TRANSACTIONS

of the

ILLINOIS STATE HORTICULTURAL SOCIETY

for the year 2009
Volume 143

and the

13th ANNUAL ILLINOIS FRUIT AND VEGETABLE

CROP RESEARCH REPORT

Transactions Compiled by Don H. Naylor
Research Report Compiled by John Masiunas
Published by the Society

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INTRODUCTION

It is always a pleasure to prepare another volume of Transactions of the Illinois Horticulture Society and the Annual Illinois Fruit and Vegetable Crops Research Report. It is a wonderful opportunity to discover the works of my colleagues and look back on my own efforts. I have a wonderful group of students, Katherine Kelley, Lauren Flowers, Steve Bossu, Rachel Atwell, and Erin Browne and Research Associate, Dan Anderson, who do all the hard work. I also had James DeDecker and Dominique Gilbert join my research group this fall.

Every year it seems like I write about challenges. In 2010 the University of Illinois and the University of Illinois Extension are facing monumental financial challenges. Extension must reorganize and become smaller to survive. The challenge I especially want to highlight is the situation at our two off campus research facilities at St. Charles and Dixon Springs. Bill Shoemaker, Jeff Kindhart and Bronwyn Aly at those facilities do excellent work to directly support the needs of the Illinois fruit and vegetable industry. How many times have you read their reports or call them with questions. Right now, these individuals are without any technical support. The people who operated equipment and help maintain the research plots have retired and cannot be replaced. This will severely limit the research and extension that Bill Shoemaker at the St. Charles Horticultural Research Station and Jeff Kindhart and Bronwyn Aly at the Dixon Springs Agricultural Center can conduct. They need your support both financial and through contacting political leaders. The applied research and extension network the Illinois fruit and vegetable industry relies is threaten. If you do nothing it **will** disappear and die. Your actions or lack of action will decide their fate!

This is a difficult transition but I must give credit. The Research Report would not have been possible without the excellent and hard work done by Bronwyn Aly, Jeff Kindhart, Mosbah Kushad, Mohammad Babadoost, Dan Anderson, and their colleagues. It is an honor to work with them. I especially want to thank all the farmers and industry personnel who have provided encouragement and direction during the year.

The research articles are in alphabetical order by the research group responsible for the project. Contributions this year came from many researchers but not every scientist contributed articles. The articles were compiled as they were received with no editing. In general, the articles are short summaries of preliminary research. Most articles have not been formally peer reviewed and are not recommendations of any practice or product by the University of Illinois, the Illinois State Horticultural Society, the authors, or myself.

A number of articles discuss research with experimental pesticides. Many of the pesticides are not registered on these specific fruit and vegetable crops in Illinois. Use of unregistered pesticides is illegal, and may cause crop damage or residues that could harm consumers.

The purpose of the Transactions and Research Report is to inform the Illinois fruit and vegetable industry. The next pages contain the names, addresses, and telephone numbers of researchers submitting articles. Contact the individual researcher if you have any questions or want more detail about the research. Also we welcome your suggestions and input on future research.

John Masiunas, March 2010

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TRANSACTIONS

of the

ILLINOIS STATE HORTICULTURAL SOCIETY

for the year 2009
Volume 143

Including the

PROCEEDINGS
of the
ONE HUNDRED FIFTY-SECOND ANNUAL CONVENTION

Held in Conjunction with the Illinois Specialty Crops Conference and the
The Illinois Specialty Growers Association Annual Meeting
at
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TRANSACTIONS OF THE ILLINOIS STATE HORTICULTURAL SOCIETY

EDWARDS APPLE ORCHARD WINS ILLINOIS CIDER CONTESTS

Dr. Elizabeth Wahle, Cider Contest Coordinator
UI Extension Specialist
Edwardsville Extension Center

The Illinois State Horticulture Society sponsored its 21st Annual Illinois Cider Contest, held in conjunction with the Illinois Specialty Crops, Agritourism and Organic Conference on January 7 in Springfield, Illinois. Edwards Apple Orchard, located at Poplar Grove, IL, produced the No.1 overall rated cider at this year's contest, thus repeating their 2006 win of the First Place National and Illinois Cider. Ken and Barb Hall pressed their winning cider for this year's contest with a Goodnature Squeezebox on November 4, using Jonagold, Honeycrisp, Golden Delicious and GoldRush as the core apple varieties in their blend.

Second Place National went to our out-of-state neighbor Jim Hill, with Hill Bros. of Grand Rapids, Michigan. Pat Curran, of Curran Orchard in Rockford, IL won Third Place National and 2nd Place Illinois Cider. Third Place Illinois Cider was awarded to Craig Tanner of Tanners Orchard, located in Speer, IL. Midwest Cider of Merit, 1st Runner-up was awarded to Tom Schwartz of Schwartz Orchards in Centralia, IL. Steve Bock of Hill-Hill Orchard in Waterman, IL was awarded the Midwest Cider of Merit, 2nd Runner-up and the Midwest Cider of Merit, 3rd Runner-up went to Keith, Denise and Justina Boggio of Boggio's Orchard and Produce in Granville, IL.

Judges evaluated the entries using a 25- point rating scale for cider quality characteristics. The judges conducted "blind" evaluations where only a randomly chosen sample number identified each cider entry. The judging team was made up of a diverse group, including: John Masiunas, University of Illinois; Dan Becker, Southern Illinois University; Delayne Reeves, Illinois Department of Agriculture; Harry Alten, Illinois Specialty Growers Association; Mike Deitrich, Haygrove Tunnels; Ben Wright, United Phosphorus, Inc.; Jim Shannon, Miller Chemical; Susan Rick, DuPont; Melissa Wade and Suzie McGuire. The Illinois State Horticultural Society (ISHS) has annually conducted the contest since the contest started in 1990. The contest presents awards in three different categories: National, Illinois and Midwest Cider of Merit. National awards are open to all US producers, and Illinois awards are open to all Illinois producers. The Midwest Cider of Merit awards are open to Illinois producers, plus producers from other adjoining states that do not place in the National or Illinois categories.

ISHS also sponsored the 8th Annual Hard Cider Contest, where contestants vied for the top honor. Jon and Robert Karr from The Orchard in Emporia, KS were awarded the Champion Hard Cider Award, using a blend of Jonathan, Ozark Gold, and Gala. Each hard cider was individually awarded points based on characteristics like clarity, color, bouquet, balance of alcohol, acidity, sweetness, sugar/acid balance, body, flavor, astringency and bitterness, any off-flavors, and the overall quality.

The ISHS gratefully acknowledges the dedication and hard work of our judging team. Thank you! Most importantly, thanks are extended to all who entered the contest this year. Start planning now for the next contest in 2011.

A summary of more contest notes is outlined below.

National Awards	Firm	Address	Cultivar Blend
First Place	Edwards Apple Orchard	Poplar Grove, IL	Jonagold, Honeycrisp, Golden Delicious, GoldRush
Second Place	Hill Bros. Orchard	Grand Rapids, MI	McIntosh, Gala, Golden Delicious, Jonathan
Third Place	Curran Orchard	Rockford, IL	Golden Delicious, Red Delicious, Jonagold, Empire, Jonathan, Northern Spy
Illinois Awards			
First Place	Edwards Apple Orchard	Poplar Grove, IL	see above
Second Place	Curran Orchard	Rockford, IL	see above
Third Place	Tanner Orchard	Speer, IL	Jonathan, Golden Delicious, Red Delicious, Honeycrisp, Fuji, Braeburn, Granny Smith
Midwest Cider of Merit			
First Runner-up	Schwartz Orchards	Centralia, IL	Red Delicious, Golden Delicious, Fuji
Second Runner-up	Honey-Hill Orchard	Waterman, IL	Jonagold, Honeycrisp, Jonathan, Fuji, Red Delicious
Third Runner-up	Boggio's Orchard and Produce	Granville, IL	Red Delicious, Laura Red, Jonathan, Golden Delicious
Hard Cider			
Champion	The Orchard	Emporia, KS	Jonathan, Ozark Gold, Gala

2009 Illinois Horticulture Field Day Recap

by Dr. Mosbah Kushad, U of I Extension Specialist

The 2009 Field Day was held at the Royal Oak Farm on June 10. Tour presentations of the Field Day were organized by Mohammad Babadoost, Maurice Ogutu, Dennis Norton, and Paul Norton. The tour began with a brief history of the Royal Oak Farm. Dennis Norton talked about the school tour programs and other educational and entertainment activities on the farm during the season.

The first stop of the tour was the bramble production site. Paul Norton explained the raspberry and blackberry production on the farm. He said that the primocane-type blackberries, Prime Jim and Prime Jan varieties, are grown on the farm, along with fall-bearing raspberry varieties. The raspberry canes are removed in early spring. Weed control is done mechanically with weed badger and hand hoeing within the rows. There is minimal pesticide spray on the brambles.

The second stop of the tour was at the western side of the orchard where apples were replanted immediately after uprooting older trees, and the new trees are not doing well. Dennis discussed the trellising system they use and how they are converting the training system to tall spindle in that section of the orchard. The next stop of the tour was by the oak tree which is over 100 years old. At this stop, Dennis discussed the IPM program for insect pest and disease management in the orchard. He said that they keep scouting and spraying records for the whole orchard. He also talked about the rootstocks of the older trees and the newly-planted trees. In the new plantings, cover crop was used in the areas where apples were removed. The new plantings were trained on a tall spindle system. The trees are irrigated using drip irrigation where the drip tapes are hung about one foot above the ground along the tree rows. He explained that they have used cover crops in some areas where trees have been removed before replanting.

The next stop was in the eastern part of the orchard where peach trees were removed because of their poor performance and sensitivity to cold. Cover crop was planted in the areas where trees were removed. Paul indicated that the trees planted at the site with cover crop were doing better than the trees at the site without cover cropping. Also, Dennis talked about trees that were converted from vertical axe training to tall spindle system.

The next stop was the southern part of the orchard where Dennis talked about the rootstock linings they grow for future grafting. At this location, Paul explained their pumpkin production. They maintain a large pumpkin patch and grow different varieties of pumpkins, including giant, medium, and small size types. Rye cover-crop had been planted on this site and disked in before planting pumpkin seed. They grow pumpkins for u-pick customers.

There was a demonstration on weed control using a weed badger. The 4-wire espalier planting was discussed. Also, Dennis talked about their beehives and tree pollination. Then, the group returned to the Pavilion for lunch where Don Naylor introduced each exhibitor. Dan Anderson (pictured left) made a presentation on the IL Sustainable Agriculture Program.

There was a concurrent session for the retail marketing and other entertainment and special events on the farm. In this session, school tours, hayride, bonfire program, apple barn merchandising, restaurant services, farm market tour, and bakery on the farm were discussed. There was also a cooking demonstration.

A big thanks to the Norton family and employees who were such gracious hosts. All attendees thoroughly enjoyed their day and appreciated the time and effort that went into making the 2009 Hort Day a success!

Specialty Crops, Agritourism and Organic Conference Report

by Rick Weinzierl, Univ of Illinois

The 2010 Illinois Specialty Crops, Agritourism, and Organic Conference, held January 6-8 at the Crowne Plaza Hotel in Springfield, expanded to include programming for the Illinois Specialty Growers Association (fruit, vegetable, and herb growers), the Agricultural Tourism Partners of Illinois (ATPI), the Illinois Irrigation Association, and Illinois organic growers. The overall effort featured three pre-conference workshops on Wednesday, January 6. and seven tracks of concurrent sessions on Thursday and Friday, January 7-8.

The three pre-conference workshops held on Wednesday, January 6 were: (1) Grow Your Market: Creating a Memorable Experience for Customers – a workshop for farmers market managers and vendors; (2) Getting Started in Local Food Production and Marketing; and (3) Expanding Seasons and Markets with High Tunnels. All drew great audiences, with about 180 in attendance for the three programs combined.

On Thursday, January 7, the kickoff for the main conference included excellent presentations on MarketMaker by Dar Knipe, University of Illinois Extension Specialist, and on Keys to Effective Marketing by Tim Woods, University of Kentucky. Both stressed the opportunities for Illinois growers to expand markets and profits

The remainder of the January 7-8 program featured up to seven concurrent program tracks on fruits, vegetables, agritourism and marketing, irrigation, business management, and organic production. Invited speakers in the fruit track included Jim Schupp from Penn State University on plant growth regulators and thinning programs for apples and peaches, Eric Hansen of Michigan State University on fertility programs for fruit production, and Ed Baushke, a grower from Benton Harbor, Michigan, on growing and marketing apples and peaches in southwestern Michigan. The fruit track also included talks on insecticide resistance management by Rick Weinzierl, bacterial diseases of apples and peaches by Mohammad Babadoost, apple and peach rootstocks by Mosbah Kushad, and grower discussions of the 2009 crop season.

For vegetable growers, Carl Cantaluppi of North Carolina State University's Extension Service wowed the audience with lots of insights and recommendations on asparagus production, and Don and Shirley Ahrens of Junction, IL, gave a great summary of the how's and why's of their roadside marketing enterprise. A squash and cucumber session included talks on production practices, disease, insect, and weed management, and grower insights by Bill Shoemaker, Mohammad Babadoost, Rick Weinzierl, Elizabeth Wahle, Wayne Sirles, and Mike Flamm. Alan Walters, Bill Shoemaker, Jeff Kindhart, Elizabeth Wahle, and Bronwyn Aly summarized numerous cultivar evaluations for specialty pumpkins, tomatoes (including heirloom tomatoes), peppers, and sweet corn.

Irrigation Section Conference Report

by Jeff Kindhart, Univ of Illinois

This year's irrigation session featured an overview of irrigation systems commonly used in the United States for agronomic and horticultural crops. There was particular emphasis on those irrigation systems used for horticultural crop production in Illinois. Discussion included advantages and disadvantages of different types of irrigation and much attention was focused on the importance of proper management of irrigation to receive the maximum return on investment in equipment, seed, land and other inputs. This included information on various methods of monitoring soil moisture and the advantages of utilizing proper soil moisture monitoring for scheduling of irrigation.

Herb Section Conference Recap
by Chuck Voigt, Univ of Illinois

This year's herb sessions at the Illinois Specialty Crops, Agritourism, and Organic Conference went well, despite one major disappointment. Sal Gilbertie, our featured speaker, had emergency coronary artery surgery the week before the conference, and his doctor's orders were, "no travel for a month". Fortunately, Mary Buckles was able to step in and do a great job of covering his "Seasonal Herbs" topic. Ted Biernacki and Liz Fiorenza did a team version of his "Transitioning to Organic Greenhouse" talk. Ted contributed greenhouse expertise, while Liz commented on the organic process. All in all, given the last minute substitution, those presentations went well. Sal is doing well, too, which is a good thing.

Ed Van Drunen gave us two interesting views into his operation in Momence, Illinois. It is always enlightening to see the size and scope of Van Drunen Farms' business, and it has continued to evolve since we last heard from Ed. The composting operation is unique in its scale and precision, and hopefully encouraged some others to try to emulate them.

"Peppermint Jim" Crosby took us inside a small, family mint oil farm to see how things have developed over the years of its existence. He also gave an accounting of some of the medicinal benefits of pure, unadulterated mint oil. Jim called last week with the fantastic news that they had finally signed the papers, getting the farm out of foreclosure and back in family hands. This has been a long and painful process, but Jim is exhilarated and looking toward the future.

Unfortunately, Mohammad Babadoost's talk on "Basil Downy Mildew" had to be moved in the schedule to accommodate his concurrent talk in the fruit sessions. I know a few people were disappointed to have missed it, but it was a wake-up call for a "new" disease, which has made an appearance in the Midwest only in the last year or so. Hopefully, knowing what it is and what to expect will help us in fighting this new threat to a very popular herb crop.

Last, but not least, Chuck Voigt gave a review of some facts about the 2010 Herb of the Year - Dill. His handout should give folks some ideas of how to celebrate this versatile herb through the year.

As has become routine, the weather was a bit foul, but those who braved it to attend were rewarded with some interesting presentations. Stay tuned for information about next year's conference.

From the President

by Steve Bock, Waterman

(Mar. 09)

I will start out with a big thank you to Lowell Lenschow, Diane Handley, Rick Weinzierl, Elizabeth Wahle, and all the other education staff that did a great job to make this past conference very successful. Those of you unable to attend missed out on some great sessions and good speakers. Congratulations to Mills Apple Orchard for receiving 1st place in the cider contest and to Chris Doll, who received the first ISHS Industry Recognition Award.

Please mark your calendars for our summer field day which will be held at the Royal Oak Farm Orchard in Harvard, IL. After viewing their website, hearing several positive recommendations, and visiting with Dennis Norton, I do believe it will be a pleasant and educational time. The date will be June 11, and I hope you can make it.

I wish you all the best in this new year. Hopefully Mother Nature will give us some great weather and the good Lord will see us through these hard economic times. Take care!

(June 09)

Hello fellow growers and friends. Well, this spring certainly is flying by very quickly, and many areas are having a difficult time getting the work done. Here in Dekalb County, we might get the crops planted before the middle of June! The apple trees are in full bloom in the northern part of the state. Hopefully, the weather will allow my Beesto to do their part. The summer field day will be here before you know it. I am looking forward to visiting the Royal Oak Farm Orchard in Hebron on June 11. I do believe it will be worth the time and experience. Hopefully, most of you can make it up here. I want to thank the Bianchini and the Norton's for being our hosts and to all the people that make this day special. Take care and God Bless!

(Sept. 09)

Hello to everyone! This summer's weather and growing conditions sure has been quite a mixture. Some of you are waiting for the faucet to shut off and others are praying for more rain. After talking to some fellow growers and receiving e-mails, there should be a decent crop over all. I know there has been quite a bit of scab and fire blight this year in some areas. From talks with several marketers, sales seem to be as good, if not a little better, than last year. Hope it continues! Those of you that were unable to attend the summer field day missed out on a excellent time of great food, information, ideas, and the wonderful hospitality of the entire Royal Oak Farm Orchard family. Thank you folks very much! Next year's Summer Hort Day will be at the Broom Orchard in Carlinville. Looking forward to visiting Jeff's place. Don't forget to mark your calendar for Jan. 6-8, 2010, to attend the annual Illinois Specialty Crops, Agritourism and Organic Conference in Springfield, Illinois.

Notes from Home

by Jerry Mills
March 2009

Direct Marketers are in an Enviable Position

With a depression facing us I think direct marketers are going to be all right.

First of all, we are mostly self-employed so we cannot be downsized or laid off. Employed workers may have it easier in terms of not having to personally plan for the future of their company but on the other hand they have little say on who is let go when times get tough. (Sometime I am tempted to fire myself but I don't want to charge myself unemployment either.) So, we cannot lose our jobs.

Second, most of us sell reasonably priced food. There is no reason that our regular customers should not keep coming and even the economy-focused folks should take another look at what we have to offer.

Third, if a family cannot afford to take a real vacation, our facilities offer a place to bring the kids for a change of pace, to relax and have inexpensive fun. Naturally, we hope they will spend money while they are here. That will depend on our marketing skills.

Fourth, the "eat local" movement is growing. What can be more local than the orchard or farm just down the road from town? We need to play on this theme in our advertising and public relations efforts.

Fifth, I sense from reading that many families are going back to basics, with more home-prepared meals, more home preservation and homemade food products. What is to keep us from offering seminars on home canning and freezing, and selling the needed supplies? If anyone in the community is an "expert" on these things, it should be us.

Six, in "honor" of the recession we intent to reduce prices on selected products. We raised prices last year on the pretext that inputs were higher, especially oil. We intend to let the public know that we are responding to lower inputs with lower prices "for the public good." I hope that this gesture will gain us friends and more customers.

Seven. Some of our inputs are actually going to be lower. Fertilizer prices are lower. I hope chemicals follow that lead. Fuel is definitely lower. Labor may not change with the increase in minimum wages. However my personal wages will remain the same…zero.

Eight, if any reader needs extra income, there are many farmers' markets established or trying to start up and they are looking for fresh produce venders. This might be the time to plant a big garden and jump into the farmers' market scene. Use your green thumb to create some green money.

In light of all of these reasons, now all we have to worry about is the weather. Keep your fingers crossed.

Notes from Home

by Jerry Mills
June 2009

Prospects Still Good For 2009

Even though we had an early bloom, and windy and cold days, the flower pollination was sufficient and temperatures stayed warm enough that they were not frozen. Return bloom is surprisingly good. In fact, trees that are clearly too thick in the middle still had flowers throughout the canopy.

At the same time, the unfavorable conditions reduced fruit set to a manageable level. I think we are on our way to a very good season indeed. Thinning will still be required but it will not be critical for our primary varieties.

I hope that everyone else is in the same boat.

Tip blight control.

How many readers had fire blight last year? As usual, we did not have much blossom blight but the tip blight was severe. I sprayed strep but maybe not enough and besides, it does not affect tip blight.

This year Chris Doll gave me a paper on fire blight control. It touted Apogee as the best thing for tip blight and I am trying it, between rains. I used it last year but not intensively enough for blight control. It did seem as if there was less growth .

Tip blight is beginning to show as of this writing (May 7) so we shall see…..

Codling Moth Control.

Last year we used mating disruption for CM and Oriental Fruit Moth and there were not many worms. We are doing the same this year.

Something must be working for, as of this writing, I have only caught 20 moths in five traps for the whole season.

Last year we had the cleanest apples ever. Fingers crossed.

CM Confusion.

The other night I was in the orchard and the codling moths were flying. I had my hearing aids turned up high and I heard a tiny buggy voice calling; “Marsha! Oh Marsha!”

