, leaf spot, seed rot and brown stalk rot. Andean insect pests include quinoa moths (*Eurysacca melanocampta* (Meyrick) and *E. quinoae* Povolný), armyworms, leafminers, cutworms, aphids, cucumber beetles, thrips and various Hemipteran species. Production of quinoa has been promoted by the Peruvian government in the dry coastal plains for water and soil conservation purposes. Quinoa requires only 30 percent of the water needed by rice and avoids salinization of soil. Quinoa grown in the coast also has higher yields (5 MT per hectare) than quinoa grown in the altiplano (1.2 MT per hectare).

The expansion of production to coastal regions has resulted in new pests not observed in the cold alti-plano region, increasing the urgency of having pest management tools available to growers.

Major insect pests in Canada include stem borers, tarnished plant bugs, flea beetles and aphids. Diseases of concern are downy mildew, *Ascochyta* leaf spot and damping off (*Pythium*). Weeds in general also need control materials.

The main pest problems in the US are weeds, including the closely related and similar in appearance, common lamb’s-quarter (*Chenopodium album* L.). This weed is more aggressive than quinoa and can adversely impact the growth of quinoa early in the season and also contaminate seed lots. Downy mildew has been reported in Oregon and in experimental plots of quinoa in Centre and Lancaster counties of Pennsylvania. Insect

pests reported in the US include cucumber beetles, *Lygus* bugs, flea beetles and leaf hoppers.



Downy mildew of quinoa

In Peru registered products for the control of downy mildew include numerous fungicides including metalaxyl, fluopicolide, mancozeb, cymoxanil, propamocarb, dimethomorph, chlorothalonil, *Bacillus subtilis*, extract of *Reynoutria sachalinensis* and *Trichoderma* species. Insecticides registered in Peru include

continued on pg 15

In Memoriam

Norman Glaze

Dr. Norman Glaze, former weed scientist with the USDA-ARS, died November 18, 2014 in Macon, Georgia.



Norman Glaze was a contributor to ornamentals in the ARS minor use pesticides program from 1979 to 1993 and completed 774 trials during this period at the Nematodes, Weeds and Crops Research Unit at Tifton, GA. He was a long-time supporter of the IR-4 program.

Norm was born in the DC area and graduated from Hyattsville High School in MD. While attending the University of Maryland he worked under Dr. Borthwick of the ARS Photo Lab at ARS in Beltsville, MD during the late 50s. He was noted as an exceptional reviewer of scientific manuscripts. He also coached a number of athletic sports.

One colleague, Carroll Johnson, remembers this about Norm. "Norman was a long-time member of the Tifton Exchange Club, serving in numerous capacities. He was a volunteer poll-worker in Tifton and in that capacity he worked many hours before and after every election. For many years, Norman officiated at high school football games. He had a very unique way of communicating with friends at Christmas. Instead of mailing Christmas cards, Norman had custom ball-point pens made with Christmas greetings printed on each pen and he would deliver the pens throughout the Christmas season. Norman was a Dodge automobile enthusiast, which included a mint 1966 Dodge Charger. He made the Dodge Charger 'fashionable' long-before the Dukes of Hazzard. (Same car, different paint scheme!) Norman had an assortment of brass belt buckles. One was simply 'Norm'. Years ago at the Southern Weed Science Society conference, a group of us were waiting in the lobby and somebody asked Norman if the 'Norm' belt buckle was an abbreviation for 'Abnormal'. Of course, he replied.

Norman loved 'good' cigars; that is he chewed on good cigars, but in the 30 year period I knew him, I never saw him smoke one. Caretakers of the break room were constantly irritated by Norman. He had a barrel-sized coffee mug that would basically drain a 10-cup coffee pot. Norman was a dedicated member of the First Presbyterian Church of Tifton. In his capacity, Norman served as Treasurer for many years, Elder, and generously supported the church in ways that few knew."