Soon there was an answer; “I’m over here John”

“Stay where you are, I’ll come over.”

After a while there was another call:” Marsha, oh Marsha!”

“I’m here you ninny! You flew right by me!

Don’t move. I’ll try again.”

Pause….“You dumb dim wit! Couldn’t you see me that time?” I could have reached out and touched you.”

“Wiggle your antennae, I will try once more.”

“Forget it John. I don’t what to have stupid kids

There was a long pause and then: “Clara! Oh Clara”.

“Get lost John. I heard what Marsha said. I don’t want dumb kids either.”

Such are the benefits of mating disruption

Banquet Speaker for Rent

It is planning time for next winters banquets and meetings. I give a speech that is a little informative, and I am told is sorta funny, and I work cheap, and I love an excuse to wander around the country in the winter instead of staying home and pruning trees. Email me at jerry@millsapplefarm.com

Notes From Home

Jerry Mills
September 2009

Keepin' up with technology

Those of us who like to appear cool by keeping up with technology are in trouble. It seems as if new gadgets are introduced every week, and it is hard to understand what they are good for. I like music, but I don't feel I need to listen to hundreds of tunes, many of which will fade into obscurity as fast as they popped up on the charts. I'm not sure I need to be instant messaged while I am working in the orchards or sitting on the 'john.' It would be nice to see rain coming on portable radar, but I can get along without it. Eyes work pretty well.

Neither do I need a telephone in my pocket that also plays tunes, tells locations and directions, and contacts websites, although the picture taking feature has some merit. I really don't need an alarm clock in my pocket either, nor a gadget that will show me where I left my car.

Every week the technology websites describe new and improved versions of personal computers and how to avoid having them compromised. Even so, I get dozens of bogus offers which a less alert or informed person might fall for.

It seems as if we are in a whirlpool of gadgets that make life "easier" but also allow us to function with the brain running on idle. I worry that a mind being constantly entertained with noise will not be thinking or planning or paying attention to the task at hand.

On the other hand, the technology that permits us to plant straight rows, adjust fertilizer rates by the square yards, color sort fruit and many other things has value. But, while it may make us more efficient, some of it also cuts out jobs for little people who need the work.

I was in a factory that makes plastic bulk bins, and there were no people around. A computer was running the machines, and robots were handling the products. It was impressive and efficient, but no workers.

Maybe this is just the rant of an old man who finds it increasingly difficult to keep up with the times, but I fear that if we do not continue using our brains and our muscles, our society will lose out to the barbarians who can.

The Information Overload

by Jerry Mills

How often do you go back and review the notes taken at conferences? Do you even take notes? I suspect that too many of us think that we will "file" the info in our brains, or scribble a squiggle on the margin of the program, and that will he l p us recall all of the valuable information that passes out at conferences. I must confess that most of my "notes" go unread after I get home.

For one thing, there is just too much information available from too many sources. At my house there are five Ag magazines, three serious non-ag magazines three newspapers and several newsletters, not to mention all the material that appears on the internet. How does one sort them out and do each justice?

Shirley used to tear things from newspapers and magazines and save them in a box. but then she never went back to them either and I had boxes of her savings.

There has a l ways been a thirst for knowledge. Even in the jungles news moved swiftly by word of mouth or drums. Early explorers often reported coming upon a village and the villagers were expecting them.

Sometime the idea of secluded communal life is appealing, no radio, no TV, no telephone, no papers, just blessed peaceful isolation. I'll bet the first thing those people say when meeting an outsider is "Hi, what's going on?

It is no wonder that people get depressed. If they pay too much attention, the news alarms them. If they do not pay enough attention, the news still alarms them but for different reasons because they do not know what is going on.

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DR= District Representative
MAL= Member-at-Large

I.S.H.S. BOARD OF DIRECTORS

January 7, 2010 to January, 2012

District #1 (north of I-80)

Steve Bock, Past Pres (MAL-11)*
Honey Hill Orchard
11747 Waterman Rd.
Waterman, IL 60556
815/264-3337
honeyhill5@verizon.net

Raoul Bergersen (MAL-11)
Valley Orchard
703 Jarvis Rd.
Winnebago, IL 61088
815/335-7158
valleyorchard@verizon.net

Pat Curran (MAL-11)
Curran's Orchard
641 Paris Ave
Rockford, IL 61107
815/398-7504
pcurran@tds.net

Dennis Norton (DR-11)
Royal Oak Farm
15908 Hebron Rd
Harvard, IL 60033
815/648-4467
dmnorton@royaloakfarmorchard.com

District #2 (between I-80 and I-70)

Denise Boggio, 2nd V-P (MAL-11)*
Boggio's Orchard
10746 N 950th
Granville, IL 61326
815/339-2245
boggiosorchard@hotmail.com

Jeff Broom (DR-11)
Broom Orchard, Inc.
12803 Broom Rd.
Carlinville, IL 62626
217/854-3514
jbroom@frontier.net

Dennis Ringhausen, (MAL-11)
Joe Ringhausen Orchards
515 W. Pearl
Jerseyville, Il 62052
618/535-6951
applehouse@gtec.com

Craig Tanner, President (MAL-11)*
Tanner's Orchard
740 State Route 40
Speer, IL 61479
309/493-5442
craig@tannersorchard.com

District #3 (south of I-70)

Chris Eckert 1st V-P (MAL-11)*
Eckert Orchards
946 Green Mount Rd.
Belleville, IL 62220
618/234-1955
Chris@eckerts.com

Kurt Range (DR-12)
Braeutigam's Orchard
2765 Turkey Hill Rd
Belleville, IL 62221
618/234-7118
kurt.range@swic.edu

Tom Schwartz (MAL-11)
Schwartz Orchards
P. O. Box 885
Centralia, IL 62801
618/322-7027
applejam1@charter.net

Academia Adviser Executive Secretary

Dr. Mohammad Babadoost (11)
Dept. of Plant, Soil, Gen Agric
U of I Dept. Crop Science
n533a Turner Hall
1201 W. Gregory Ave.
Urbana, IL 61801
217/333-1523
FAX: 217/333-1289
babadoos@uiuc.edu

Don Naylor*
Illinois State Horticultural Society
15962 Old Orchard Rd
Bloomington, IL 61705
309/828-8929
ilsthortsoc@yahoo.com
www.specialtygrowers.org

* Executive Committee
DR= District Representative
MAL=Member-at-Large

Committees List
2008-2009

Following are current appointments to existing committees. They should be re-confirmed for next year. You will notice there are several topics for which there is no committee. This issue needs discussed and decisions made to strengthen the overall committee/ programmatic structure of the organization.

Cider Contest
- Pat Curran
- Steve Bock
- Elizabeth Walhe

Cider Champion For Excellence
- Chris Doll
- Brad Taylor

Hall of Fame
- Bob Edwards
- Chris Doll

Industry Recognition Award
- Ken Hall
- Jerry Mills
- Wayne Sirles

C-FAR

Denise Boggio	- Voting Delegate
Tom Schwartz	Grp #1- Expanding Agricultural Markets
Don Naylor	Grp #2- Rural Development
	- Research Committee
Craig Tanner	Grp #3- Agricultural Production Systems
Randy Graham	Grp #4- Human Nutrition and Food Safety
Denise Boggio	Grp #5- Natural Resources

ILLINOIS STATE HORTICULTURAL SOCIETY

MINUTES

Board of Directors Meeting
Thursday, January 8, 2009

The meeting was called to order at 7:28 a.m. in the Rosewood Restaurant at the Crowne Plaza Conference Center in Springfield, Il.

MOTIONS

A motion was made by Chris Eckert, seconded by Dennis Ringhausen, and it carried to place the minutes on file as amended.

A motion was made by Dennis Ringhausen, seconded by Denise Boggio, and it carried, to approve the Treasurer's Report as printed.

A motion was made by Chris Eckert, seconded by Dennis Ringhausen to initiate a voluntary contribution appreciation program and provide a certificate as follow as follows:

Contributions up to $50 a Certificate
Contributions $51-$100 a Bronze Certificate
Contributions $100-$250 a Silver Certificate
Contributions $251-$500 a Gold Certificate
Contributions $501 and above a Platinum Certificate

Members and others will be recognized at meetings in addition to continuing sending a note of thanks to each contributor.

The meeting adjourned at 8:16 a.m.

TREASURER'S REPORT

Executive Secretary Naylor reported on income for 2008 at $8,907, expenses of $10,199. This represents expenditures of $1,292 attributed in part to purchase of a computer at the cost of $1,600. Assets as of December 31, 2009 were $8,624 with Liabilities at $1,052 for a Net Worth of $7,572.

MOTIONS

President's Report. Steve thanked the Tanner's for hosting an excellent field day that attracted a large crowd.

Industry Recognition Award. A meeting of the committee is tentatively scheduled for Monday, December 8,2008 via tele-conference call to set guidelines and select the first award recipient. The committee members are Chris Eckert, Jerry Mills and Wayne Sirles.

Finance. Don reported on a cumulative income of $8.623, cumulative expense of $9,387 and a bank balance of $9,386.through October. (Note: These numbers are updated as original report used through September.)

Membership. Reported as holding to the same as last year (87).

Summer Field Day. Initial contacts to host the 2009 field day were not successful. Additional suggestions were discussed and will be followed up today. The date was set on Thursday, June 11, 2009, the second Thursday of the month as usual.

Hall of Fame Award. No honorees this year.

C-FAR. All present representatives agreed to continue to serve on work committees. Denise Boggio announced she is running for the board of directors.

Chider Champion for Excellence. No honorees this year.

Cider Contest. Contest winners will be announced at the banquet this evening as usual.

Transactions. Distribution will be at the field day. They deadline for submitting articles is January 20. UIUC plans to publish them on the web to have greater access. As the Society has not made a donation to the printing for the past two years, $500 will be given as soon as possible.

Topics of the 2010 Specialty Growers Conference. Board members were asked for suggestions for next year. A suggestion was made to add a session on plums, nectarines, and pears.

Attendance. Board members in attendance included: President Steve Bock, Raoul Bergersen, Denise Boggio, Jeff Broom, Pat Curran, Chris Eckert, Kurt Range, Dennis Ringhsausen, Wayne Sirles, Tom Schwartz, and Craig Tanner and Adviser Mohammad Babadoost. . Not present: Adviser, Brad Taylor.

ILLINOIS STATE HORTICULTURAL SOCIETY

M I N U T E S
Annual Meeting
Crown Plaza Hotel — Springfield, IL
Thursday, January 8, 2009

President Steve Bock called the 2008 Annual Meeting to order at 4:46 p.m.

A motion was made by Pat Curran, seconded by Denise Boggio, and it carried, that the minutes of the January 10, 2008 Annual Meeting be accepted as printed.

A motion was made by Craig Tanner, seconded by Jerry Mills, and it carried, to accept the Treasurer's Report.

A motion was made by Pat Curran, seconded by Bernie Colvis, and it carried to approve the acts and deeds of the Board of Directors for the year 23008.

A motion was made by Pat Curran, seconded by Ken Hall, and it carried, to adjourn the meeting at 5:07 p.m.

Bill Bodine, Illinois Farm Bureau Director of External Relations discussed interest from a number of chemical companies, food chains and restaurants to find sources of fresh product. Consumers are seeking more and more local grown produce. Bill mentioned a few of the companies that he is aware of and volunteered to put anyone interested in touch with a contact name. His telephone number is 309/754-0464.

Treasurer's Report. Income for 2008 totaled $ 8,907 (up $415 from a year ago) including: a $ 2,610 payment from I. S.G.A. for 87 (87 year before) memberships in the Society; $ 2,580 member contributions (down $1;205); $2,180 meeting registrations (up 720); $350 cider contest; and $192 for transactions sales.

Expenses for the year totaled $ 10,199 (up $1,929 from year ago) including: $80 for cider contest; $ 790 membership dues; $60 annual meeting; $ 1,370 field day; $257for miscellaneous; $223 for postage; $ 84 office supplies; $ 379 executive secretary reimbursement; and $3 8289 for salary.

Membership. Membership was reported at 87 members up six from the previous year.

Summer Field Day. The date has been tentatively set for June 11, 2000 at a northern Illinois location to be announced shortly.

Cider Contest. There were 17 (up 1) entries plus some 6 hard cider entries. The winners will be announced late today at the banquet this evening.

Transactions. Transactions will be available at the summer field day and possibly on line.

ILLINOIS STATE HORTICULTURAL SOCIETY
MINUTES
Board of Directors Meeting via Teleconference
Thursday, March 2, 2009

President Steve Bock called the meeting to order at 9:08 a.m.

Motions
A motion was made by Wayne Sirles, seconded by Denise Boggio, and it carried to approve the minutes of the January 8, 2009 meeting of the Board of Directors.

A motion was made by Wayne Sirles, seconded by Denise Boggio, and it carried to adjourn the meeting at 9:50 a.m..

Membership
Current membership stands at 71 members compared to last year at 87 or 16 fewer. However it is actually lower than that as we have had 3 former members (not last year) re-join, and we have 3 new members. So subtracting these six we actually have 65 renewals from last year. Diane has sent out reminders to delinquents.

Six new growers raised their hand at one of the educational sessions at the conference. An effort will be made to identify them so they may be contacted to see if they are interested in joining the Society

Contributions
Eighteen have been received 18 contributions (2 in Dec) totaling $2,970. Following is a breakdown.

Contributions up to $50 a Certificate	5
Contributions $51-$100 a Bronze Certificate	9
Contributions $101-$250 a Silver Certificate	2
Contributions $251-$500 a Gold Certificate	0
Contributions $501 and above a Platinum Certificate	2

Certificates are going to have to be created and there will be a cost for original design and then printing to have color continuity, ex bronze, silver, etc. The board authorized to proceed and notify about expected costs..

EQIP Contact was made with Ivan Dozier, coordinator for the EQIP program at USDA Natural Resources Conservation Service. It was learned that $12 million of $17 allocated this year remains available for granting. The new farm bill has new provisions that will be announced soon that will help the fruit industry. New emphasis is being placed on organics even though details are not available and granting may not be doable this year, but they are going to try on some requests. We are to be put on mailing list to receive information. The next meeting is scheduled in Champaign on April 2, 9:30 am. Jim or Chris Eckert volunteered to go to this meeting and Don plans to go.

C_FAR
Denise will be unable to attend her workgroup meeting on March 5 in Champaign but her daughter Kristina will fill in for her.

Summer Field Day
The summer field day is set for Thursday, June 11 at Royal Oak Farm near Harvard with a board meeting the preceding evening. Mohammad visited the facility and reports that it is an excellent site for the field day. Don will communicate with Maurice about attendance lists for the Northern Illinois and Kankakee meetings. A cooking demonstration will be an added feature to promote expanded use of product. There was also discussion about locations for years 2010, 2011 and possibly 2012 that will be followed up on so an announcement may be made this year.

2010 Specialty Grower Conference Suggestions
With the large attendance at the fruit sessions it will be suggested that a larger room be used next year. It was suggested to offer some type of fruit cooking school and a program on hard cider and vinegar making.

Transactions. No word yet if printed.

Attendance. Board members in attendance included: President Steve Bock, Denise Boggio, Chris Eckert, Dennis Ringhsausen, Wayne Sirles, Tom Schwartz and Adviser Mohammad Babadoost. Not participating were: Raoul Bergersen, Jeff Broom, Pat Curran, Kurt Range and Craig Tanner and Adviser Brad Taylor.

Next Meeting. Teleconference call on Monday, March 30, 2009 at 9 a.m.

ILLINOIS STATE HORTICULTURAL SOCIETY

MINUTES

Board of Directors Meeting via Teleconference
Monday, March 30, 2009

President Steve Bock called the meeting to order at 9:06 a.m.

Membership

Board members received a list of current members (77) that included 5 new members and 12 delinquents. Delinquents include:

Clara Carrigan-
Sherry Chase-
Patrick Fennel- Craig volunteered to call
Jennifer Lester- Steve and Craig volunteered to talk to her when visits
Bill Murdock-
Jennifer Nelson-
Kurt Range- in transit
Gale Rippentrop- Steve or Pat possibly
Sandra Streed-
Sheila Thomas-
Malcom Whipple- Steve volunteered to call
Dan Williams-

Contributions

We have received 20 contributions totaling $3,645. Here is a breakdown.

Contributions up to $50 a Certificate	6
Contributions $51-$100 a Bronze Certificate	9
Contributions $101-$250 a Silver Certificate	2
Contributions $251-$500 a Gold Certificate	0
Contributions $501 and above a Platinum Certificate	3

A second letter is planned that will go out shortly.

Summer Field Day

A hotel will be contacted for those staying overnight on Wednesday. Don announced that fliers will be mailed out early as he would be out of the country May 12-27.

Specialty Growers Board Report

Specialty Crops Conference financing remains stable with some left over grant monies to help one more year, then may have to utilize savings to continue. Organic grower and farm marketing

manager groups have been approached to associate with specialty growers. The Crowne Plaza is booked for the next three years but may have to find an alternative for 2012 due to January dates that year are not ideal. Topics are being solicited for next year's conference. Suggestions so far have included tunnel growing, grower panels, marketing, and chef schools.

Attendance. Board members in attendance included: President Steve Bock, Denise Boggio, Jeff Broom, Tom Schwartz , Craig Tanner and Don Naylor. Not participating were: Raoul Bergersen, Pat Curran, Chris Eckert, Kurt Range, Dennis Ringhausen, Wayne Sirles and Advisers Mohammad Babadoost and Brad Taylor.

Next Meeting. Teleconference call on Monday, May 4, 2009 at 9 a.m.

The meeting adjourned at 9:36 a.m.

ILLINOIS STATE HORTICULTURAL SOCIETY

MINUTES

Board of Directors Meeting via Teleconference
Monday, May 5, 2009

President Steve Bock called the meeting to order at 9:07 a.m.

Board members present discussed the upcoming field day at Royal Oak Farm and Orchard near Harvard. A dinner board meeting will be held the evening before at the orchard. Board members volunteered to check with a couple of suppliers about exhibiting.

Attendance. Board members in attendance included: President Steve Bock, Denise Boggio, Kurt Range, Tom Schwartz, and Wayne Sirles, Don Naylor and Adviser Mohammad Babadoost. Not participating were: Raoul Bergersen, Pat Curran, Chris Eckert, Dennis Ringhausen, Craig Tanner, and Adviser Brad Taylor.

Next Meeting. Wednesday June 10, 2009 at 7 p.m. at Royal Oak Farm near Harvard.

The meeting adjourned at 9:28 a.m.

ILLINOIS STATE HORTICULTURAL SOCIETY

MINUTES

Board of Directors Meeting Royal Oak Farm, Harvard, IL
Monday, June 10, 2009

President Steve Bock called the meeting to order at 8:16 p.m.

Board members present discussed the locations and dates for future field days. Following are tentative dates and locations. Jeff Broom will be contacted to identify his interest in hosting next year and Kurt Range will be contacted to see if they will host the following year.

2010- Broom Orchard (Carlinville, central)
2011- Braeutigam's Orchard (Belleville, southern)
2012- Kuiper's Family Farm (Maple Park, northern)
2013- University of Illinois Curtis Orchard (Champaign, central)
2014- TDA (northern location)
2015- TDA (central location)
2016- Honey Hill Orchard (Waterman, northern)

Steve asked for suggestions for topics for the 2010 Specialty Growers Conference. Some suggestions included live demonstrations such as bread and pie making, cider vinegar making, and pollination alternatives.

Lowell Lenschow discussed the possibility of an organic/IPM and a farm market group becoming a part of ISGA. If this occurs in the next few months there would be new topic sections added to the program.

Attendance. Board members in attendance included: President Steve Bock, Raoul Bergersen, Denise Boggio, Pat Curran, Craig Tanner, Don Naylor and Adviser Mohammad Babadoost. Not participating were: Jeff Broom, Chris Eckert, Kurt Range, Dennis Ringhausen, Tom Schwartz , Wayne Sirles, and Adviser Brad Taylor. Others attending included: Dennis Norton, Renee Norton, Maurice Ogutu, Lowell Lenschow and Diane Handley.

Next Meeting. A tele-conference call was set for Monday June 22, 2009 at 9:00 a.m.

The meeting adjourned at 9:11 p.m.

ILLINOIS STATE HORTICULTURAL SOCIETY

MINUTES

Board of Directors Tele-conference Meeting
Monday, December 1, 2009

President Steve Bock called the meeting to order at 9:08 a.m.

A motion was made by Dennis Ringhausen, seconded by Jeff Broom, and it carried to place the minutes on file.

Steve reported on the fall meeting of the Illinois Specialty Growers Association. The specialty crops conference has been expanded with the addition of organics and horseradish. With accommodate expanded educational sessions, cider contest judging will be moved to the 3rd floor of the Crowne Plaza.

The board meeting will be moved up to Wednesday night beginning at 7:30 p.m. At the present time there are no plans to present any awards at the conference. There was discussion about filling the 2nd Vice-Presidents position as that position will be vacated with the changing of officers due to the board election to be held during the annual meeting. Pat Curran expressed interest in filling the position. Current board members will be solicited for interest in running for re-election.(Note: Raoul Bergersen, District Representative term limit is up and will be a candidate for the North Member-at-Large position. This will require seeking someone (North) to run for the district representative position.)

Jeff reported on preliminary planning for the field day scheduled for Thursday, June 9, 2010 to be held near Carlinville, IL.

Attendance. Board members in attendance included: President Steve Bock, Jeff Broom, Pat Curran, Dennis Ringhausen, Craig Tanner and Adviser Mohammad Babadoost. Not present: Raoul Bergersen, Denise Boggio Chris Eckert, Kurt Range, and Tom Schwartz.

Next Meeting. Wednesday January 6, 2009 at 7:30 p.m.

The meeting adjourned at 9:37 a.m.

2009 Balance Sheet

	2005	2006	2007	2008	2009
Assets:					
Through December 31, 2009	$6,885	$10,549	$9,916	$8,624	$8,320
Liabilities: (est)					
Through December 31, 2009	$476	$2,400	$1,126	$1,052	$1,200
Net Worth: (est)	$6,409	$8,149	$8,790	$7,572	$7,120
Change in Position (est)	$1,490	$1,740	$641	-$1,218	-$452

INCOME	2005	2006	2007	2008	2009	2009 Budget	2010 Budget
Bank Interest	$18	$0	$0	$0	$0	$0	$0
Cider Contest				$310	$390	$0	$375
Dues	$2,460	$2,430	$2,610	$2,610	$2,430	$3,000	$2,400
Contributions	$3,650	$3,600	$3,785	$2,580	$3,645	$4,000	$3,500
Exhibitor Fees	$590	$0	$95	$825	$0	$300	$300
Grants	$0	$0	$0	$0	$0	$0	$0
Mtg. Regis.	$2,350	$2,500	$1,460	$2,180	$2,010	$2,500	$2,000
Miscel.	$0	$0	$0	$200	$22	$0	$0
Other*	$180	$0	$0	$0	$0	$0	$0
Sales, Cider	$0	$180	$350	$0	$0	$0	$0
, General	$0	$0	$0	$0	$0	$0	$0
, Trans	$194	$135	$192	$202	$208	$150	$150
Total	$9,442	$8,845	$8,492	$8,907	$8,705	$9,950	$8,725

EXPENSE	2005	2006	2007	2008	2009	2009 Budget	2010 Budget
Bank charge	$0	$0	$0	$20	$0	$0	$0
Cider Contest	$130	$146	$285	$80	$0	$150	$150
Dues	$250	$830	$0	$790	$790	$790	$790
Equipment				$1,802	$0	$0	$0
Grant Reimb.	$0	$0	$0	$0	$0	$0	$0
Insurance	$0	$0	$750	$0	$0	$0	$0
Meetings, ann.	$116	$75	$70	$60	$199	$50	$50
Mtgs, SHFD	$1,949	$300	$1,140	$1,370	$1,405	$1,500	$1,500
Miscel.	$0	$5	$12	$257	$0	$100	$100
Office, copies	$19	$0	$85	$141	$45	$100	$100
Office, gen	$0	$0	$0	$64	$0	$100	$100
Office, postal	$148	$31	$138	$223	$180	$200	$200
Office, supl	$64	$8	$279	$84	$31	$100	$100
Other	$5	$0	$5	$10	$10	$1,000	$100
Printing	$69	$29	$0	$31	$139	$100	$300
Publications	$40	$150	$10	$2	$569	$150	$0
Public Rel.	$0	$0	$0	$0	$0	$0	$0
Reimb-E.D.	$321	$655	$470	$379	$791	$500	$500
Reimb-gen	$0	$0	$0	$0	$0	$0	$0
Ind. Support	$0	$0	$0	$0	$0	$0	$0
Salary	$3,493	$3,511	$3,829	$3,889	$3,829	$3,900	$3,900
Sales exp	$0	$0	$1,197	$0	$0	$0	$0
Subscr.	$0	$0	$0	$0	$0	$0	$50
Taxes	$1,096	$295	$0	$997	$1,081	$1,300	$1,300
Telephone	$0	$0	$0	$0	$0	$50	$0
Total	$7,700	$6,035	$8,270	$10,199	$9,069	$10,090	$9,240
Inc over (Exp)	$1,742	$2,810	$222	($1,292)	($364)	($140)	**($515)**

Financial Note: Financial Statement is reconciled with Busey Bank statements

ILLINOIS STATE HORTICULTURAL SOCIETY

HALL OF FAME

The following Guidelines were established June 6, 1966 shortly after the award was established. They were published in Transactions # 100: page 7 & 8.

Guidelines

A. To be recognized and made a member of the Illinois State Horticultural Society Hall of Fame, a candidate must have the following qualifications:

1. Be a past or present citizen of Illinois.

2. Be a member of the Illinois State Horticultural Society.

3. The contribution must be related to the production and marketing of Illinois Fruit.

B. Years of service should not necessarily be a consideration. For example, if a man or woman spends 40 years in Illinois without making an outstanding contribution or performing above and beyond the normal call of duty, then he should not be eligible for this award. On the other hand, if a man makes a significant contribution early in his career, he should be so recognized.

C. A Hall of Fame award need not be given annually. It should be presented only when appropriate.

D. A standing committee including the Society Secretary, should be appointed by the Board of Directors of the Illinois State Horticultural Society, with an annual review and change, if necessary of its membership. The committee is to select the candidate or candidates and report to the Board. The Board should pass upon the selection before it can be officially recognized by the Society.

E. There need be no limit upon the number of candidates chosen within any one year. This is especially true if an award is not to be presented annually. A limit can be imposed at the discretion of the Board if and when the Hall of Fame is brought up to date. For posthumous awards, a certificate will be presented. All others will receive a plaque.

F. Criteria to be used in evaluations:
   1. Leadership.
   2. Outstanding original discoveries.
   3. Outstanding ability to perform service.
   4. Publications (especially of University people).
   5. Affiliation in National Horticulture organizations.

6. Affiliation in State Horticulture organizations.
7. Outstanding service (over and above normal duties).
8. Breadth of motivation to unselfishly help the Illinois fruit industry
9. Interest in participating and contributing to the Illinois State Horticultural Society meetings.

G. This recognition program will be called the "Illinois State Horticultural Society Hall of Fame."

CURRENT MEMBERS OF HALL OF FAME

"For Outstanding Service to the Illinois Fruit Industry"

MR. STEWART C. CHANDLER	1964	DR. HARRY W. ANDERSON	1965
MR. DAVE B. PERRINE	1966	DR. THOMAS BURRILL	1966
DR. W.S. HULL	1966	MR. ALVIN O. ECKERT	1966
MR. W.S. PERRINE	1966	DR. MAXWELL J. DORSEY.	1966
MR. CURT E. ECKERT	1967	DR. RICHARD V. LOTT	1967
DR. RICHARD V. LOTT	1967	DEAN JOSEPH C. BLAIR	1967
MR. ARTHUR BRYANT SR.	1967	DR. ARTHUR S. COLBY	1967
MR. HENRY M. DUNLAP	1967	PROF. W. P. FLINT	1967
MR. HARRY W. DAY	1968	MR. PAUL C. STARK	1968
DR. DWIGHT POWELL	1969	MR. JOHN L. BELL SR.	1971
MR. LESTER R. STONE	1974	MR. CORNELL H. ECKERT	1975
MR. EDWARD D. Mc GUIRE	1976	MR. FRANK W. CHATTEN	1977
MR. CLAUD J. BOYD	1978	MR. JOHN D. SURGEION, JR.	1979
MR. ALSON MEYERS	1980	DR. JAMES D. MOWERY	1981
MR. JOHN TANNER	1982	DR. ROSS A. KELLY	1983
DR. ROY K. SIMONS	1984	MR. ROBERT M. EDWARDS	1985
MR. C. CHRIS DOLL	1986	DR. RONALD H. MEYER	1988
DR. DANIEL B. MEADOR	1991	MR. MARION A. KOELLER	1993
MR. JAMES A. ECKERT	1993	MR. DANIEL D. McGUIRE	1996
MR. FRANK W. OWEN	1996	MR. BERNARD E. COLVIS	1997
MR. J. BOND HARTLINE	1998	MR. THOMAS MILNAMOW	2003
MR. RICHARD J. TANNER	2004	MR. JERRY MILLS	2006

ILLINOIS STATE HORTICULTURAL SOCIETY

C. CHRIS DOLL
INDUSTRY RECOGNITION AWARD

The ISHS C. Chris Doll Industry Recognition Award recognizes and honors individuals who have made exemplary contributions and influenced the fruit tree industry either as a current or retired industry activist, or as an industry supporter.

Purpose.

- To recognize individuals and for outstanding achievement or enhancement to the fruit industry.
- To demonstrate to ISHS members and others that ISHS values such achievement.
- To motivate ISHS members and others, improve and enhance meetings and conferences.
- To encourage volunteerism in ISHS and the industry through recognition of service, new and innovative ideas or practices.

Criteria for Nomination.

- Numerous years as an industry educator, practitioner or supporter.
- Active involvement and outstanding contributor/volunteer at local, state and national levels including relevant positions held on committees and boards, and/or academic rank.
- Professional/career achievements and designations, including articles and publications, speaking, general involvement in industry meetings, or other activities.
- Recognition as a mentor by their peers (students, new members, growers, new staff, etc).
- Quality and impact of education program/research development and participation level.
- Involved in community service (local, state, national) relating to the industry.

RECIPENTS OF THE C. CHRIS DOLL INDUSTRY RECOGNITION AWARD
"For Outstanding Service to the Illinois Fruit Industry"

C. CHRIS DOLL 2008

I l l i n o i s S t a t e H o r t i c u l t u r a l S o c i e t y
PAST PRESIDENTS

Dr. E. S. Hull
1856-57
Dr. J. A. Kennicott
1861
Smiley Shepard
1864
Elmer Baldwin
1867
Willard C. Flagg
1870
M. L. Dunlap
1873
A. C. Hammond
1876
T. J. Burrill
1879
E. Hollister
1882
Arthur Bryant
1886
H. M. Dunlap
1889
Henry Augustine
1893-1894
H. A. Aldrich
1903-1905
F. D. Voris
1911-1912
A. W. Brayton
1917-1919
J. B. Burrows
1924-1925
John A. Garnier
1930-1931
George L. Smith
1936-1937
Logan N. Colp
1942-1943
David B. Perrine
1948-1949

C. R. Overman
1858-1859
O. B. Galusha
1862
John P. Reynolds
1865
A. M. Brown
1868
Arthur Bryant
1871
Robert Douglas
1874
Dr. A. G. Humphrey
1877
Parker Earle
1880
O. B. Galusha
1883
E. A. Riehl
1887
Jabez Webster
1890-1891
T. E. Goodrich
1895-1897
George J. Foster
1906-1907
J. Mack Tanner
1913
J. R. Lambert
1920-1921
L. M. Smith
1926-1927
Alvin O. Eckert
1932-1933
C. F. Heaton
1938-1939
Hugh L. Hale
1944-1945
Dr. Dwight Powell
1950-1951

Sammuel Edwards
1960
George W. Miner
1863
Parker Earle
1866
Tyler McWhorter
1869
James E. Starr
1872
Dr. E. S. Hull
1875
J. W. Robison
1878
C. N. Dennis
1881
John M. Pearson
1884-1885
Milo Barnard
1888
T. E. Goodrich
1892
Henry M. Dunlap
1898-1902
R. O. Graham
1908-1910
W. S. Perrine
1914-1916
F. H. Simpson
1922-1923
W. R. Soverhill
1928-1929
George M. Schoff
1934-1935
O. G. Jones
1940-1941
Frank E. Penstone
1946-1947
Lester R. Stone
1952-1953

PAST PRESIDENTS, continued

Curt Eckert
1954-1955
J. Bon Hartline
1960-1961
Richard Crowell
1966-1967
Allen Meyers
1972-1973
Bernard E. Colvis
1978-1979
Harold Tanner
1984-1985
Richard Tanner
1990-1993
Randy Graham
2001-2003
Steve Bock
2008-2009

Frank Chatten
1956-1957
John Surgeon
1962-1963
Cornell Eckert
1968-1969
John L. Bell, Jr.
1974-1975
Robert M. Edwards
1980-1981
William Hartline
1986-1987
Jerry Mills
1994-1997
Patrick Curran
2004-2005
Craig Tanner
2010-

Paul Mallinson
1958-1959
John Tanner
1964-1965
Daniel McGuire
1970-1971
James A. Eckert
1976-1977
William R. Broom
1982-1983
Tom Schwartz
1988-1989
Tom Milnamow
1998-2000
Dennis Ringhausen
2006-2007

2009 Contributions to the Society

1. Larry J. Bigard	Larry Bigard Orchard
2. Denise Boggio	Boggio's Orchard
3. Kurt Christ	Christ Orchard
4. Pat Curran	Curran's Orchard
5. Chris Doll	Dolls Horticultural Services
6. Lary Eckert	Eckert's Orchards
7. Mike Edwards	Edwards Orchard West
8. Bob Edwards	Edwards Apple Orchard
9. James Hong	All Season Farm and Nursery
10. Rob Kowalski	
11. Stefan Land	Langs Orchard
12. Robert Lighfoot	Lightfoot Orchard
13. Bob Malham	Malham Orchard
14. Richard Mazanek	Richard Mazanek Orchard
15. Brad Mazanke	Richard Mazanek Orchard
16. John Moran	Moran Orchard
17. Joe Ringhausen	Joe Ringhausen Orchards
18. Richard Tanner	Tanner's Orchard
19. Jane Weir	Weir Fruit Farm
20. Dennis Zellerman	Edgewood Orchards

2009 MEMBERS OF THE SOCIETY

#	F NAME	L NAME	ENTERPRISE	ADDRESS	CITY	ST	ZIP	TELEPHONE (H)
1	Andy	Smith	Edwards Apple Orchard	1768 Middle Rd	South Beloit	IL	61080	815/601-6906
2	Robert	Grimm	Grimm Acres Diversified	R. R. #1, Box 97	Albion	IL	62806	618/445-4022
3	John	Schlafer	J & J Berry Farm	26686 McClusky Rd	Dow	IL	62022	618/885-5849
4	David	Woodruff	W & M Land Company	10209 Bull Valley Rd	Woodstock	IL	60098	815/337-0740
5	Joe/Dennis	Ringhausen	Joe Ringhausen Orchards	24748 Reddish Rd.	Fieldon	IL	62031	618/376-6772
6	John R.	Moran	Moran Orchard	1096 Cty Rd 500 E	Trilla	IL	62469	217/895-3408
7	Larry J.	Bigard	Larry Bigard Orchard	10505 N. 1400th St	Newton	IL	62448	618/783-3251
8	Rob	Kowalski		25 W 451 Webster Ave	Roselle	IL	60172	630/417-1287
9	Patrick D.	Curran	Curran's Apple Farm	641 Paris Ave.	Rockford	IL	61107	815-398-7504
10	C. Chris	Doll	Doll Horticultural Services	4681 Drda Ln	Edwardsville	IL	62025	618/656-1605
11	Mike	Edwards	Edward's Orchard West	8218 Cemetery Rd	Winnebago	IL	61088	815/963-2261
12	Dennis	Zellerman	Edgewood Orchards	1628 Edgewood Orchard Ln	Quincy	IL	62305	217/224-5414
13	C. Richard	Mazanek	Richard Mazanek Orchard	504 2nd St., P. O. Box 45	Alma	IL	62807	618/547-7691
14	Jane	Weir	Weir Fruit Farm	R. R. #1, Box 25	Gladstone	IL	61437	309/627-2106
15	Robert L.	Malham	Malham Orchard	17218 Shipman Rd	Carlinville	IL	62626	217/854-2815
16	Richard	Tanner	Tanner Orchard, Ltd.	726 State Rte 40	Speer	IL	61479	309/493-7781
17	Kurt	Christ	Christ Orchard	4008 N. Texas Rd	Elmwood	IL	61529	309/446-9751
18	Ronald H.	Brinker	Brinker's First Fruit Farm	424 Olde Cabin Rd	Greenville	IL	62246	618/664-0780
19	Dale	Jefferies	Jefferies Orchard	5036 Muench Rd	Cantrall	IL	62625	217/487-7845
20	Ken	Hall	Edward's Apple Orchard	7061 Centerville Rd	Poplar Grove	IL	61065	815/765-2093
21	James	Bailey	Okaw Valley Fruit Farm	R. R. #2, Box 124	Sullivan	IL	61951	217/728-8269
22	Paul E.	Krueger	Krueger's Orchard	2914 Airport Rd	Godfrey	IL	62035	618/466-3576
23	Gerald L.	McArtor	Jonamac Orchard, Inc.	19412 Shabbona Rd	Malta	IL	60150	815/825-2265
24	Jeffrey M.	Broom	Broom Orchard	12803 Broom Rd.	Carlinville	IL	62626	217/854-6501
25	Mohammad	Babadoost	U of I Dept. of Crop Sciences	1102 S. Goodwin Ave.	Urbana	IL	61801	217/333-1523
26	Raoul	Bergersen	Valley Orchard	703 Jarvis Dr	Winnebago	IL	61088	815/398-0527
27	Steve	Bock	Honey Hill Orchard	11747 Waterman Rd	Waterman	IL	60556	815/264-3337
28	Joe	Doll	Doll's Orchard	573 Doll's Orchard Ave	Pocahontas	IL	62275	618/669-2414
29	Richard	Flavin	Flavin Farms	101 Fandel Lane	Metamora	IL	61548	309/383-4934
30	Harvey	Gahl	Gahl's Apple Orchard	15704 Witwer Rd	South Beloit	IL	61080	815/389-1946
31	Dean C.	Johnson	Apple Barn	2290 E. Walnut	Chatham	IL	62629	217/483-5272
32	Robert A.	Knoernschild	Centennial Farms	199 Jackson	Augusta	MO	63332	636/228-4338

#	F NAME	L NAME	ENTERPRISE	ADDRESS	CITY	ST	ZIP	TELEPHONE (H)
33	Rita	Lipscomb	Plummer Supply, Inc.	2875 Plummer Pk Pl, "P.O. Box 177	Bradley	MI	49311	616/792-2215
34	Glenn	Meyer	G & C Meyer Farm	4370 Rockcastle Rd	Steelville	IL	62288	618/965-3800
35	Irvin	Sager	Sager Farms	5251 Kell Rd	Kell	IL	62853	618/822-6637
36	Wayne D.	Sirles	Rendleman Orchards	P.O. Box 159	Alto Pass	IL	62905	618/893-2771
37	Craig	Tanner	Tanner Orchard, Ltd.	740 State Rt 40	Speer	IL	61479	309/493-5442
38	Ronald	Wolfe	Wolfe Farms	1657 N 1125 E R	Monticello	IL	61856	217/762-7180
39	Sara	Lipe	Lipe's Orchards	2932 Springer Ridge Rd	Carbondale	IL	62901	618/985-5481
40	Bill	Sharelis	Bill's Christmas Farm	5102 N. Eliz-Scales Rd.	Scales Mound	IL	61075	618/893-2771
41	Jim	Eckert	Eckert's Country Store & Farm	901 S. Greenmount Rd	Belleville	IL	62220	618/235-3876
42	Chris	Eckert	Eckert Orchards, Inc.	951 S. Greenmount Rd	Belleville	IL	62220	618/235-3876
43	Bennie C.	Blackburn	Partridge Point Orchard	807 Partridge Point Rd	Metamora	IL	61548	309/367-4052
44	Thomas	Ringhausen	Tom Ringhausen Orchards	303 Mortland, Box 201	Hardin	IL	62047	618/576-9302
45	Brad	Denney	Denney Brothers Orchard	P. O. Box 226	Baldwin	IL	62217	618/785-2348
46	Mark	Abendroth	Abby Farms	132 N Kansas, P.B. Box 362	Edwardsville	IL	62025	314/232-3808
47	Chris	Curtis	Curtis Orchard, Ltd.	3902 S. Duncan Rd	Champaign	IL	61822	217/359-5565
48	Donald	Matheny	Little Creek Orchard		Shelbyville	IL	62838	217/774-4272
49	LeRoy	Yoder	Echo Valley Orchard	492 Grammer Rd	Carbondale	IL	62903	618/684-3618
50	Clara	Carrigan	Planted Palette	727 N Randolph	Macomb	IL	61455	309/837-1263
51	Patricia D.	Hermes	Country Mist Apples, Inc.	R. R. #1, Box 523	Heyworth	IL	61745	309/473-3771
52	Mike	Seneczko		23504 W Williams Ct	Plainfield	IL	60544	815/609-3718
53	Thomas B.	Range	Braeutigam's Orchard	2765 Turkey Hill Ln	Belleville	IL	62221	618/233-4059
54	Dwight	Morrison	Morrison's Hilltop Orchard	2299 E Walnut	Chatham	IL	62629	217/483-2103
55	Keith	Weigel	Weigel's Orchards	R. R. #1, Box 111	Golden Eagle	IL	62036	618/883-2405
56	Robert	Lightfoot	Lightfoot Orchard	64 Lightfoot Rd	Murphysboro	IL	62966	618/687-3234
57	Denise	Boggio	Boggios Orchard	10746 N 950th Ave	Granville	IL	61326	815/339-2460
58	Lloyd E.	Nichols	Nichols Farm & Orchard	2092 Hawthorne Rd.	Marengo	IL	60152	815/568-6782
59	William	Whiteside	Horticultural Consultant	624 Shabbona Trail	Batavia	IL	60510	630/879-7573
60	Bob	Fielding	Camp Creek Farm & Orchard	3753 N 1100th Ave	Lynn Center	IL	61262	309/521-7099
61	John	Masiunas	University of Illinois at Urbana	NRES, 260 ERML, MC-051	Urbana	IL	61801	618/245-6060
62	Kurt	Range	Southwestern Illinois College	2500 Caryle Ave.	Belleville	IL	62221	618/234-7118
63	Elizabeth A.	Wahle	UIUC Coop Ext Serv	200 University Pk Dr, Ste 280	Edwardsville	IL	62025	618/288-4584
64	Robert	Blain	River Front Berry Farm	2799 N 1700 East Rd	Martinton	IL	60951	815/428-7382
65	Bernard E.	Colvis	Colvis Orchards LLP	3971 State Rte 3	Chester	IL	62233	618/826-2702
66	Daryl	Keylor	Kathy's Kitchen	201 N Pitt	Virginia	IL	62691	217/452-3035