Dr. Glaze will be missed. 🌱

Crop Grouping Update

The proposed rule for Phase IV of the Crop Grouping Project published on November 14, 2014. This rule proposes to revise the crop group regulations in 40 CFR 180.41 by revising the existing leafy vegetable (except brassica) and brassica vegetable crop groups and by establishing new crop groups for: stalk, stem, and leaf petiole; tropical fruit, edible peel; and tropical fruit, inedible peel. The proposed rule also makes minor editorial changes to commodities and subgroups, revises 40 CFR § 180.40(f), and revises commodity definitions in 40 CFR §180.1 (g).

40 CFR § 180.40(f) of the Crop Group Regulations was first promulgated in 1983. This section addresses the interaction of crop group tolerances with processed food tolerances and meat, milk, and egg tolerances. Based on a re-examination of §180.40(f), EPA has concluded that several changes are needed. Therefore, EPA is proposing to revise § 180.40(f) to more clearly enunciate the three principles originally included in the provision and to update these provisions in line with current practice. 🌱

FireQuencher: A Phage-based Treatment for Fire blight

— by Julianne H. Grose, Donald P. Breakwell and Sandra H. Burnett

Fire blight is commonly considered the most devastating bacterial disease of apple and pear trees; it causes over \$100 million in produce losses annually in the United States (Norelli et al, 2003). Fire blight has been on the rise due to increased tree density in orchards and an increased market for very

2014 ban on antibiotic treatment for organics. Bacteriophages, viruses that infect bacteria, have proven effective in the treatment of many agricultural diseases and are the active ingredient in “FireQuencher”, a new approach in the treatment of fire blight.

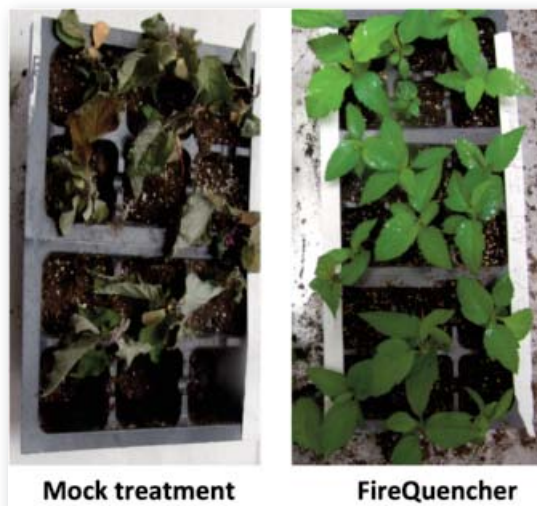
specifically to the bacterial cell, take over the cell, and produce between 10 and 100 new phages that can then attack other bacterial cells. This natural expansion of phages can rapidly decrease the number of bacteria and, control the disease. These qualities of a natural, specific, self-amplifying and biodegradable therapy make phages a safe, organic treatment. The potential use of phages as an anti-bacterial