#	F NAME	L NAME	ENTERPRISE	ADDRESS	CITY	ST	ZIP	TELEPHONE (H)
67	Lowell	Lenschow	Illinois Farm Bureau	1701 N. Towanda Ave.	Bloomington	IL	61701	309/557-3662
68	James I.	Hong	All Season Farm & Nursery	14510 Route 176	Woodstock	IL	60098	815/337-6653
69	Stefan	Lang	Lang's Orchard	17411 Secor Rd	Woodstock	IL	60098	815/568-7547
70	Daniel	Willett	Willett's Sandy Oak Orchard	P. O. Box 218	Manito	IL	61546	309/264-9000
71	Jerry M.	Mills	Mills Apple Farm	11477 Pocahontas Rd	Marine	IL	62061	618/887-1037
72	Dale	Conrady	Blackwood's Berry Farrm	27244 Hettick Scottville Rd.	Hettick	IL	62649	217/436-2510
73	Lawrence E.	Peceniak	Peceniak's Apples on Oak	16146 Oak Ave	Lockport	IL	60432	815/726-0386
74	Dennis	Norton	Royal Oak Farm, Inc.	15908 Hebron Rd	Harvard	IL	60033	815/648-4141
75	Leslie	Cooperband	Prairie Fruits Farm, LLC	4410 N. Lincoln Ave	Champaign	IL	61822	217/643-2314
76	David	Myers	Davidson's Japanese Maples	5611 Old Jacksonville Rd	Springfield	IL	61711	217/341-5906
77	Gary	Hiller	Garden Patch Farm & Orchard	14154 N 159th	Homer Glen	IL	60491	708/301-7720
78	Diane	Oriak	The Farm	25400 S. LaGrange Rd	Monee	IL	60449	708/720-2550
79	Thomas	Schwartz	Schwartz Farms	P. O.Box 885	Centralia	IL	62801	618/532-8058
80	Cty F. B.	Cook	Cook County Farm Bureau	6438 Joliet Rd.	Countryside	IL	60525	708/354-3276
81	Vatren	Jurin	Brandt Consolidated	2935 S Koke Mill Rd	Springfiled	IL	62711	217/626-1123

Research Report

Evaluation of the Efficacy of selected Fungicides for Control of Phytophthora Blight (*Phytophthora capsici*) in Processing Pumpkin in Illinois, 2009

M. Babadoost; Department of Crop Sciences, University of Illinois, Urbana, IL 61801
E-mail: babadoos@illinois.edu; phone: 217-333-1523

Summary

This study was conducted to evaluate efficacy of selected fungicides for control of Phytophthora blight (*Phytophthora capsici*) of processing pumpkins. No seedling damping-off was observed in the plots. Also, there was not a measurable Phytophthora leaf infection in the plots. The first vine and fruit infections were observed on 28 July. Percentage fruit rot, caused by *P. capsici*, was lower than 10% in 11 treatments and were less than 5% with four treatments. Percentages of vine infection and fruit rot in untreated (check) plots were significantly higher than plots received fungicides except the plots received only soil-drenched Ridomil Gold SC. Severity of powdery mildew on leaves ranged from 0.17 to 12.08%. No downy mildew, viral infection, or other diseases were detected in the plots.

Introduction

More than 90% of commercial processing pumpkins produced in the United States are grown and processed in Illinois. Phytophthora blight, caused by *Phytophthora capsici*, is one of the most serious threats to production of processing pumpkins and other cucurbits, causing up to 100% crop losses. This study was conducted to evaluate efficacy of selected fungicides for control of Phytophthora blight of processing pumpkin.

Materials and Method

A trial was conducted in an irrigated field near Pekin, IL, to evaluate the efficacy of selected fungicides for control of Phytophthora blight of processing pumpkin, caused by *Phytophthora capsici*. The field was naturally infested with *P. capsici*. Soil was chisel-plowed in October 2008, and was deep plowed in early June 2009. Fertilizers (60 lb phosphorus, 200 lb potassium, and 140 lb anhydrous ammonium per acre) were broadcast and incorporated into soil in late October 2008.

Seeds of processing pumpkin cultivar Dickinson were slurry-treated with Apron XL LS (0.64 fl oz/100 lb seed) and planted on 7 June. Seeds were sown 18-inch apart in single-row plots, 20 ft long. The plots were spaced 30 ft apart in a randomized complete block design with three replications. Command 3ME herbicide (1.33 pt) and Dual Magnum (1.0 pt) in 25 gallons of water per acre) was applied over the entire field on 5 June. During the season, weeds were controlled by cultivating and hand weeding. Soil-drench fungicides were applied on 10 June (Table 1). Spray-applications of fungicides began 14 July and continued until 2 September at 7-

day intervals (Table 1). Fungicides were applied with a backpack sprayer using 50 gal of water per acre.

Average monthly high and low temperatures (°F) were 82/65, 78/60, 78/61, and 78/57, during 7-30 June, July, August, and 1-15 September. Recorded precipitation in the field was 8 days (3.82 in.) during 7-30 June, 10 Days (6.24 in.) in July, 10 days (3.42 in.) in August, and 2 days (0.63 in.) during 1-15 September. The field was irrigated 1 day (0.3 in.) in July.

Plants were examined biweekly for Phytophthora damping-off, foliar blight, and fruit rot from 21 June to 15 Sep. Disease incidence and severity were assessed by examining all seedlings, 40 leaves in four spots (10 leaves per spot), 20 vines in four spots (five vines per spot), and all fruit in each plot. Severity of downy mildew and powdery mildew on leaves (i.e., percentage of total leaf area affected) was assessed by examining 40 leaves in four spots (10 leaves per spot) in each plot on 11 September. Plots were harvested on 15 September and the fruit yields were measured. The data were analyzed using GLM procedures of SAS.

Results and Discussion

No seedling damping-off was observed in the plots. Also, there was not a measurable Phytophthora leaf infection in the plots. The first vine and fruit infections were observed on 28 July. Percent of vine infection and fruit rot, caused by *P. capsici*, were significantly higher in untreated (check) plots than plots received fungicides except the plots received only soil-drenched Ridomil Gold SC (Table 2). Percentage fruit rot was less than 5% in the plots received Aliette, Revus plus Kocide alternated with Presidio plus Kocide, Revus plus Kocide alternated with Tanos plus Kocide, and Presidio plus Gavel alternated with Tanos plus Bravo Weather Stik (Table 2). Marketable fruit number and yield in untreated (check) plots were lower than the plots received fungicides.

Severity of powdery mildew on leaves ranged from 0.17 to 12.08%. No downy mildew, viral infection, or other diseases were detected in the plots.

Table 1. Fungicide application schedule in processing pumpkin plots in Illinois in 2009

Treat #	Treatment Code*	Rate/Acre (Product)	**Seed sowing** 0 (7 June)**	Spray Application (Weekly Schedule)								
				1 (10 June (**S**)	5 (14 July)	6 (21 July)	7 (28 July)	8 (4 Aug)	9 (11 Aug)	10 (18 Aug)	11 (25 Aug)	12 (2 Sep)
1	**Control**	AP: 0.64 fl oz/100 lb Seed	—	—	—	—	—	—	—	—	—	—
2	**(RGS);**	AP: 0.64 fl oz/100 lb Seed; RGS: 32 fl oz	—	**RGS (S)**	—	—	—	—	—	—	—	—
3	**(RGS); B-EXP + SIL**	AP: 0.64 fl oz/100 lb Seed; RGS: 32 fl oz; B-EXP: 11 fl oz; SIL: 2 fl oz	—	**RGS (S)**	**B-EXP + SIL**	**B-EXP + SIL**	**B-EXP + SIL**	**B-EXP + SIL**	**B-EXP + SIL**	—	—	—
4	**(RGS); B-EXP + SIL**	AP: 0.64 fl oz/100 lb Seed; RGS: 32 fl oz; B-EXP: 13.7 fl oz; SIL: 2 fl oz	—	**RGS (S)**	**B-EXP + SIL**	**B-EXP + SIL**	**B-EXP + SIL**	**B-EXP + SIL**	**B-EXP + SIL**	—	—	—
5	**(RGS); RS + IND**	AP: 0.64 fl oz/100 lb Seed; RGS: 32 fl oz; RS: 8 fl oz; IND: 0.25% v:v	—	**RGS (S)**	**RS +IND**	**RS +IND**	**RS +IND**	**RS +IND**	**RS +IND**	—	—	—
6	**(RGS); RN + SIL**	AP: 0.64 fl oz/100 lb Seed; RGS: 32 fl oz; RN: 2.75 fl oz; SIL: 2 fl oz	—	**RGS (S)**	**RN +SIL**	**RN +SIL**	**RN +SIL**	**RN +SIL**	**RN +SIL**	—	—	—
7	**(RGS); PO**	AP: 0.64 fl oz/100 lb Seed; RGS: 32 fl oz; PO: 4 fl oz	—	**RGS (S)**	**PO**	**PO**	**PO**	**PO**	**PO**	—	—	—
8	**(RGS); AT**	AP: 0.64 fl oz/100 lb Seed; AT: 5 lb	—	**RGS (S)**	**AT**	**AT**	**AT**	**AT**	**AT**	—	—	—
9	**(AP); (RS+KE+A90)/ (PO+A90)**	AP: 0.64 fl oz/100 lb Seed; RS: 8 fl oz; KE: 1 lb; A90: 0.125; PO: 4 fl oz	—	—	**RS+KE+ A90**	**PO+KE**	**RS+KE +A90**	**PO+KE**	**RS+KE+ A90**	**PO+KE**	**RS+KE +A90**	**PO+ KE**
10	**(RGS); (RS+KE+A90) / (PO+A90)**	AP: 0.64 fl oz/100 lb Seed; RGS: 16 fl oz; RS: 8 fl oz; KE: 1 lb; A90: 0.125% v:v; PO: 4 fl oz	—	**RGS (S)**	**RS+KE+ A90**	**PO+KE**	**RS+KE +A90**	**PO+KE**	**RS+KE+ A90**	**PO+KE**	**RS+KE +A90**	**PO+ KE**

A90=Activator-90; AT=Aliette 80WG; AP=Apron XL LS; B-EXP=B-EXP65100F; BWS=Bravo Weather Stik 6F; FM=Forum 4.16SC; GL=Gavel 75DF; IND=Induce 90; KE=Kocide-3000 46.1DF; PO=Presidio 4SC; RN=Ranman 400F; RS=Revus 2.09SC; RGS=Ridomil Gold 480SC; RGC=Ridomil Gold Copper 65WP; SIL= Silwet L-77; TS=Tanos 50DWG.

Table 1. Fungicide application schedule in processing pumpkin plots in Illinois in 2009 – continues

Treat #	Treatment Code*	Rate/Acre (Product)	**Seed sowing** 0 (7 June)**	Spray Application (Weekly Schedule)								
				(10 June **(S)**	5 (14 July)	6 (21 July)	7 (28 July)	8 (4 Aug)	9 (11 Aug)	10 (18 Aug)	11 (25 Aug)	12 (2 Sep)
11	**(RS+A90) /(GL+A90)**	AP: 0.64 fl oz/100 lb Seed; RS: 8 fl oz; A90: 0.25% v:v; GL: 2 lb	—	—	**RS+A90**	**GL+A90**	**RS+A90**	**GL+A90**	**RS+A90**	**GL+A90**	**RS+A90**	**GL+A90**
12	**(RN+A90) /(GL+A90)**	AP: 0.64 fl oz/100 lb Seed; RN: 2.75 fl oz; A90: 0.25% v:v; GL: 2 lb	—	—	**RN+A90**	**GL+A90**	**RN+A90**	**GL+A90**	**RN+A90**	**GL+A90**	**RN+A90**	**GL+A90**
13	**(TS+A90) /(GL+A90)**	AP: 0.64 fl oz/100 lb Seed; TS: 10 oz; A90: 0.25% v:v; GL: 2 lb	—	—	**TS+A90**	**GL+A90**	**TS+A90**	**GL+A90**	**TS+A90**	**GL+A90**	**TS+A90**	**GL+A90**
14	**(RN+SIL) /(RS+A90)/ (TS+KE)**	AP: 0.64 fl oz/100 lb Seed; RN: 2.75 fl oz; SIL: 2 fl oz; RS: 8 fl oz; A90: 0.25% v:v; TS: 10 oz; KE: 1.5 lb	—	—	**RN+SIL**	**RS+A90**	**TS+KE**	**RN+SIL**	**RS+A90**	**TS+KE**	**RN+SIL**	**RS+A90**
15	**(RGS); (RS+KE+A90) / (RGC)**	AP: 0.64 fl oz/100 lb Seed; RGS: 16 fl oz; RS: 8 fl oz; KE: 1.5 lb; A90: 0.25% v:v; RGC: 2 lb	—	**RGS (S)**	**RS+KE+ A90**	**RGC**	**RS+KE+ A90**	**RGC**	**RS+KE+ A90**	**RGC**	**RS+KE+ A90**	**RGC**
16	**(RGS); (RS+KE+A90) / (RGC)**	AP: 0.64 fl oz/100 lb Seed; RGS: 16 fl oz; RS: 8 fl oz; KE: 0.75 lb; A90: 0.25% v:v; RGC: 2 lb	—	**RGS (S)**	**RS+KE+ A90**	**RGC**	**RS+KE+ A90**	**RGC**	**RS+KE+ A90**	**RGC**	**RS+KE+ A90**	**RGC**
17	**(RGS); (RS+KE+A90) / (TS+KE)**	AP: 0.64 fl oz/100 lb Seed; RGS: 16 fl oz; RS: 8 fl oz; KE: 1.5 lb; A90: 0.25% v:v; TS: 10 g	—	**RGS (S)**	**RS+KE+ A90**	**TS+KE**	**RS+KE+ A90**	**TS+KE**	**RS+KE+ A90**	**TS+KE**	**RS+KE+ A90**	**TS+KE**
18	**(RGS+PO); (PO+GL) / (TS+BWS)**	AP: 0.64 fl oz/100 lb Seed; RGS: 16 fl oz; PO: 4 fl oz; GL: 1.5 lb; TS: 10 oz; BWS: 16 fl oz	—	**RGS + PO (S)**	**PO+GL**	**TS + BWS**	**PO+GL**	**TS + BWS**	**PO+GL**	**TS + BWS**		
19	**(TS+KE) / (RS+A90)**	AP: 0.64 fl oz/100 lb Seed; TS: 10 oz; KE: 1.5 lb; RS: 8 fl oz; A90: 0.25% v:v	—	—	**TS+KE**	**RS+A90**	**TS+KE**	**RS+A90**	**TS+KE**	**RS+A90**	**TS+KE**	**RS+A90**
20	**(TS+KE) / (FM+KE)**	AP: 0.64 fl oz/100 lb Seed; TS: 10 oz; KE: 1.5 lb; FM: 6 fl oz; KE: 1.5 lb	—	—	**TS+KE**	**FM+KE**	**TS+KE**	**FM+KE**	**TS+KE**	**FM+KE**	**TS+KE**	**FM+KE**

A90=Activator-90; AT=Aliette 80WG; AP=Apron XL LS; B-EXP=B-EXP65100F; BWS=Bravo Weather Stik 6F; FM=Forum 4.16SC; GL=Gavel 75DF; IND=Induce 90; KE=Kocide-3000 46.1DF; PO=Presidio 4SC; RN=Ranman 400F; RS=Revus 2.09SC; RGS=Ridomil Gold 480SC; RGC=Ridomil Gold Copper 65WP; SIL= Silwet L-77; TS=Tanos 50DWG.

Table 2. Incidence of Phytophthora blight on vines and fruit, powdery mildews on leaves, and yield in processing pumpkin plots following applications of the fungicides in Illinois in 2009

Treatment, rate/Acre (application)[v]	Phytophthora blight			Powdery mildew severity (%) (11 Sep)[w]	Marketable yield/plot	
	Infected vines (%) (20 July)	Infected vines (%) (11 Sep)	Infected fruit(%) (15 Sep)		Fruit number	Fruit weight (lb)
Untreated check[x]	3.33 a[y]	41.67 a	41.05 a	10.83 ab	11.67 d	148.00 e
Ridomil Gold SC, 32 fl oz (S)[z] (1)	0.00 b	31.67 a	27.93 ab	12.08 a	16.33 bcd	198.00 cde
Ridomil Gold SC, 32 fl oz (S) (1); B-EXP65100, 11.0 fl oz + Silwet, 2.0 fl oz (2-6)	0.00 b	5.00 b	7.12 de	6.17 bcd	18.67 abcd	219.33 bcde
Ridomil Gold SC, 32 fl oz (S) (1); B-EXP65100, 13.7 fl oz + Silwet, 2.0 fl oz (2-6)	0.00 b	5.00 b	14.80 bcde	6.92 bc	22.67 abc	243.00 abcde
Ridomil Gold SC, 32 fl oz (S) (1); Revus 2.09SC, 8.0 fl oz + Induce 90, 0.25% v:v (2-6	0.00 b	8.33 b	25.90 bc	6.75 bc	14.00 cd	140.67 e
Ridomil Gold SC, 32 fl oz (S) (1); Ranman 400F, 2.75 fl oz + Silwet L-77, 2 fl oz (2-6)	1.67 ab	8.33 b	18.33 bcd	5.08 cde	17.33 bcd	209.33 bcde
Ridomil Gold SC, 32 fl oz (S) (1); Presidio 4SC, 4.0 fl oz (2-6)	0.00 b	1.67 b	8.20 de	3.75 cdef	21.33 abc	209.00 bcde
Ridomil Gold SC, 32 fl oz (S) (1); Aliette 80wg, 5.0 lb (2-6)	1.67 ab	3.33 b	4.04 de	6.75 bc	20.67 abcd	212.33 bcde
Revus 2.09SC, 8.0 fl oz + Kocide-3000 46.1DF, 1 lb + Activator-90, 0.125% v:v (2,4,6,8) *alt* Presidio 4SC, 4.0 fl oz + Kocide-3000 46.1DF, 1 lb (3,5,7,9)	1.67 ab	1.67 b	2.99 e	2.25 cdef	23.33 abc	295.00 abc
Ridomil Gold SC, 32 fl oz (S) (1); Revus 2.09SC, 8.0 fl oz + Kocide-3000 46.1DF, 1 lb + Activator-90, 0.125% v:v (2,4,6,8) *alt* Presidio 4SC, 4.0 fl oz + Kocide-3000 46.1DF, 1 lb (3,5,7,9)	0.00 b	3.33 b	5.34 de	1.33 ef	28.00 a	330.33 ab
Revus 2.09SC, 8.0 fl oz + Activator-90, 0.25% v:v (2,4,6,8) *alt* Gavel 75DF, 2 lb + Activator-90, 0.25% v:v (3,5,7,9)	1.67 ab	5.00 b	7.00 de	0.17 f	21.00 abcd	258.67 abcde
Ranman 400F, 2.75 fl oz + Activator-90, 0.25% v:v (2,4,6,8) *alt* Gavel 75DF, 2 lb + Activator-90, 0.25% v:v (3,5,7,9)	1.67 ab	6.67 b	11.57 cde	0.58 ef	22.33 abc	250.00 abcde
Ranman 400F, 2.75 fl oz + Activator-90, 0.25% v:v (2,4,6,8) *alt* Gavel 75DF, 2 lb + Activator-90, 0.25% v:v (3,5,7,9)	1.67 ab	6.67 b	11.57 cde	0.58 ef	22.33 abc	250.00 abcde
LSD (P=0.05)	***3.01***	***17.04***	***14.54***	***4.74***	***9.42***	***127.62***

[v] Application time: 1= 10 June; 2= 14 July; 3= 21 July; 4= 28 July; 5= 4 August; 6= 11 August, 7= 18 August; 8= 25 August; and 9= 2 August.

[w] Percentage of leaf area affected 4 days prior to harvest.

[x] Seeds for all plots, including check plots, were treated with Apron XL LS (0.64 fl oz/100 lb seed) prior to sowing seeds.

[y] Values within each column with a letter in common are not significantly different (P=0.05) from each other according to Fisher's protected LSD test.

[z] Soil-drench of the fungicides on 10 June.

Table 2. Incidence of Phytophthora blight on vines and fruit, powdery mildews on leaves, and yield in processing pumpkin plots following applications of the fungicides in Illinois in 2009 - continues

Treatment, rate/Acre (application)[v]	Phytophthora blight			Powdery mildew severity (%) (11 Sep)[w]	Marketable yield/plot	
	Infected vines (%) (20 July)	Infected vines (%) (11 Sep)	Infected fruit(%) (15 Sep)		Fruit number	Fruit weight (lb)
Untreated check[x]	3.33 a[y]	41.67 a	41.05 a	10.83 ab	11.67 d	148.00 e
Tanos 50DWG, 10 oz + Activator-90, 0.25% v:v (2,4,6,8) *alt* Gavel 75DF, 2 lb + Activator-90, 0.25% v:v (3,5,7,9)	0.00 b	0.00 b	9.01 de	0.50 ef	24.00 ab	279.67 abcd
Ranman 400F, 2.75 fl oz + Silwet L-77, 2.0 fl oz (2,5,8) *alt* Revus 2.09SC, 8.0 fl oz + Activator-90, 0.25% v:v (3,6,9) *alt* Tanos 50DWG, 10 oz + Kocide-3000 46.1DF, 1 lb (4,7)	0.00 b	1.67 b	6.29 de	3.75 cdef	18.33 bcd	215.00 bcde
Ridomil Gold SC, 32 fl oz (S) (1); Revus 2.09SC, 8.0 fl oz + Kocide-3000 46.1DF, 1.5 lb + Activator-90, 0.125% v:v (2,4,6,8) *alt* Ridomil Gold Copper 65WP, 2 lb (3,5,7,9)	1.67 ab	1.67 b	14.05 bcde	3.75 cdef	21.00 abcd	232.67 abcde
Ridomil Gold SC, 32 fl oz (S) (1); Revus 2.09SC, 8.0 fl oz + Kocide-3000 46.1DF, 1.5 lb + Activator-90, 0.125% v:v (2,4,6,8) *alt* Ridomil Gold Copper 65WP, 2 lb (3,5,7,9)	0.00 b	0.00 b	8.10 de	0.75 ef	23.67 ab	356.67 a
Ridomil Gold SC, 32 fl oz (S) (1); Revus 2.09SC, 8.0 fl oz + Kocide-3000 46.1DF, 1.5 lb + Activator-90, 0.125% v:v (2,4,6,8) *alt* Tanos 50DWG, 10 oz + Kocide-3000 46.1DF, 1.5 lb (3,5,7,9)	0.00 b	5.00 b	4.72 de	3.50 cdef	19.00 abcd	227.67 bcde
Ridomil Gold SC, 32 fl oz (S) + Presidio 4SC, 4 fl oz (S) (1); Presidio 4SC, 4 fl oz + Gavel 75DF, 1.5 lb (2,4,6) *alt* Tanos 50DWG, 8 oz + Bravo Weather Stik 6F, 32 fl oz (3,5,7)	0.00 b	0.00 b	2.70 e	0.17 f	22.33 abc	262.33 abcde
Tanos 50DWG, 8 oz + Kocide-3000 46.1DF, 1.5 lb (2,4,6,8) *alt* Revus 2.09SC, 8.0 fl oz + Activator-90, 0.125% v:v (3,5,7,9)	0.00 b	11.67 b	13.28 cde	2.00 def	17.33 bcd	164.67 de
Tanos 50DWG, 8 oz + Kocide-3000 46.1DF, 1.5 lb (2,4,6,8) *alt* Forum 4.16SC, 6.0 fl oz + Kocide-3000 46.1DF, 1.5 lb (3,5,7,9)	1.67 ab	1.67 b	13.08 cde	2.92 cdef	21.00 abcd	265.33 abcde
LSD (P=0.05)	***3.01***	***17.04***	***14.54***	***4.74***	***9.42***	***127.62***

[v] Application time: 1= 10 June; 2= 14 July; 3= 21 July; 4= 28 July; 5= 4 August; 6= 11 August, 7= 18 August; 8= 25 August; and 9= 2 August.

[w] Percentage of leaf area affected 4 days prior to harvest.

[x] Seeds for all plots, including check plots, were treated with Apron XL LS (0.64 fl oz/100 lb seed) prior to sowing seeds.

[y] Values within each column with a letter in common are not significantly different (P=0.05) from each other according to Fisher's protected LSD test.

[z] Soil-drench of the fungicides on 10 June.

Efficacy of Selected Fungicides for Control of Powdery Mildew and other Diseases of Jack-O-Lantern Pumpkin in Champaign, Illinois - 2009

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Summary

This study was conducted to evaluate effectiveness of 11 fungicides for control of powdery mildew and other diseases of jack-o-lantern pumpkin in Illinois. Severity of powdery mildew in all of the treated plots with fungicides was significantly lower than that of untreated plots. The experimental fungicides, GWN-4617 and LEM 17SC, appeared to be highly effective on controlling powdery mildew. The results showed that powdery mildew could be controlled with four spray-applications of Pristine plus Kocide-3000 alternated with Procure plus Kocide-3000 as effectively as six or seven spray-applications. No downy mildew, Fusarium rot, gummy stem blight, black rot of fruit, Plectosporium blight, Sclerotinia rot, or viral infection was observed in the plots. Severe infection by *Xanthomonas campestris* pv. *cucurbitae* (bacterial spot) on leaves and fruit occurred. None of the treatments provided adequate control of bacterial infection on fruits. Fruit rot in some plots was higher than the past. No fruit rot was observed in the plots received applications of Actigard + A16001A alternated with Bravo Weather Stik, although 29.13% of the fruits in the plots had the bacterial infection. Fruit number and fruit weight were lower in the control plots than plots were sprayed.

Introduction

Powdery mildew (*Podosphaera xanthii*), downy mildew (*Pseudoperonospora cubensis*), Phytophthora blight (*Phytophthora capsici*), gummy stem blight and black rot (*Didymella bryoniae*), Plectosporium blight (*Plectosporium tabacinum*), Fusarium wilt and fruit rot (*Fusarium* spp.), Sclerotinia rot (*Sclerotinia sclerotiorum*), bacterial spot (*Xanthomonas campestris* pv. *cucurbitae*), bacterial wilt (*Erwinia tracheiphila*), and viral diseases (cucumber mosaic, papaya ring spot, squash mosaic, tobacco ring spot, watermelon mosaic, zucchini yellow mosaic) occur in pumpkin fields in Illinois every year. These diseases can cause up to 100% yield losses, if effective control measures are not applied. This study was conducted to evaluate efficacy of selected fungicides for control of powdery mildew and other diseases of jack-o-lantern pumpkin in Illinois.

Materials and Methods

The trial was conducted at the University of Illinois Vegetable Research Farm near Champaign, IL. The soil was a silt clay loam with pH 6.5. Soil was chisel-plowed on 24 October 2008 after soybean was harvested and disked on 9 June and chisel-plowed on 11 June. Nitrogen, 115 lb per acre was broadcast and incorporated on 24 March 2009. Jack-o-lantern pumpkin cultivar Howden was planted on 15 June. Seeds were sown 18 in. apart in single-row plots, 20-ft long. The plots were spaced 35 ft apart in a randomized complete block design with four replications. Herbicides Dual (II) Magnum 7.6E (1 qt/A) and Permit 75WSG (1 oz/A), in 20 gal of water/A, were applied over entire field on 15 June. During the season, weeds were controlled by cultivation and hand weeding. Cucumber beetles (*Acalymma vittatum* and *Diabrotica undecimpunctata*) and other insects were managed by applying Furadan 4F insecticide (1 qt/A) on 15 June and Pounce 25WP (3.2 oz/A) on 12 August and 2 September 2009.

Eleven fungicides, including A16001A, Actigard 50WG, Bravo Weather Stik 6F, Folicur 3.6SC, GWN-4617, Kocide-3000 46.1DF, LEM 17 SC, Pristine 38WG, Procure 480SC, Quintec 250SC, and Rally 40W, in 24 different combinations (treatments), were spray-applied onto plants (Table 1). Application of fungicides began on 21 July and continued (at 7-day intervals) until 1 September (Table 1). Fungicides were applied with a backpack sprayer, using 50 gal of water per acre. Fruits were harvested on 13 October.

Average monthly high and low temperatures (°F) were 87/68, 80/62, 81/61, 77/58, and 58/38, during 15-30 June, July, August, September and 1-13 October, respectively. Recorded precipitation in the field was 7 days (2.67 in.) during 15-30 June, 6 Days (6.45 in.) in July, 6 days (4.90 in.) in August, 3 days (0.70 in.) in September, and 6 days (3.81 in.) during 1-13 October.

Severity of powdery mildew and bacterial leaf spot (percent total area of vines and leaves affected) was visually evaluated on 29 July, 12 and 26 August, 9 September, and 7 October. Severity of the disease was assessed at four spots (43 sq ft each) in each plot, and at the same locations, throughout the season. Incidence of fruit diseases, including bacterial spot, Fusarium rot, black rot, Plectosporium blight, Sclerotinia rot, viral infection, and overall-fruit rot were assessed on 12 October. Also occurrence of downy mildew, Plectosporium foliage blight, gummy stem blight, and foliage viral infection was monitored throughout the season. Numbers of marketable fruit were recorded and their weight was measured on 13 October. The data were analyzed using GLM procedures of SAS (SAS Institute, Cary, NC).

Results and Discussions

Powdery mildew was first observed in the untreated plots on 4 August. Severity of powdery mildew in all of the treated plots with fungicides was significantly lower than that of untreated plots (Table 2). All of the fungicide treatments were effective on controlling powdery mildew throughout the season. However, spray-application of Actigard alone did not provide as much protection against powdery mildew as did other fungicides. The experimental fungicides, GWN-4617 and LEM 17SC, appeared to be highly effective on controlling powdery mildew. The results showed that powdery mildew could be controlled with four spray-applications of Pristine plus Kocide-3000 alternated with Procure plus Kocide-3000 as effectively as six or seven spray-applications.

No downy mildew, Fusarium rot, gummy stem blight, black rot of fruit, Plectosporium blight, Sclerotinia rot, or viral infection was observed in the plots throughout the season. In contrast, severe infection by *Xanthomonas campestris* pv. *cucurbitae* (bacterial spot) of leaves and fruit occurred. None of the treatments provided adequate control of this bacterial infection on fruits. Fruit rot in some plots, mainly due to the bacterial infection, was higher than the past. However, no fruit rot was observed in the plots received applications of Actigard + A16001A alternated with Bravo Weather Stik, although 29.13% of the fruits in the plots had the bacterial infection. Fruit number and fruit weight were lower in the control plots than plots were sprayed.

Table 1. Schedule of fungicide applications in jack-o-lantern pumpkin plots at Champaign, Illinois, in 2009.

	Treatment (**number of sprays**)	Week-0 June 15	Week-5 July 21	Wek-6 July 28	Wek-7 Aug 4	Wek-8 Aug 11	Wek-9 Aug 18	Wek-10 Aug 25	Wek-11 Sep 1
1	**Control (untreated)** – [No pray]	__	__	__	__	__	__	__	__
2	**[A16001A (20 fl oz)] *alt* [Bravo Weather Stik (32 fl oz)] [5 sprays]**	__	**A16**	**A16**	**BWS**	**A16**	**A16**	__	__
3	**[Actigard (0.76 oz)] [5 sprays]**	__	**AD**	**AD**	**AD**	**AD**	**AD**	__	__
4	**[Actigard (0.25 oz)+A16001A (20 fl oz)] *alt* [Bravo Weather Stik (32 fl oz)] [5 sprays]**	__	**AD + A16**	**AD + A16**	**BWS**	**AD + A16**	**AD + A16**	__	__
5	**[Actigard (0.25 oz)+A16001A (20 fl oz)] *alt* [Actigard (0.25 oz)+Bravo Weather Stik (32 fl oz)] [5 sprays]**	__	**AD + A16**	**AD + A16**	**BWS+ AD**	**AD + A16**	**AD + A16**	__	__
6	**[Actigard (0.25 oz)] *alt* [Kocide (1.5 lb)] [7 sprays]**	__	**AD**	**AD**	**AD**	**AD**	**AD**	**KE**	**KE**
7	**[GWN-4617 (3.4 oz)] *alt* [Procur (8 fl oz)] [7 sprays]**	__	**GWN**	**PR**	**GWN**	**PR**	**GWN**	**PR**	**GWN**
8	**[GWN-4617 (3.4 oz)] *alt* [Rally (5 oz)] [7 sprays]**	__	**GWN**	**RY**	**GWN**	**RY**	**GWN**	**RY**	**GWN**
9	**[GWN-4617 (3.4 oz)] *alt* [Quintec (4 fl oz)] [7 sprays]**	__	**GWN**	**QC**	**GWN**	**QC**	**GWN**	**QC**	**GWN**
10	**[GWN-4617 (3.4 oz)] *alt* [Quintec (4 fl oz)] [6 sprays]**	__	**GWN**	**QC**	**GWN**	**QC**	**GWN**	**QC**	__
11	**[GWN-4617 (3.4 oz)]*alt* [Brov W. S. (32 fl oz)] [7sprays]**	__	**GWN**	**BWS**	**GWN**	**BWS**	**GWN**	**BWS**	**GWN**
12	**[Pristine (18.5 oz) + Kocide (1.5 lb)] *alt* [Procure (8 fl oz) + Kocide (1.5 lb) [5 sprays]**	__	**PE + KE**	__	**PR + KE**	**PE + KE**	__	**PR + KE**	**PE + KE**
13	**[LEM 17 SC (16.0 fl oz)] [7 sprays]**	__	**LS**	**LS**	**LS**	**LS**	**LS**	**LS**	**LS**
14	**[LEM 17 SC (16.0 fl oz)] *alt* [Quintec (4 fl oz)] [7 sprays]**	__	**LS**	**QC**	**LS**	**QC**	**LS**	**QC**	**LS**
15	**[LEM 17 SC (16.0 fl oz)] *alt* [Quintec (4 fl oz)] [6 sprays]**	__	**LS**	**QC**	**LS**	**QC**	**LS**	**QC**	__
16	**[Rally (5 oz)] *alt* [LEM 17 SC (16.0 fl oz)] [7 sprays]**	__	**RY**	**LS**	**RY**	**LS**	**RY**	**LS**	**RY**
17	**[LEM 17 SC (16.0 fl oz)] *alt* [Bravo Weather Stik (32 fl oz)] [7 sprays]**	__	**LS**	**BWS**	**LS**	**BWS**	**LS**	**BWS**	**LS**
18	**[Rally (5 oz)] *alt* [Quintec (4 fl oz)] [7 sprays]**	__	**RY**	**QC**	**RY**	**QC**	**RY**	**QC**	**RY**
19	**[Bravo Weather Stik (48 fl oz)] [7 sprays]**	__	**BWS**	**BWS**	**BWS**	**BWS**	**BWS**	**BWS**	**BWS**
20	**[Bravo Weather Stik (32 fl oz)] *alt* [LEM 17 SC (16.0 fl oz) + Bravo Weather Stik (32 fl oz)] *alt* [Folicur (8 fl oz)] [7 sprays]**	__	**BWS**	**LS + BWS**	**FR**	**BWS**	**LS + BWS**	**FR**	**BWS**
21	**[Procure (8 fl oz) + Silwet L-77 (2 fl oz)] [7 sprays]**	__	**PR + SIL**	**PR + SIL**	**PR + SIL**	**PR + SIL**	**PR + SIL**	**PR + SIL**	**PR + SIL**
22	**[Procure (8 fl oz)] *alt* [Quintec (6 fl oz)] [7 sprays]**	__	**PR**	**QC**	**PR**	**QC**	**PR**	**QC**	**PR**
23	**[Procure (8 fl oz)] *alt* [Quintec (4 fl oz)] [7 sprays]**	__	**PR**	**QC**	**PR**	**QC**	**PR**	**QC**	**PR**
24	**[Pristine (18.5 oz) + Kocide (1.5 lb)] *alt* [Procure (8 fl oz) + Kocide (1.5 lb) [4 sprays]**	__	**PE + KE**	__	**PR + KE**	**PE + KE**	__	**PR + KE**	__

A16= A16001A; AD= Actigard 50WG; BWS= Bravo Weather Stik 6F; FR= Folicur 3.6SC; GWN=GWN-4617; KE= Kocide-3000 46.1DF; LS= LEM 17 SC; PE= Pristine 38WG; PR= Procure 480SC; QC= Quintec 250SC; RY= Rally 40W; SIL= Silwet L-77.

Table 2. Occurrence of powdery mildew, bacterial spot, and fruit rot and yield in jack-o-lantern pumpkin plots following application of selected fungicides in Illinois in 2009

Treatment, rate/A (application)[y]	Powdery mildew severity (%)						Bacterial spot		Fruit Rot (%) 12 October	Marketable fruit (yield per plot)	
	12 August		9 September		7 October		Severity on leaves (%) 9 September	Incidence on fruit (%) 12 October			
	Vine	Leaf	Vine	Leaf	Vine	Leaf				Number	Weight (lb)
1Control (untreated)	15.31a[z]	13.75 a	50.94 a	46.88 a	70.63 a	70.00 a	35.16 a	43.44 ab	9.06 a-e	10.00 e	183.50 g
2A16001A, 20 fl oz (1,2,4,5) *alt* Bravo Weather Stik 6F, 32 fl oz (3)	2.94 b	2.81 bc	5.56 cd	3.19 c	33.75 b	21,25 c	13.75 c	28.39 a-c	14.97 a-c	15.00 b-e	270.50 d-g
3Actigard 50WG, 0.76 oz (1-5)	0.00 c	0.00 c	31.56 b	26.00 b	41.25 b	29.38 b	17.66 b	28.75 a-c	18.85 a	13.75 c-e	265.00 d-g
4Actigard 50WG, 0.25 oz + A16001A, (20 fl oz (1,2,4,5) *alt* Bravo Weather Stik 6F, 32 fl oz (4)	0.00 c	0.00 c	11.88 c	7.56 c	40.63 b	29.36 b	17.50 b	29.13 a-c	0.00 e	14.00 c-e	287.00 c-g
5Actigard 50WG, 0.25 oz + A16001A, (20 fl oz (1,2,4,5) *alt* Actigard 50WG, 0.25 oz + Bravo Weather Stik 6F, 32 fl oz (3)	0.00 c	0.00 c	11.31 c	7.56 c	38.13 b	27.50 b	16.41 bc	37.09 a-c	9.17 a-e	15.75 a-e	348.75 a-f
6Actigard 50WG, 0.25 oz (1-5) *alt* Kocide-3000 46.1DF, 1.5 lb (6,7)	3.00 b	3.00 b	9.06 cd	6.00 c	37.50 b	25.00 bc	15.63 bc	49.24 a	10.39 a-e	12.00 de	236.50 fg
7GWN-4617, 3.4 oz (1,3,5,7) *alt* Procure 480SC, 8 fl oz (2,4,6)	0.00 c	0.00 c	0.00 d	0.00 c	1.50 fg	1.00 fg	0.63 f	21.14 bc	3.13 de	15.75 a-e	340.25 a-f
8GWN-4617, 3.4 oz (1,3,5,7) *alt* Rally 40W, 5 oz (2,4,6)	0.00 c	0.00 c	0.00 d	0.00 c	1.25 fg	0.75 fg	0.50 f	20.16 c	7.05 b-e	21.00 ab	403.00 a-d
9GWN-4617, 3.4 oz (1,3,5,7) *alt* Quintec 250SC, 4 fl oz (2,4,6)	0.00 c	0.00 c	0.00 d	0.00 c	0.69 g	0.56 g	0.31 f	24.81 bc	2.51 e	21.75 a	464.50 a
10GWN-4617, 3.4 oz (1,3,5) *alt* Quintec 250SC, 4 fl oz (2,4,6)	0.00 c	0.00 c	1.75 d	1.00 c	2.06 e-g	1.56 fg	0.91 f	35.48 a-c	9.26 a-e	18.25 a-d	368.75 a-f
LSD (*P*=0.05)	***2.83***	***2.96***	***9.31***	***8.52***	***7.66***	***6.24***	***3.39***	***22.46***	***10.90***	***6.35***	***147.98***

[y] Application time: 0 = 16 June; 1 = 21 July, 2 = 28 July, 3 = 4 August, 4 = 11 August, 5 = 18 August, 6 = 25 August, and 7 = 1 September.

[z] Values within each column with a letter in common are not significantly different (*P*=0.05) from each other according to Fisher's protected LSD test.

Table 2. Occurrence of powdery mildew, bacterial spot, and fruit rot and yield in jack-o-lantern pumpkin plots following application of selected fungicides in Illinois in 2009 - continues

Treatment, rate/A (application)[y]	Powdery mildew severity (%)						Bacterial spot		Fruit Rot (%) 12 October	Marketable fruit (yield per plot)	
	12 August		9 September		7 October		Severity on leaves (%) 9 September	Incidence on fruit (%) 12 October			
	Vine	Leaf	Vine	Leaf	Vine	Leaf				Number	Weight (lb)
Control (untreated)	15.31a[z]	13.75 a	50.94 a	46.88 a	70.63 a	70.00 a	35.16 a	43.44 ab	9.06 a-e	10.00 e	183.50 g
11GWN-4617, 3.4 oz (1,3,5,7) *alt* Bravo Weather Stik 6F, 32 fl oz (2,4,6)	0.00 c	0.00 c	0.00 d	0.00 c	2.38 e-g	0.75 fg	0.78 f	24.80 bc	4.03 de	17.00 a-d	410.75 a-d
12Pristine 38WG, 18.5 oz + Kocide-3000 46.1DF, 1.5 lb (1,4,7) *alt* Procure 480SC, 8 fl oz + Kocide-3000 46.1DF, 1.5 lb (3,6)	1.31 bc	1.13 bc	1.56 d	0.81 c	9.38 de	4.25 e-g	3.41 ef	23.24 bc	10.33 a-e	16.75 a-d	387.75 a-e
13LEM 17SC, 16.0 fl oz (1-7)	0.00 c	0.00 c	0.38 d	0.13 c	7.38 d-g	4.00 fg	2.84 ef	30.04 a-c	5.94 b-e	19.75 a-c	418.75 a-c
14LEM 17SC, 16.0 fl oz (1,3,5,7) *alt* Quintec 250SC, 4 fl oz (2,4,6)	0.00 c	0.00 c	0.00 d	0.00 c	4.75 e-g	2.13 fg	1.72 ef	31.16 a-c	19.73 a	12.50 de	250.00 e-g
15LEM 17SC, 16.0 fl oz (1,3,5) *alt* Quintec 250SC, 4 fl oz (2,4,6)	0.31 bc	0.31 bc	0.19 d	0.06 c	4.75 e-g	2.00 fg	1.69 ef	26.81 a-c	4.00 de	17.25 a-d	312.25 b-g
16Rally 40W, 5 oz (1,3,5,7) *alt* LEM 17SC, 16.0 fl oz (2,4,6)	0.00 c	0.00 c	1.19 d	0.63 c	13.44 cd	6.81 d-f	5.06 de	34.94 a-c	3.89 de	17.25 a-d	369.00 a-f
17LEM 17SC, 16.0 fl oz (1,3,5,7) *alt* Bravo Weather Stik 6F, 32 fl oz (2,4,6)	0.00 c	0.00 c	0.25 d	0.25 c	8.75 d-f	4.63 d-g	3.34 ef	29.50 a-c	16.03 ab	13.50 c-e	284.50 c-g
LSD (*P*=0.05)	***2.83***	***2.96***	***9.31***	***8.52***	***7.66***	***6.24***	***3.39***	***22.46***	***10.90***	***6.35***	***147.98***

[y] Application time: 0 = 16 June; 1 = 21 July, 2 = 28 July, 3 = 4 August, 4 = 11 August, 5 = 18 August, 6 = 25 August, and 7 = 1 September.