continued on next pg

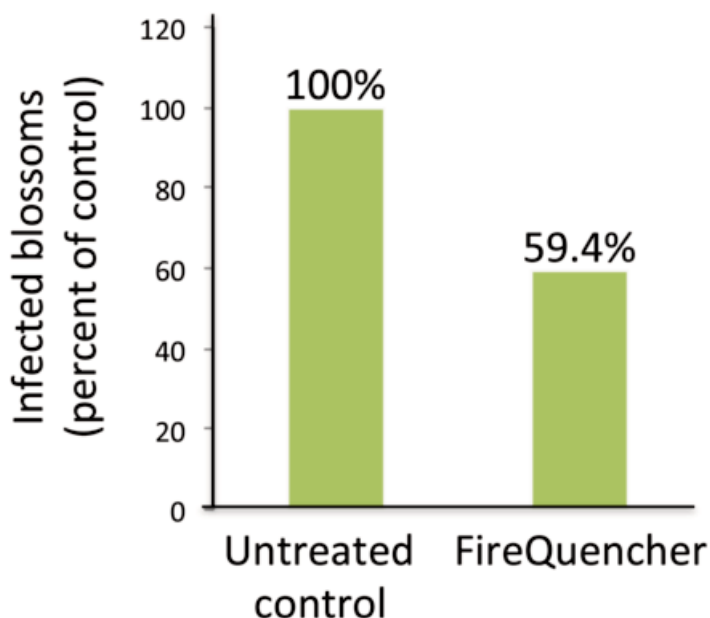


An apple tree limb showing scarring from a fire blight infection that invaded through the blossom.

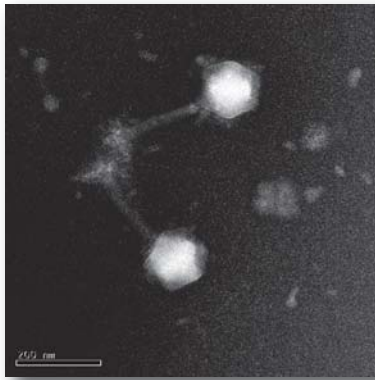
As the most abundant of living entities on the planet, bacteriophages naturally regulate the levels of their bacterial hosts. The word “phage” means “to devour” in Greek and most bacteriophages are highly specific for their bacterial host. A phage will bind



susceptible apple varieties, such as Gala, Fuji, Braeburn, Ginger-gold, and Jonagold. The causative agent, the bacterium *Erwinia amylovora*, enters through blossoms or other lesions and spreads to flowers, shoots, and wood, making them appear as if they have been burned. Antibiotics and heavy metals have been the standard treatment for over fifty years, but the emergence of resistant strains and an organic market have spurred advances in alternative treatment options - particularly in the wake of the



was first envisioned when discovered by Felix d'Herelle in 1917, just prior to the discovery of antibiotics. Several commercialized phage treatments for bacterial diseases were released in the 1940's by Eli Lilly and Company, but mass production of antibiotics in



A transmission electron micrograph (TEM) of bacteriophages that infect *Erwinia amylovora*. This phage was isolated from an apple orchard in Salem, Utah.

1945 quickly overshadowed phage therapy in the US. With the current issues of antibiotic resistance, phage therapy is now of great interest in the US and across the globe. There are now many phage-based therapies for both human and agricultural diseases available and more are being developed including FireQuencher.

A milestone for phage product development is that FireQuencher was included in USDA-funded trials for fire blight treatment during spring 2014. In these trials at Washington State University, FireQuencher showed promising efficacy (see table). As a product in early development, FireQuencher has been further

optimized throughout the year in the laboratory, improving infectivity and stability. Expanded field tests are scheduled for spring 2015 and will include the improved phage cocktail. Other combination approaches with phages, antibiotics and heavy metals will also be tested. These improvements should increase the performance of FireQuencher in field trials. FireQuencher will be available as a room-temperature stable liquid that can be diluted in water for spray application on orchards. 🌿

Norelli, J. L., A. L. Jones, and H. S. Aldwinckle. (2003) Fire Blight Management in the Twenty-First Century: Using New Technologies that Enhance Host Resistance in Apple. *Plant Disease* 87 (7): 756-765.

Quinoa continued from pg 12

phenthoate and *Bacillus thuringiensis* products. In the U.S. there are no registered products for direct application on quinoa with the sole exception of the herbicide glyphosate.

In addition to a lack of pesticide registrations in the US, the other challenges for growing quinoa are environmental conditions. Quinoa requires short daylengths and cool temperatures for good growth. Cultivated quinoa has been known to flower and produce seed at elevations between 7,000 and 10,000 feet in Colorado. Quinoa is tolerant of light frosts and is not affected by even cooler temperatures down to 20 °F after the grain has reached the soft dough stage. Temperatures which exceed 95 °F

cause plant dormancy or pollen sterility.