[z] Values within each column with a letter in common are not significantly different (*P*=0.05) from each other according to Fisher's protected LSD test.

Table 2. Occurrence of powdery mildew, bacterial spot, and fruit rot and yield in jack-o-lantern pumpkin plots following application of selected fungicides in Illinois in 2009 - continues

Treatment, rate/A (application)[y]	Powdery mildew severity (%)						Bacterial spot		Fruit Rot (%) 12 October	Marketable fruit (yield per plot)	
	12 August		9 September		7 October		Severity on leaves (%) 9 September	Incidence on fruit (%) 12 October			
	Vine	Leaf	Vine	Leaf	Vine	Leaf				Number	Weight (lb)
Control (untreated)	15.31a[z]	13.75 a	50.94 a	46.88 a	70.63 a	70.00 a	35.16 a	43.44 ab	9.06 a-e	10.00 e	183.50 g
18Rally 40W, 5 oz (1,3,5,7) *alt* Quintec 250SC, 4 fl oz (2,4,6)	0.00 c	0.00 c	0.25 d	0.13 c	6.88 d-g	3.75 fg	2.66 ef	33.04 a-c	2.75 de	17.50 a-d	371.25 a-f
19Bravo Weather Stik 6F, 3 pt (1-7)	0.00 c	0.00 c	3.00 cd	1.63 c	17.81 c	10.38 de	7.05 d	19.72 c	4.57 c-e	14.50 c-e	298.50 b-g
20Bravo Weather Stik 6F, 32 fl oz (1,4,7) *alt* LEM 17SC, 16.0 fl oz + Bravo Weather Stik 6F, 32 fl oz (2,5) *alt* Folicur 3.6SC, 8 fl oz (3,6)	0.00 c	0.00 c	0.81 d	0.13 c	8.44 d-f	4.38 e-g	3.20 ef	16.85 c	4.95 c-e	16.75 a-d	359.00 a-f
21Procure 480SC, 8 fl oz + Silwet L-77, 2 fl oz (1-7)	0.00 c	0.00 c	0.31 d	0.06 c	7.94 d-g	4.25 e-g	3.05 ef	36.60 a-c	10.05 a-e	13.25 de	308.00 b-g
22Procure 480SC, 8 fl oz (1,3,5,7) *alt* Quintec 250SC, 6 fl oz (2,4,6)	0.00 c	0.00 c	1.19 d	0.69 c	7.00 d-g	4.75 d-g	2.94 ef	27.61 a-c	3.97 de	16.75 a-d	439.00 ab
23Procure 480SC, 8 fl oz (1,3,5,7) *alt* Quintec 250SC, 4 fl oz (2,4,6)	0.00 c	0.00 c	0.31 d	0.19 c	5.56 e-g	3.00 fg	2.14 ef	38.25 a-c	5.51 b-e	15.25 b-e	328.50 a-g
24Pristine 38WG, 18.5 oz + Kocide-3000 46.1DF, 1.5 lb (1,4) *alt* Procure 480SC, 8 fl oz + Kocide-3000 46.1DF, 1.5 lb (3,6)	0.00 c	0.00 c	4.31 cd	2.63 c	18.13 c	10.63 d	7.19 d	27.12 a-c	13.54 a-d	18.25 a-d	419.00 a-c
LSD (*P*=0.05)	***2.83***	***2.96***	***9.31***	***8.52***	***7.66***	***6.24***	***3.39***	***22.46***	***10.90***	***6.35***	***147.98***

[y] Application time: 0 = 16 June; 1 = 21 July, 2 = 28 July, 3 = 4 August, 4 = 11 August, 5 = 18 August, 6 = 25 August, and 7 = 1 September.

[z] Values within each column with a letter in common are not significantly different (*P*=0.05) from each other according to Fisher's protected LSD test.

Bell Pepper Evaluation for Resistance to Phytophthora blight (*Phytophthora capsici*)

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Phytophthora blight, caused by *Phytophthora capsici*, has become one of the important diseases of peppers in Illinois, as well as worldwide. Yield losses up to 100% occur in commercial fields and home gardens. The objective of this study was to evaluate reaction of selected bell pepper cultivars to *P. capsici* in the field in Illinois.

Materials and Methods

Ten bell pepper cultivars, Alliance, Aristotle XR3, California Wonder, Declaration, Intruder, Paladin, Polaris, Revolution, Snapper, and 9941819 SVR (Table 1) were tested for resistance to Phytophthora blight. Seedlings were grown in a greenhouse. Seven-week-old seedlings were kept outside the greenhouse for 9 days, and then transplanted in a commercial field near Bradley (Kankakee county), Illinois, on 30 May. The field was naturally infested with *P. capsici*. The soil was a silt clay loam with pH 6.5. Soil was deeply-tilled in October 2008 after corn crop was harvested and was disked on 24 May, 2009. Raised beds with drip irrigation and black plastic mulch were prepared on 29 May, 2009. The experiment was performed in a completely randomized block design with four replications. Seedlings (10/plot) were planted in one straight row with plants spaced 12 in. apart within rows centered 6 ft apart. Weeds were controlled by hand weeding. Plants received 0.3 in. water every week, or as needed, through the drip. Recorded precipitation in the area was 0 days (0.00 in.) during 30-31 May, 12 days (3.92 in.) in June, 9 days (2.51 in.) in July, 10 day (3.10 in.) in August, and 0 day (0.00 in.) during 1-13 September. Average monthly high and low temperatures (°F) were 80/44, 79/58, 76/57, 77/56, and 76/53, during 30-31 May, June, July, August, and 1-13 September, respectively. The percent plants wilted or dead was determined on 12, 18, and 25 June; 2, 9, 16, 23, and 30 July; 7, 14, 21, and 28 August; and 4 and 11 September. Due to a mechanical damage, most of the plants were lost in one of the blocks, thus the data from only three blocks were included in the data analysis. The data were analyzed using the LSD test.

Results and Discussion

Phytophthora lesions were observed on the crowns and at the base of stems beginning 14 days after transplanting the seedlings. Symptomatic plants gradually wilted and died. Significantly higher percentage of plants of cultivar California Wonder, a susceptible pepper to *P. capsici*, lost during the season (Table 1). In cultivars Alliance, Paladin, Revolution, and 9941819 SVR > 85% of the plants were asymptomatic at the end of the season. Percentage of asymptomatic plants of cultivars Paladin and 9941819 SVR (96.67%) was the highest at the end of the season. Due to the cooler condition in 2009 than the normal, the incidence of Phytophthora blight was relatively lower than the past.

Average number of marketable fruit ranged from 6.03 (Snapper) to 12.44 (9941819 SVR) (Table 1). Similarly, weight of marketable fruit ranged from 2.14 pound (Alliance) to 5.06 pound (9941819 SVR).

Table1. Reaction of bell pepper cultivars to *Phytophthora capsici* in the field in Illinois in 2009.

Cultivar	Seed source[v]	Plant stand (%)[w]						Fruit yield/plant[x]			
		30 May[y]	18 June	9 July	31 July	21 August	11 September	Total		Marketable	
								Number	Weight (lb)	Number	Weight (lb)
Alliance	HM	100	93.33	93.33	93.33	93.33 a	93.33 a	10.83 abc	2.83 d	7.20 cd	2.14 d
Aristotle XR3	SM	100	86.67	83.33	83.33	80.00 ab	80.00 abc	11.76 abc	4.08 bc	8.53 bcd	3.43 bc
California Wonder	ST	100	86.67	86.67	83.33	70.00 b	66.67 c	12.71 ab	4.76 ab	10.46 ab	4.28 ab
Declaration	HM	100	90.00	90.00	90.00	80.00 ab	80.00 abc	12.62 ab	4.88 ab	9.13 bc	3.85 bc
Intruder	SW	100	90.00	90.00	90.00	90.00 a	86.67 ab	10.38 abc	3.80 bcd	8.38 bcd	3.39 bc
Paladin	SY/RG	100	100	100	100	96.67 a	96.67 a	11.50 abc	3.85 bcd	8.77 bc	3.29 bcd
Polaris	WN	100	90.00	90.00	90.00	90.00 a	83.33 abc	9.10 bc	3.78 bcd	7.25 cd	3.39 bc
Revolution	HM	100	90.00	86.67	86.67	86.67 ab	86.67 ab	11.92 abc	4.07 bc	8.17 bcd	2.98 cd
Snapper	EZ	100	86.67	86.67	80.00	80.00 ab	73.33 bc	8.57 c	3.30 cd	6.03 d	2.83 cd
9941819 SVR	SM	100	96.67	96.67	96.67	96.67 a	96.67 a	13.39 a	5.28 a	12.44 a	5.06 a
LSD (*P*=0.05)		***NS***	***NS***	***NS***	***NS***	***19.67***	***19.17***	***3.79***	***1.11***	***2.68***	***1.16***

[v] HM = Harris Moran; SM = Seminis; ST = Stokes; SW = Seedway; SY/RG = Syngenta, Rogers Brands; WN = Western; EZ = Enza Zaden.

[w] Symptomless plants.

[x] Fruit yield was harvested only twice (14 August and 13 September) during the season.

[y] Seedlings were transplanted on 30 May.

[z] Values within each column followed with the same letter are not significantly different (*P*=0.05) from each other according to Fisher's protected LSD test.

2007 TOMATO CULTIVAR TRIAL FOR SOUTHERN ILLINOIS

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A tomato cultivar trial was conducted at the Dixon Springs Agricultural Center located in Pope County. Transplants used in the study were grown at DSAC and field set on May 17, 2007. The plants were grown on raised beds with black plastic mulch and trickle irrigation. Plants were set 24 inches apart in rows with 5.5-foot bed spacing. They were grown using a trellis weave and pruned to below first cluster. All plots were replicated three times. Pest control practices followed recommendations given in the *Midwest Vegetable Production Guide, 2007.*

The plots were harvested twice a week for the period of July 16 to August 30. Cultivars are listed in descending order of total pounds of U.S. No. 1 fruit harvested. We wish to thank the seed companies for their contribution in this trial.

Table 1. Results of 2007 DSAC tomato variety trial.

Cultivar	Source	Early 7/16-7/20	Midseason 7/24-7/31	Total #1 7/16-8/30	Total Mktbl Yield 7/16-8/30	Size	Culls
		U.S. No. 1 (----------pounds per plant----------)				(oz)	(no.)
NC 0377	NC	1.6	5.7	15.0	18.0	10.7	4.8
NC 05137	NC	1.6	4.5	12.7	16.1	9.9	12.0
Crista	SW	2.5	4.2	12.2	15.9	10.6	11.3
NC 0392	NC	2.4	5.5	11.2	13.6	10.5	7.5
Fabulous	SW	1.3	3.9	10.5	12.7	10.2	10.7
Big Beef	SW	1.3	4.1	10.2	15.0	9.2	10.2
NC 0718	SW	2.5	4.1	9.7	12.1	10.6	8.8
Florida 47	SW	1.3	4.3	9.2	17.8	10.7	6.9
BHN 589	SW	2.1	4.1	9.2	11.9	11.2	8.9
Pink Girl	SW	0.6	1.6	6.3	9.5	10.3	14.1
Tough Boy	SW	0.1	0.2	2.4	7.4	8.0	36.4
NC 05255 *	NC	0.3	3.0	13.5	13.5	4.4	
NC 05114*	NC	2.1	2.9	13.4	13.4	1.6	
Smarty*	NC	1.6	2.0	11.0	0.4		

* Specialty tomato

2009 DSAC PEPPER VARIETY TRIAL

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A pepper cultivar trial was established and evaluated at the Dixon Springs Ag Center in Pope County Illinois. The plots were established from transplants set on May 19, 2009. The plots were grown in twin rows at 12" spacing on raised beds at 5.5' spacing with black plastic mulch and trickle irrigation. Fertility and pest management followed recommendations from the *Midwest Vegetable Production Guide for Commercial Growers 2009*. They were harvested four times from July 23 to September 10. Each variety was replicated three times.

The 2009 growing season was exceptionally wet and also cooler than normal. Over 10 inches of rainfall was recorded at DSAC for the month of July alone. Even with the cooler and wetter weather conditions, the pepper varieties seemed to do reasonably well although maturity was later than we would have anticipated on a year with normal weather conditions. Losses from phytophthora were small and plot size was not adjusted for plant losses.

Table 1 shows yield data. The varieties are listed in descending order of U.S. No. 1 yield. We wish to thank the seed companies for their contributions in this trial.

Table 1. Results of 2009 Pepper Cultivar Trial at DSAC.

			U.S. No. 1		U.S. No.2		
			Early	Total		Culls	
Cultivar	Source	Color/ Type	Bu/Acre	Bu/Acre	Bu/Acre	No. / Acre	Avg Fruit Size US No. 1
Karisma	RI	Red	360	1560	540	22500	7.3 oz
El Jefe	SI	Jalapeno	300	1500	0	3000	1 oz
LaFayette	SI	Yellow	300	1440	720	9000	7.7 oz
Polaris	SI	Red	300	1440	480	13500	7.4 oz
Declaration	SW	Red	300	1380	780	21000	7.2 oz
Telestar	SI	Red	60	1380	720	16500	7.1 oz
Alliance	RI	Red	360	1320	840	16500	7.3 oz
Gloria	SW	Yellow	180	1200	600	13500	6.9 oz
PS9928302	RI	Red	300	1200	540	18000	7.5 oz
Sirius	SI	Yellow	60	1200	360	28500	7.2 oz
Intruder	RG	Red	300	1140	900	16500	6.9 oz
Red Knight X3R	RI	Red	360	1080	840	31500	7.0 oz
Heritage	SW	Red	240	1080	780	16500	7.2 oz
Aristotle X3R	RI	Red	180	1080	660	28500	7.4 oz
Tom Cat	RG	Red	180	1080	600	30000	7.3 oz
Don Emilio	SI	Pablano	180	1080	0	7500	3.2 oz
Patriot	SW	Red	300	1020	900	25500	7.0 oz
Hunter	RG	Red	180	960	960	19500	6.9 oz
Valencia	SI	Orange	0	600	780	64500	6.1 oz
Queen	SI	Orange	0	480	1020	49500	5.6 oz

2009 DSAC Blackberry Variety Trial

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A blackberry cultivar trial was established at DSAC on May 15, 2006. Selections for this trial include experimental varieties from Dr. John Clark, University of Arkansas as well as two named varieties, *Prime Jim* and *Prime Jan*, donated by Indiana Plant & Berry Company but also originating from Dr. Clark's breeding program. Of the eight selections in this trial, the following four are a thornless, floricane fruiting type: A-1937, A-2315, A-2215, and *Natchez.* The rest of the selections in the trial are thorny, primocane fruiting types. They include APF 41, APF 40, *Prime Jan,* and *Prime Jim.*

Due to poor performance, the following four varieties have been eliminated from Dr. Clark's advanced breeding trial and from the DSAC site: APF 46, APF 27, A-1937, & *Prime Jim*. *Prime Jim* should be considered more for the home gardener than for a commercial planting. Data from these four varieties will still be included in this year's report.

Each variety was replicated twice with six plants per plot. The plants were set three feet apart on raised beds with black plastic mulch and trickle irrigation. Beds were spaced on 12 feet centers. Table 1 provides the average floricane yields in pounds per acre for each variety. Table 2 provides the average primocane yields in pounds per acre for each variety. Table 3 gives a yield comparison for the varieties between the 2008 and 2009 seasons. Figures 1 & 2 show the harvest dates for the 2009 floricane and primocane seasons.

Table 1. Average floricane yields for the 2009 DSAC blackberry variety trial.

Variety	**Total Floricane Yields**
	(lbs/Acre)
Natchez	13122.5
A 2215	11290.4
A 1937	7898.4
A 2315	7477.3
Prime Jim	5792.2
Prime Jan	5763.2
APF 41	5750.5
APF 40	3155.2
APF 27	2262.3
APF 46	1781.3

Table 2. Average primocane yields for the 2009 DSAC blackberry variety trial.

Variety	**Total Primocane Yields**
	(lbs/Acre)
Prime Jan	6379.3
APF 27	4500.9
APF 40	4274.0
APF 46	2976.4
APF 41	2214.2
Prime Jim	2141.6

Table 3. Yield comparison between the 2008 & 2009 harvest seasons at DSAC.

2008 Total Harvest Yields		**2009 Total Harvest Yields**	
Variety	**(lbs/Acre)**	**Variety**	**(lbs/Acre)**
Natchez	12160.6	Natchez	13122.5
Prime Jan	14683.4	Prime Jan	12142.5
A 2215	12523.6	A 2215	11290.4
APF 41	14883.1	APF 41	7964.6
Prime Jim	12414.7	Prime Jim	7933.8
A 1937	15155.4	A 1937	7898.4
A 2315	10672.3	A 2315	7477.3
APF 40	5916.9	APF 40	7429.2
APF 27	7804.5	APF 27	6763.2
APF 46	5299.6	APF 46	4757.7

Figure 1. 2009 DSAC blackberry floricane harvest data for the varieties continuing in the trial next year.

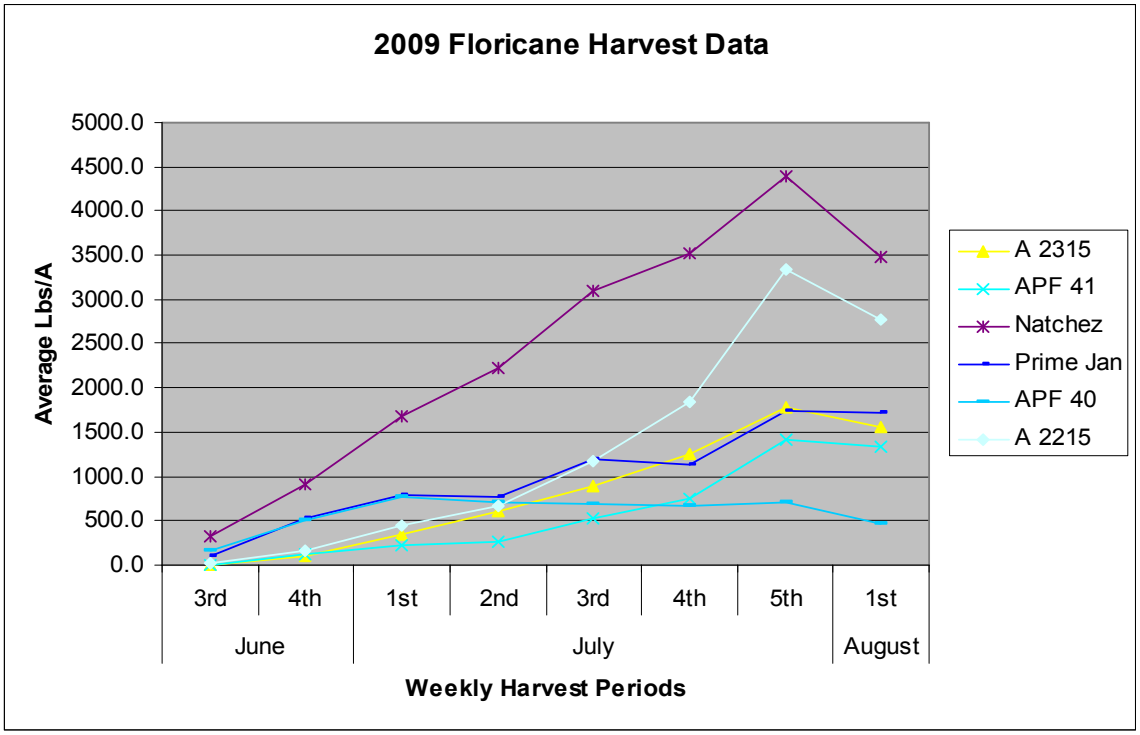
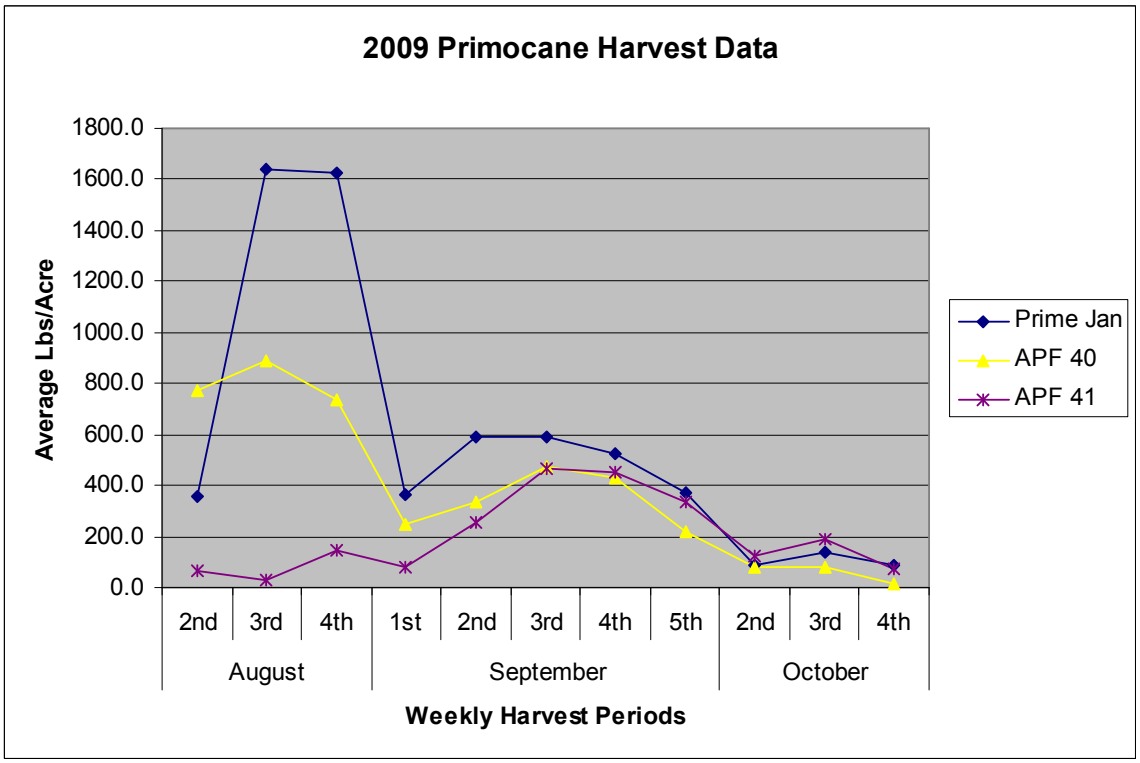


Figure 2. 2009 DSAC blackberry primocane harvest data for the varieties continuing in the trial next year.



2009 DSAC STRAWBERRY PLASTICULTURE TRIAL

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In the summer of 2008, strawberry plasticulture plots were established at the Dixon Springs Agricultural Center (DSAC) to evaluate effects different cover crops had on fruit yield and quality. For this study, the two soil amendments, buckwheat and 'Caliente' mustard, were compared to a control of no soil amendment. The cover crops were established in mid July at standard seeding rates (10lb/A mustard and 65lb/A buckwheat). The cover crops were incorporated just prior to bedding and laying plastic mulch the first of September. Pre-plant fertilizer was applied and incorporated to the field at a rate of 60 lbs N/Acre prior to bedding. Strawberry plug plants were transplanted in September , 2008. Two varieties, 'Chandler' and 'Camarosa' were evaluated in this trial.

Plots were harvested three days a week from April 30th to May 29th. One observation noticed between treatments of the 'Chandler' variety was that the control treatment with no soil amendment was delayed by 4 days in having fruit ready for the first harvest. The buckwheat and mustard plots began first harvest on 4/30 or 5/1 whereas the control plots began first harvest on 5/4 or 5/7. There was no noticeable difference of first harvest dates between treatments within the 'Camarosa' plots, although this variety began harvests on 4/30 and was a few days earlier than 'Chandler'. Table 1 provides yield data of both varieties across the three treatments. Table 2 provides the fruit quality data of both varieties across the three treatments.

Table 1. 2009 DSAC Strawberry Plasticulture Yield Data.

	Chandler		
	Control	**Buckwheat**	**Mustard**
Total lbs/plot harvested	23.69	18.88	19.16
	25.96	24.51	20.51
	27.76	27.06	16.7
Average lbs/plot	**25.80**	**23.48**	**18.79**
Average lbs/plant	**1.29**	**1.17**	**0.94**
Average lbs/Acre	19352.50	17612.50	14092.50

	Camarosa		
	Control	**Buckwheat**	**Mustard**
Total lbs/plot harvested	19.04	15.29	10.3
	11.84	11.59	15.83
	8.17	17.26	5.41
Average lbs/plot	**13.02**	**14.71**	**10.51**
Average lbs/plant	**0.65**	**0.74**	**0.53**
Average lbs/Acre	9762.50	11035.00	7885.00

Table 2. 2009 DSAC Strawberry Plasticulture Fruit Quality Data.

	Chandler		
	Control	**Buckwheat**	**Mustard**
Fruit Size			
average number berries/quart	30	31	28
Fruit Quality			
average number marketable fruit harvested per plot	568	552	399
average number of culls per plot	70	80	102
% marketable fruit per plot	**89**	**87**	**80**

	Camarosa		
	Control	**Buckwheat**	**Mustard**
Fruit Size			
average number berries/quart	29	29	26
Fruit Quality			
average number marketable fruit harvested per plot	192	234	113
average number of culls per plot	258	232	245
% marketable fruit per plot	**43**	**50**	**32**

2009 DSAC Matted Row Strawberry Yield Data

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A matted row strawberry variety trial was established at DSAC in April 2007, looking at 12 different varieties. Plants were set with a spacing of two feet between plants and four feet between rows. For the 2009 season, harvest began on May 14 and ended on May 29, 2009. Plots were harvested five times during this two week period. Table 1 lists the varieties by total yield in descending order. Table 2 provides a comparison in total yield between the 2008 and 2009 harvest seasons.

Table 1. Total yield in pounds per acre for the matted row strawberry varieties trialed at DSAC in 2009.

Variety	**Total Yield**
	(Lbs/Acre)
Honeoye	15436.6
Clancy	11107.8
Itasca	10154.9
Evangeline	9855.5
Darselect	9719.3
Allstar	9365.4
Earliglow	7650.2
L'Amour	6670.1
Jewel	6642.9
Eros	6098.4
Idea	5880.6
Ovation	3630.0

Table 2. Comparison of total yield in pounds per acre for the matted row strawberry variety trial at DSAC for the 2008 and 2009 harvest seasons.

	2008	**2009**
Variety	**Total yield**	**Total Yield**
	(lbs/Acre)	*(lbs/Acre)*
Honeoye	21346	15436.6
Itasca	21019	10154.9
Darselect	18296	9719.3
Earliglow	17752	7650.2
Evangeline	14920	9855.5
Clancy	14049	11107.8
Idea	12851	5880.6
Eros	12415	6098.4
L'Amour	12088	6670.1
Allstar	11544	9365.4
Jewel	9801	6642.9
Ovation	4465	3630.0

2009 DSAC SWEET CORN TRIAL

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A sweet corn variety trial was established and evaluated at the Dixon Springs Agricultural Center in Pope County Illinois. The varieties were hand seeded on June 1, 2009 at 12 inch in-row spacing and 30 inch rows. Each plot was 30 feet in length. Fertility and pest management followed recommendations from the *Midwest Vegetable Production Guide for Commercial Growers 2009*. Excessive rainfall resulted in slightly diminished stand for some cultivars. However, ears harvested and plant stand counts are both being provided in Table 1 so growers can determine relative productivity of the cultivars evaluated.

Ears were hand harvested and evaluated for various horticultural and marketing characteristics. Results of these evaluations are contained in Table 1 and are based on the average of five representative ears. Table 2 provides growers with a list of the cultivars evaluated as well as seed source, color, and type of sweet corn.

Table 1. Yield data from 2009 DSAC sweetcorn variety trial.

Date	Variety	No. of stalks	No. of ears	Wt. per 5 Ears (lbs.)	Avg.length 5 ears (in.)	Width of 5 Ears (in.)	Tip Fill*	Husk Cover*	Flavor**/ Comments
8/8/09	Shasta	22	16	2.7	7.8	9.4	8.2	9.5	2.5
8/8/09	BC 0808	22	16	3.1	7.9	9.9	8.0	5.2	3.0
8/8/09	372A	14	18	2.7	7.0	9.9	9.2	8.5	3.5
8/8/09	2171	10	8	2.6	7.2	9.5	7.5	7.0	3.5/tough
8/8/09	2170	11	15	2.7	7.6	9.2	9.2	8.5	~
8/8/09	Ravelin	12	12	2.4	7.1	9.2	8.8	7.0	3.5
8/9/09	Honey Select	18	21	3.1	8.2	9.8	6.0	8.0	1.5/not good
8/9/09	Vitality	20	10	1.8	6.0	8.5	3.0	7.0	4.0/overall poor
8/9/09	277A	14	16	2.7	6.8	9.5	7.5	7.0	4.0/juicy
8/9/09	Mirai 350BC	10	10	2.4	7.0	9.4	9.8	7.5	4.0
8/9/09	Mirai 308BC	14	16	2.2	7.1	9.1	8.5	7.5	4.0/least favorite of Mirai
8/9/09	Triumph	11	10	2.6	7.2	9.4	8.8	8.5	4.0
8/9/09	78553Y	15	20	3.1	7.6	9.5	9.2	8.0	4.5/nice
8/9/09	1178	13	13	2.5	7.4	9.2	9.2	7.5	3.0/tough
8/10/09	White Out	24	16	2.6	7.5	9.4	8.2	7.8	3.5

Date	Variety	No. of stalks	No. of ears	Wt. per 5 Ears (lbs.)	Avg. length 5 ears (in.)	Width of 5 Ears (in.)	Tip Fill*	Husk Cover*	Flavor**/ Comments
8/10/09	Celestial	24	20	2.4	7.6	8.9	8.0	8.8	3.5
8/10/09	Sugar Pearl	18	16	2.6	6.5	9.4	9.2	7.2	4.5
8/10/09	Avalon	25	21	2.7	7.8	9.0	9.0	8.2	2.0
8/10/09	Synergy	26	22	2.5	6.9	9.5	10.0	9.0	4.25/tough
8/10/09	BC 0805	25	24	2.8	7.9	9.4	8.2	8.2	3.0
8/10/09	Absolute	24	21	3.4	7.9	10.4	9.0	8.2	2.0/pretty ear
8/10/09	Devotion	20	18	2.7	7.4	9.6	9.5	8.8	3.5
8/10/09	Awesome	14	22	2.8	6.9	9.8	9.8	8.5	3.5/tough
8/10/09	Mirai 336BC	16	16	2.7	7.2	9.0	9.2	9.0	4.5/pretty ear, uniform
8/10/09	Obsession	14	15	2.6	7.4	9.2	9.2	9.2	4.0
8/10/09	Fantastic	14	13	2.8	7.1	9.8	8.8	8.5	4.5
8/10/09	71413B	17	16	2.4	6.9	9.2	9.5	9.0	4.5/pretty good, uniform
8/10/09	Mirai 351BC	18	20	3.0	7.4	9.8	9.5	8.5	5.0
8/10/09	Mirai 301BC	14	15	3.2	7.9	9.9	9.2	9.2	5.0/pretty ear
8/10/09	14213B	14	13	2.5	7.0	9.2	10.0	8.0	3.5
8/10/09	BSS 0982	11	18	2.9	7.0	10.0	9.0	6.0	4.5
8/10/09	74987Y	15	12	2.9	7.6	9.5	9.5	8.0	4.0/uniform, nice
8/10/09	71628Y	12	14	2.8	7.5	9.4	8.8	8.8	4.0
8/10/09	71492Y	12	10	2.0	6.5	9.0	10.0	8.8	4.25/uniform, nice, tender
8/10/09	Mirai 131Y	12	7	2.8	7.9	9.6	7.8	6.5	4.0
8/10/09	Mirai 130Y	10	8	2.6	7.6	9.8	8.2	8.0	4.0/uniform
8/10/09	GH 0851	21	20	2.8	7.8	9.5	7.0	8.5	1.5
8/10/09	1575	14	16	2.5	7.0	9.0	8.0	8.5	4.0/uniform
8/10/09	Vision	10	14	2.3	6.5	9.0	8.5	9.0	4.0
8/10/09	173A	12	11	2.2	6.1	9.1	7.0	8.2	4.0
8/11/09	Montauk	16	18	3.0	7.5	10.0	8.5	9.0	4.0/pretty ear
8/11/09	Temptation	19	13	2.3	6.2	9.4	8.5	8.2	2.2/tough
8/11/09	Kristine	22	20	3.0	8.0	9.8	9.0	9.0	3.5
8/11/09	Iceburg	13	11	2.1	6.9	8.9	8.0	8.2	4.0/tender
8/12/09	Misquamicut	20	11	2.4	7.5	9.6	8.8	9.0	3.0
8/12/09	Providence	20	19	2.6	8.0	8.5	9.0	8.5	4.5/juicy, tender
8/12/09	Legion	13	17	2.1	7.0	8.5	7.0	8.5	4.0
8/12/09	Garrison	14	14	2.2	7.0	9.0	8.0	8.8	3.0
8/15/09	BSS 0977	14	24	2.1	7.0	8.9	8.0	9.0	3.5/double ears, uniform
8/17/09	WSS	15	21	2.5	6.8	9.8	8.5	8.5	3.5

Table 2. List of cultivars evaluated in the 2009 DSAC sweetcorn trial along with seed source, color, and type of corn.

Variety	Seed Co.	Color	Type*	Variety	Seed Co.	Color	Type
Montauk	Seedway	bi	Sy	Legion	Rogers	bi	sh2
Synergy	Seedway	bi	Sy	Fantastic	Seedway	bi	sh2
Kristine	Seedway	bi	Sy	Awesome	Seedway	bi	sh2
Temptation	Seedway	bi	Se	2170	Seedway	bi	sh2
Providence	Seedway	bi	Sy	2171	Seedway	bi	sh2
Absolute	Seedway	bi	Se	Obsession	Seedway	bi	sh2
Vitality	Seedway	bi	Sy	277A	Seedway	bi	sh2
Shasta	Seedway	w	Se	Triumph	Seedway	bi	sh2
Sugar Pearl	Seedway	w	Se	BSS 0977	Rogers	bi	sh2, bt
White Out	Seedway	w	Se	372A	Seedway	w	sh2
Misquamicut	Seedway	w	Sy	Devotion	Seedway	w	sh2
Avalon	Seedway	w	Sy	Iceberg	Seedway	w	sh2
Celestial	Seedway	w	Sy	Garrison	Rogers	y	sh2
Honey Select	Seedway	y	Sy	Vision	Seedway	y	sh2
BC 0805	Rogers	bi	sy, bt	173A	Seedway	y	sh2
BC 0808	Rogers	bi	sy, bt	1178	Seedway	y	sh2
71413B	Centest	bi	sh2	1575	Seedway	y	sh2
Mirai 351BC	Centest	bi	sh2	GH 0851	Rogers	y	sy, bt
74213B	Centest	bi	sh2	Mirai 308BC	Centest	bi	sh2
BSS 0982	Rogers	bi	sh2, bt	Mirai 301BC	Centest	bi	sh2
WSS 1830	Rogers	w	sh2	Mirai 336BC	Centest	bi	sh2
71492Y	Centest	y	sh2	Mirai 350BC	Centest	bi	sh2
78553Y	Centest	y	sh2	Mirai 130Y	Centest	y	sh2
71628Y	Centest	y	sh2	Mirai 131Y	Centest	y	sh2
74987Y	Centest	y	sh2				
Ravelin	Rogers	y	sh2				

*sy=synergistic, se=sugar enhanced. sh2=supersweet or augmented supersweet, bt=insect-protected.

Tomato Cultivar Demonstration Trial, Fournie Farms, Collinsville, IL, 2007

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This paper reports on yield results from a fresh market tomato cultivar demonstration trial established at the Fournie Farm in Collinsville, IL in conjunction with a grower meeting held August 6, 2009.

Materials and Methods

Twenty-one cultivars of tomatoes were seeded from March 25 to March 30 and finished in 4.5 inch peat pots at the Dixon Springs Agricultural Center and field set at the Fournie Farms on May 12, 2009. Preplant fertilizer was applied at the rate recommended in the 2009 Midwest Vegetable Production Guide for Commercial Growers. No additional fertility was supplied. Treflan® 4 EC was preplant incorporated at an equivalent rate of 1.5 pints per acre. Additional hand hoeing was used to maintain season-long weed control. The plots consisted of six plants of one cultivar in a single row with a spacing of three feet apart in rows 3 feet apart. Tomatoes were caged immediately after planting and plants were not pruned. Pesticides were applied at the labeled rate for disease control starting July 8 and ending September 2. Kocide®3000 was applied on a 7 day schedule, tank mixed with a rotation of two sprays of Tanos® followed by two sprays of Manzate® Pro-Stick™. Harvest began on July 8 with the first appearance of fruit at breaker stage. Harvest continued on a weekly basis for a total of ten harvests and ended with a destructive harvest on September 18 to remove all remaining fruit. For each harvest, all fruit were harvested at breaker stage or beyond and graded by United States Standards for Grades of Fresh Tomato and all size designations were pooled together within each grade. Grade 1 fruit from each plot were recorded separately. Grade 2 and 3 were pooled together and when combined with grade 1 was reported as marketable fruit. Fruit that did not meet grade standards were recorded as culls, and unripe green fruit at final harvest were recorded as green and combined together reported as unmarketable fruit.

Results and Discussion

Tomato growth and development was slowed due to unusual weather conditions in 2009. Within two weeks after planting, the experimental site received 6.7 inches of rainfall which significantly slowed plant establishment and development. Rainfall continued to be heavy throughout the growing season, with significant flooding again in late August. In addition, daily temperature highs were approximately 5 degrees F. cooler in July compared to the 30-year average. August was also cooler than normal, which overall delayed the ripening process not only at the demonstration site but for most tomato growers statewide. Cooler temperatures and heavy rainfall resulted in heavy disease pressure, specifically Septoria, early blight, bacterial spot, bacterial speck and buckeye rot. Fungicide and bactericide sprays effectively controlled all but buckeye rot from infecting fruit, with very few culls as a result of disease infection other than

buckeye rot. Culls early in the harvest season were due to rodent predation but the majority of culls occurred later in the season due to buckeye rot in low-hanging fruit. Mite pressure was consistent on foliage, but injury from tomato fruit worm and tomato horn worm were slight to non-existent. Blossom end rot and sun scald was not significant, but zippering was fairly heavy and resulted in significant grade reductions throughout harvest.

Despite below optimal growing conditions and employing low input management of this site, fruit yields were above the expected minimum of 10 pounds per plant for all cultivars in the demonstration. 'Mountain Magic' and 'BHN 968' significantly outgrew the cage support system and would have benefitted from a taller support system to reduce buckeye rot by keeping fruit off the ground. 'Torbay' was the overall top yielder but it had a tendency to produce numerous medium to small fruit, making it a good candidate for pruning to possibly improve fruit size.

Table 1. *Average fruit weight for 21 fresh market tomato cultivars, Collinsville, IL.*

Cultivar	Seed Source[v]	Average Fruit Weight (oz) *Grade 1*	Average Fruit Weight (oz) *Grade 2 & 3*	Average Fruit Weight (oz) *Marketable*
Scarlet Red	RI	9.6	6.1	7.2
Phoenix	RI	9.4	5.2	6.4
Bella Rosa	SW	9.2	6.1	7.0
Mt. Glory	RG	9.1	6.1	7.3
Fabulous	SW	8.9	5.5	6.3
Rocky Top	RI, RG	8.5	5.4	6.4
Primo Red	RI	8.4	5.4	6.1
Redline	SI	8.3	5.8	6.4
Security 28	SW	8.3	4.9	5.6
Fletcher	SW	8.2	5.1	6.0
Crista	SW	8.2	5.4	6.2
Polbig	SW	7.9	5.5	6.2
Ofri	SW	7.9	4.5	5.5
Red Defender	SW	7.9	4.1	5.0
Nico	SW	7.8	5.2	5.9
Mt. Crest	SW	7.4	4.6	5.4
Carolina Gold[w]	SI	7.2	4.4	5.1
Torbay[x]	SW	7.0	4.2	4.6
Plum Crimson[y]	SW	3.8	2.4	2.8
Mt. Magic[z]	SW	1.1	0.7	0.7
BHN 968[z]	SW	0.4	0.3	0.3

[v]RI= Rispens Seeds; SW= Seedway, Inc.; RG= Syngenta Seeds, Inc., Rogers Brands; SI= Siegers Seed Co.
[w]Yellow-colored tomato cultivar
[x]Pink-colored tomato cultivar
[y]Plum-type tomato cultivar
[z]Cherry-type tomato cultivar

Table 2. Y*ield per plant for 21 fresh market tomato cultivars, Collinsville, IL.*

Cultivar	Average Yield per Plant (lbs) *Grade 1*	Average Yield per Plant (lbs) *Marketable*	Average Yield per Plant (lbs) *Unmarketable*	Marketable by Weight (%)
Mt. Glory	12.8	24.9	7.1	77.7
Bella Rosa	10.0	25.9	4.8	84.2
Fletcher	9.7	24.5	2.9	89.3
Phoenix	9.1	22.4	5.6	80.0
Carolina Gold[w]	8.8	25.8	4.6	84.9
Nico	8.7	24.5	6.6	78.8
Scarlet Red	8.4	20.4	5.8	77.7
Plum Crimson[y]	8.3	18.1	3.0	85.7
Fabulous	8.1	24.2	5.9	80.5
Rocky Top	8.1	19.3	4.1	82.5
Mt. Crest	7.8	21.0	3.6	85.4
Crista	7.3	18.2	6.1	75.0
Polbig	6.6	18.2	5.3	77.4
Torbay[x]	6.2	28.5	6.9	80.5
Ofri	6.1	14.8	2.6	84.9
Red Defender	6.0	17.1	2.1	88.9
Primo Red	5.6	16.6	2.2	88.1
Security 28	5.2	16.1	3.2	83.4
Redline	4.3	14.0	2.7	83.9
BHN 968[z]	4.0	20.1	6.7	75.0
Mt. Magic[z]	3.7	27.8	8.2	77.2

[W]Yellow-colored tomato cultivar
[X]Pink-colored tomato cultivar
[Y]Plum-type tomato cultivar
[Z]Cherry-type tomato cultivar

Good Agricultural Practices and Good Handling Practices for Safer Production of Fruits and Vegetables

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Good agricultural practices and good handling practices are fundamental steps needed for production of fruits and vegetables free from potential contamination with microbes that are harmful to human health. The Center for Disease Control (CDC) lists more than 250 diseases that affect food crops on its website http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm#mostcommon). These diseases are caused by different organism including bacteria, viruses, and other parasites. These majority of these diseases contaminate foods through contaminated water, contaminated compost, and poor workers hygiene.