The increasing popularity of quinoa has not been without controversy. An article in the *J. Agron. Crop Sci.* (Jacobsen, S.-E., 2011) focused on Bolivia and the impact of boom-like consumer demand for quinoa around the world. With the price increase of quinoa tripling from 1999 to 2008, 90% of quinoa produced in Bolivia is now exported. Jacobsen reported negative effects on the environment including degradation of soil fertility, displacement of llama production and increased erosion. Due to the high value of quinoa, Jacobsen indicated that farmers preferred to sell quinoa and bought less nutritious food for consumption. This was disputed by Winkel et al. (2012) in the same journal

citing yield data that did not support the negative environmental effects of increased quinoa production and also disputed the decrease in home consumption of quinoa. Several press articles (The Guardian, NPR, AP, and NY Times) also presented stories about the negative effects of buying quinoa in that poorer people in Bolivia could no longer afford to eat a nourishing staple food because of high prices. However the impact of higher quinoa prices is complex and conflicted by sovereignty and food security issues. Bolivia and Peru have recently incorporated quinoa into school breakfast and new mothers' subsidies and growers in these countries have become economically successful, yet still set aside quinoa for personal use. 🌿

Tolerance Successes

May - December 2014

Federal Register: May 7, 2014

Fenoxaprop-ethyl

Trade Name: Puma

Crop: Grass hay **PR#:** 06220

Federal Register: Aug 6, 2014

Bifenazate

Trade Name: Acramite

Crops: Herb subgroup 19A (except chervil and chive), Pome fruit group 11-10, Fruiting vegetable group 8-10, Timothy forage and hay, **PR#:** 08846, 11060, 11061, 09037, 09773

Federal Register: Aug 29, 2014

Kasugamycin Trade Name: Kasumin

Crops: Pome fruit group 11-10
PR#: 09973

Federal Register: Sep 3, 2014

Saflufenacil Trade Name: Treevix

Crop: Olive **PR#:** 10787

Federal Register: Sep 12, 2014

Sulfentrazone Trade Name:

Spartan **Crop:** Apple **PR#:** 07770

The trade names listed below are provided as a means to identify the chemical for which a tolerance has been established. A trade name listed here may not be the name of the product on which the new food use(s) will be registered. Only labeled products may be used on a food crop. Be sure to obtain current information about usage regulations and examine a current product label before applying any chemical.

Federal Register: Sep 24, 2014

Fluensulfone (tolerances supported by registrant's data after receiving A priorities at the IR-4 Food Use Workshop)

Trade Names: Nimitz

Crops: Fruiting vegetable group 8-10, Cucurbit vegetable group 9
PR#: 10459, 10460, 10461, 10462, 10463, 10599

Federal Register: Oct 22, 2014

Metrafenone Trade Name: Vivando
Crops: Peach subgroup 12-12B, Apricot, Cherry subgroup 12-12A, Cucurbit vegetable group 9, Hops, Small vine-climbing fruit (except fuzzy kiwifruit) subgroup 13-07F, Fruiting vegetable group 8-10
PR#: 10369, 10370, 10466,

10477, 10478, 10479, 11252, 11253

Federal Register: Oct 29, 2014

Paraquat Trade Name: Gramoxone

Crops: Tuberous and corm vegetable subgroup 1C

PR#: 10583

(None in June, July, November, or December)

Correction from Spring issue

Federal Register: Feb 07, 2014

Chlorantraniliprole

Trade Names: Coragen, Altacor

Crops: Green onion subgroup 3-07B, Papaya, Passionfruit, Spice subgroup 19B, Stone fruit group 12-12 (except cherry, chickasaw plum, and damson plum)

PR#: A10204, B10204, 11200

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Major funding for IR-4 is provided by Special Research Grants and Hatch Act Funds from USDA-NIFA, in cooperation with the State Agricultural Experiment Stations, and USDA-ARS.

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