I. Common diseases that can contaminate foods

Several disease causing microorganisms have been reported to survive in water and on the surfaces of produce including the following:

(a) Protozoa, such as, *Cryptosporedium pavum, Cyclospora cayetanensis, Entamoeba histolytica, and Giardia lamblia*
(b) Parasites, such as, *Ascaris lumbricoidis, Coenurosis, Schistosoma, Dracunculus, Echinococcus granulosus, Enterobius vermicularis, Hymenolepis nan, and Taenia, Fasciolopsis bulski.*
(c) Bactrial diseases, such as, *Colstridium botulinum* (botulism), *Campylobacter jejuni, vibrio cholerae* (cholera), *Escherichia coli* (some strains), *Mycobacterium marinum, Schigella dysenteriae, Salmonella*, *Legionella pneumophila* (Legionnaires disease), *Leptospira, several strains of salmonella like Salmonella typhi* (typhoid), and several strains of Vibrio (*Vibrio vulnificus*, *Vibrio alginolyticus*).
(d) Viruses. Adinovirus, SARS virus (Corona virus), hepatitus A virus, poliovirus, and polyomavirus (JC and BK viruses).

A brief synopsis of these diseases is listed below

1. *Giardia.* This parasite is spread across the United States. It is recognized as a common cause of waterborne infection in human. If an animal drinks contaminate water, Giradia will live in its intestine for a long time. The parasite is protected by a hard shell and so it can also survive outside the intestine, like in water and in the soil, for month. Gialardia symptoms include diarrhea, stomach cramps, soft and greasy stool, nausea, and frequent gas. Symptoms can last for as long as 6 weeks. Most vulnerable to Gialardia are the very young and very old and those with weak immune systems. The most effective way to decontaminate water is to heat it to a boil for one minutes or use certified filters with less than one micron pore size. Chemical treatment is also effective at the proper concentration.

2. *Cryptosporidium*. Is another important waterborne parasite. It lives in the intestine of many animals and human. Cryptosporidium may survive in the soil, food, water, or any surfaces that have been contaminated with feces from infected animals. The CDC estimates that 300,000 people in the US maybe infect with cryptosporidium each year. The symptoms of this parasite include Stomach cramps or pain, dehydration, nausea, vomiting, fever, weight loss. Similar to Giardia, people most vulnerable to infection are those with a compromised immune system, the very young and very old. Boiling water and use of filters are the most effective way to get rid of this parasite, while chemical treatments will provide protection under certain conditions.
3. *Campylobacter jejuni.* The most commonly reported bacteria, which causes foodborne illnesses in the US. Survival of *C. jejuni* outside the gut is poor, especially at freezing temperatures, acidic conditions, and drying. Often it is difficult to identify its source, because of its poor survival outside the intestine. However, it can survive in water, especially in the spring and summer. The disease is commonly found in the intestine of poultry and cattle and was reported to occur in fresh cut vegetables and fruits, in lettuce, cucumber, and strawberries.
4. *Salmonella.* There are about 2,000 closely related Salmonella types that cause illness by reproducing in the digestive tract. Salmonella is the most widely reported cause of foodborne illness in the world with nearly 1.4 million cases reported in the US each year. Salmonella live in the intestinal tracts of humans and other animals, including birds. Infections usually occur by eating foods contaminated with animal feces. Salmonella may live in wood cracks for year but become active when conditions are favorable. Washing with hot water is the preferred method of eliminating the disease.
5. *E. coli* O157:H7. Is a member of a large group of bacteria that live in the intestines of animals and birds. In 1982, *E. coli* O157:H7 was the first to be recognized as a foodborne pathogen. Similar to other foodborne diseases, the most vulnerable to infection are the young and old and those with immune deficiency. Symptoms of the disease include severe stomach cramps, diarrhea (often bloody), and vomiting. Symptoms can occur in as short as one day and as long as ten days. The most effective method of disinfecting foods and water is by heating them to 155 ^{o}F. Ultraviolet radiation and ozone are also used commercially to control this disease.

II Guidelines for GAP and GHP Development

A good source of information on GAP/GHP is the 1998 USDA "Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables"

The guiding principle of good agricultural and handling practices is to develop a system that stresses prevention of microbial contamination rather than deal with an outbreak if and when it happens. The best strategy is to divide your production and handling operation into sections, categorize the work to be done at each section, and identify potential risks in each category. For example most fruit and vegetable farm operations can be divided into two sections (Production and postharvest handling).

The production section can be divided further into a) field and facilities (restroom/outhouse, roads, ponds, lakes, ditches, animals, birds, wildlife), b) site selection, c) land preparation, d)

planting (if transplants are used, then identify steps of production), e) Fertilizers application (if compost is used then identify steps of preparation, application equipment), f) Irrigation (identify source of water, layout and design of wells and lakes, types of irrigation), g) pesticides (identify source of water, equipments, personnel), harvesting (equipments and personnel).

The postharvest handling section can be divided into a) field packing (grading, packages, water, equipment), b) hauling equipment (open/enclosed wagon, non or refrigerated trucks, c) packing house (restroom facilities), d) dump tank (water quality, equipment), washing equipment (water quality), e) sorting/grading (personnel), f) packaging (personnel), storage (design, temperature, humidity), transportation (temperature, humidity, open or enclosed vehicles). Using the same principles, another section maybe made for direct marketing operation, including an entertainment farm section, if available.

Identify contamination risks at each section and develop strategies to prevent these risks. For example, if manure is used as fertilizer fertilizers), EPA proposes that it should be composted for at least three months with a target temperature of 55 to 65^{o}C, that it must be frequently turned to allow for adequate aeration, and adequate moisture be added in order to allow for a peak microbial composition. In some areas, a time separation of 60 to 100 days must be observed between compost application in the field and time of planting.

Water is another extremely important source of microbial contamination. Clean water is required for all phases of fruit and vegetable production and postharvest handling. In General, well water is preferred over surface water for irrigation and pesticide sprays. All spray water, regardless of its source should be free of any potential hazardous microorganisms. In packinghouses, the recommended source for cleaning produce is well water, not surface water. While potable water is required for all employees drinking, hand washing, and sanitation.

Water sources must be tested periodically. Fecal coliform bacteria, total coliform bacteria, and *Escherichia coli (E. coli) a*re three tests used to identify the safety of water. Testing should be done once a year for municipal water and twice a year for well-water. Surface water (rivers, ponds, or streams) for irrigation should be tested three times a year (at the beginning of the season, at peak irrigation use, and close to harvest). The following procedures maybe followed for sampling irrigation water. Run the water through the irrigation system for at least 30 minutes in order to flush the lines and ensure a representative sample. Obtain two to three samples of about 100 mL or 4 to 5 fl.oz. from the end of the irrigation line prior to its application in the field (at the sprinkler nozzle or irrigation pipe, not at the source; well or pond). Place the water in a sterile bottle and cap immediately. Most testing laboratories provide sterile bottles. Place water on ice or in a refrigerator and deliver either via express mail or personal delivery to the testing laboratory within 24 hours. Use the same procedure to sample wash water in the packing facility by collecting samples at the water inlet to the wash tank.

Results of the analysis will include total coliform, fecal coliform and E. coli. Total coliform is a measure of bacteria that is present in surface water, soil, and in human or animal waste including those bacteria that may cause food borne illnesses. Fecal coliforms are a measure of bacteria present in the gut and feces of most farm animals. Because fecal coliform counts are more specific than total coliform bacteria counts, fecal coliforms are considered to be a more

accurate indicator of contamination by animal or human waste than the total coliforms. The most important microbial species in fecal coliforms is *Escherichia coli* (*E. coli*). *E. coli* survives mainly in the guts of animals and human and so its presence in water or on the surfaces of produce is an excellent indicator that contamination with animal/human waste has occurred. It is important to note that these are just indicator tests and are not specific for a pathogen such as salmonella or the most commonly found hazardous pathogen on produce, *E. coli O157:H7*. The best strategy for produce safety is to develop a solid GAP/GHP program.

There are no specific levels of bacterial that indicate a hazard is present on produce or in irrigation water. However, the presence of *E. coli* in water or on produce surfaces should trigger further testing in order to determine the source of contamination.
Any contaminated sources should not be used for irrigation and remedial treatments be applied in order to ensure the source is safe to use.

Water testing laboratories in Illinois include:

PDC Laboratories, Inc.
2231 W. Altorfer Drive
Peoria, IL 61615
(309) 692-9688

Suburban Laboratories, Inc.
4140 Litt Drive
Hillside, IL 60162-1183
(708) 544-3260

American Water Central Laboratory
1115 South Illinois
Belleville, IL 62220-6349
(618) 239-0516

(other laboratories may also be available to do the tests – the list is not an endorsement of any laboratory).

Influence of Leaf Removal before Veraison on Yield and Fruit Quality of Three Wine Grape Cultivars

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Abstract

Fruit yield and quality are equally important to wine grape growers, because having a proper balance between the volume of wine produced and the quality of that wine are essential for maximizing profits. The general belief among grape growers is that the number of leaves per shoot has significant impact on wine quality. Leaf removal of fruit bearing shoots was investigated to elucidate impacts on yield and berry mass in Frontenac, Vignoles, and Norton grapes grown in Illinois. At veraison, three fruit bearing shoots per vine were thinned to one cluster each and number of leaves per shoot was thinned to 10, 8, 6, 4, 2, or 0 leaves. Grapes clusters from thinned shoots were harvested at maturity and weight. Results showed no significant impact between any treatments in any variety. Vignoles showed significantly lower yield (66g/cluster) in 2007 as compared to Frontenac and Norton (107-111g/cluster), however Norton yielded lower in 2008 (57g/cluster) compared to Vignoles and Frontenac (81-87g/cluster). It is therefore possible to thin leaves at veraison with no impact on yield, as the fruit does not rely on these leaves after that time. This may also be used as a late season tool for canopy management for disease control.

Introduction

Leaf removal for grapes canopy management is practiced widely, especially when vineyard conditions are cool and moist (Jackson & Lombard, 1993). Fruit zone leaf removal is a common summer practice for disease control, light exposure, and air circulation (Main & Morris, 2004; Percival, et al., 1994; Poni, et al., 2006). Partial defoliation can increase titratable acidity and lower must pH and noticeably show improvement in wine by sensory analysis (Hunter, et al., 1995). Leaf removal can also increase skin phenolics (mostly flavonols), increase sugars, reduce acids, and reduce diseases (Jackson & Lombard, 1993; Pereira et al., 2006). Additionally, wines made from Cabernet Sauvignon defoliated at veraison have been rated higher in overall quality than wines made from non-defoliated fruit (Jackson & Lombard, 1993). Work has been done on leaf removal for *Vitis vinifera* varieties comparing several grape constituents. Removal of the first six basal leaves on each shoot in Sangiovese grapes showed an increase in must concentration of titratable acidity, total phenolics, total anthocyanins, and ^{o}Brix (Poni et al., 2006). A similar leaf removal experiment on 'Ruby Seedless' grapes in Morocco found an increase in total soluble solids and a decrease in titratable acidity, but no significant change in juice pH or yield (Ezzahouani & Williams, 2003).

Leaf removal in Riesling grapes in the Canadian Niagara Region showed no differences in sugars, pH or TA. However, the same treatments decreased the occurrence and severity of bunch rot (Percival et al., 1994). Canopy management reduction of the incidence and severity of bunch rot was also observed in a study done in Missouri on Seyval Blanc and Vignoles (English et al., 1993). Keller et al. (2000), indicated that pruning grape vines during the critical bloom period decreased stilbenes, which they suggested to lead to latent botrytis infections. In a three

year study in Arkansas on Cynthiana (Norton), leaf removal had no effect on cluster weight, cluster number, berry weight, TA, TSS, or organic acids (Main & Morris, 2004).

The first objective of this study was to determine if removing leaves in the fruiting zone will affect the yield of the clusters and the size of the berries. The second objective was to determine the association between the numbers of leaves removed and the change in yield and berry mass.

Materials and Methods

The experiment was conducted in an established commercial wine grape vineyard in El Paso, IL in 2007, and in an established commercial wine grape vineyard in Peru, IL in 2008. Three wine grape varieties Frontenac, Vignoles, and Norton were used in the study in both vineyards. The rows in El Paso ran East-West with 50 grape vines of a single variety planted in each row and trained in a Geneva High-Wire system with two cordons, one on the North side and one on the South side of the row. Vines were spaced 8 feet apart in rows 13 feet apart. Vines were planted in 2001 on their own roots. The field in Peru is oriented similarly, with the plants trained on a double high-wire system. Vines were planted in 2003 on their own roots, except Norton which was grafted on 3309, and spaced 7 feet apart in rows 10 feet apart. Ten plants of each variety were selected at random in a one row, and 6 grape clusters on the plant were selected at random. In El Paso the clusters chosen were on the north cordon to compensate for variation in solar radiation between the two sides of the cordons. Leaves of fruit bearing shoots were thinned to 0, 2, 4, 6, 8, or 10 (control) leaves. One cluster was kept on each shoot and the pruning was done before the fruit reached veraison. Experimental clusters were harvested at maturity according to the vintners.

Photosynthetically active radiation (PAR) was measured (QMSS Quantum Meter Spectrum Technologies) at two locations in the canopy of each experimental plant in 2007 and above each cluster in 2008. Measurements were taken at veraison and at harvest. At harvest, each cluster was weighed and total berries in each cluster were counted and weighed. Berries from each cluster were divided into two sub samples. One subsample was juiced and frozen and another portion was freeze dried in a Virtis freeze dryer (SP Industries, Gardiner, NY) and ground to a powder. Statistical analysis was done using SAS 9.1 statistical software (SAS corp.) using proc mix. Least squared means were adjusted using Tukey p=.05.

Results

The results of the experiment show that treatments had no significant effect on yield or berry mass (Tables B1-B6). Norton and Frontenac had the highest mean cluster mass in 2007 (111 g and 107 g), and Vignoles was the lowest (66 g). Frontenac and Vignoles had the highest mean mass in 2008 (87 g and 81 g) and Norton the lowest (57 g). In 2007, Norton had the highest mean berry mass (1.47 g) and Frontenac the lowest (1.15 g). In 2008, Frontenac and Vignoles were the highest (1.22, 1.30 g) and Norton the lowest (1.06 g) (Table 1). PAR was not significant between replicates of either year, and was not significant between treatments in 2008 (not measured for treatment in 2007). In both years, Vignoles received the highest PAR at both veraison and harvest (maximum of 940 □mol/m^2s veraison 2008), whereas Frontenac and Norton varied only during veraison in 2008 (table 3). Crop load was not significant between replicates in 2008 (not measured for treatment in 2007). The highest was for Norton (3 kg/ vine) and Frontenac and Vignoles both yielded 1 kg/vine (table 2).

Discussion

The results show yield and berry mass were not affected by any of the treatments applied. These results are also consistent with organic acids, sugars, phenolics, antioxidants, and trans-resveratrol and quercetin reported in previous studies.

Yield is an important concern with respect to grapes as it is in any crop. Pruning around the fruiting zone at veraison has been shown to not affect yield in Riesling grapes in the Niagra region of Canada, in Barbera, Croatina, and Malvasia grapes in Italy, and Norton in Arkansas (Main & Morris, 2004; Percival et al., 1994). Berry mass was also shown not to be affected leaf removal of Norton grapes grown in Arkansas (Main & Morris, 2004). In studies were large areas of leaves have been removed, significant reduction in berry mass and soluble solids and an increase titratable acidity were observed (Jackson & Lombard, 1993). Cluster and berry mass for 2008 compared favorably with data obtained for Norton by Main and Morris (2004); however, our values were much higher in 2007. This could possibly be due to variation in weather, soil, and crop load between the two vineyards.

In the first year, auxiliary buds broke after the initial leaf removal; however, in the second year any newly formed leaves were removed. The similarities of the results in both years show these extra leaves did not have a significant effect on yield.

Differences in berry size are an important consideration with respect to concentrations of chemicals in the berry (Crippen & Morrison, 1986). Although the average berry weight was different among varieties, it was not significantly different between treatments within variety (table 1). Berry weights were different between varieties; however, their masses were not consistent between years for each variety, as Norton had the largest berries in 2007 and the smallest in 2008 (table 1).

Increased exposure to PAR has also been shown to increase sugars, decrease acids, and increase phenolics (Jackson & Lombard, 1993). Photosynthetically active radiation (PAR) was measured in the canopy for each grapevine the first year and for each treatment in the second year. There were no significant differences between the between treatments in both years. This suggests that PAR was not functioning as a confounding variable in the experiment. It may be possible that pruning alters the amount of PAR reaching each cluster more than it alters the source/sink balance of the vine. More studies are needed to confirm this claim.

Conclusions

This study has shown that a limited degree of thinning of the fruit bearing shoots has no significant impact on yield or berry mass of Frontenac, Norton, or Vignoles vines grown in Illinois. The grape mass (and by extension, clusters) is dependent on water and accumulation of several metabolites. These compounds are all dependent on photosynthetically active leaves. Results of this study suggest that the source/sink balance is altered in response to leaf removal after veraison, allowing for movement of metabolites for by other leaves on the plant to compensate for this loss. Our results show that leaves could be removed for this purpose with no significant effect on yield. This strategy allows growers in geographical areas conducive to warm moist conditions, such as the Midwest, to reduce fungal growth and fungicide use while protecting the crop from disease during ripening. This study has also shown that there are significant differences in yield and berry mass between the three varieties. More study is needed to determine if more severe removal will have greater impacts.

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Table 1. Yield for three varieties of grapes in El Paso, IL (Harvested in late August and Early September, 2007) and Peru, IL (Harvested in late August and Early September, 2008). Yield based on cluster mass and berry mass.

	2007		2008	
Variety	Cluster mass (g)	Berry Mass (g)	Cluster mass (g)	Berry Mass (g)
Frontenac	107.22 A	1.15 C	87.39 A	1.2215 A
Vignoles	65.88 B	1.38 B	81.15 A	1.2947 A
Norton	110.63 A	1.47 A	57.05 B	1.0595 B

Values with the same letter are not significantly different at p=.05 using Tukey adjustment.

Table 2. Mean photosynthetically active radiation (PAR) measured in □mol/m^2s reaching three varieties in El Paso, IL (2007) and Peru, IL (2008). Veraison was in Early to Mid July and Harvest was in Late August to Early September.

	2007		2008	
Variety	Veraison	Harvest	Veraison	Harvest
Frontenac	177.80 B	92.90 B	225.17 C	160.70 B
Vignoles	433.50 A	333.40 A	939.53 A	396.12 A
Norton	218.90 B	151.05 B	476.53 B	132.48 B

Values with the same letter are not significantly different at p=.05 using Tukey adjustment. PAR was not significant between replicates.

Table 3. Mean crop load for three varieties in Peru, IL (2008)

Variety	Mass (kg)
Frontenac	1.0055 B
Vignoles	1.0279 B
Norton	3.0055 A

Values with the same letter are not significantly different at p=.05 using Tukey adjustment. Crop load was not significant between replicates.

Influence of Leaf Removal before Veraison on Sugars and Organic Acids in Three Wine Grape Cultivars

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Abstract

Leaf removal of fruit bearing shoots was investigated to elucidate its impacts on °Brix, TA, pH, D-glucose, D-fructose, L-tartaric acid, and L-malic acid in Frontenac, Vignoles, and Norton wine grapes grown in Illinois. Fruit bearing shoots were thinned to one cluster and were pruned at veraison allowing either10, 8, 6, 4, 2, or 0 leaves to remain on each shoot. Grapes were harvested at maturity juice fractions from each treatment were analyzed for °Brix, titratable acidity, pH, monosaccharide and organic acids. Results showed no significant effect of leaf removal on any of the above variables in the three varieties. Varieties were significantly different for °Brix, pH, and titratable acidity (TA) in 2007, with Vignoles being the highest in sugar (19.7 °Brix, 96mg/mL glucose and 100 mg/mL fructose) and the lowest in acid (1.22% TA, 6mg/mL tartaric acid, and 9 mg/mL malic acid). In 2008, total soluble solids (TSS or °Brix) were not different between varieties; however Vignoles maintained the lowest acid content (0.91% TA, 5 mg/mL tartaric acid and 7 mg/mL malic acid). Therefore, it is concluded that partial leaf removal at veraison has no impact on fruit quality. Results also show that leaf removal maybe used as a tool to improve disease management.

Introduction

Leaf removal in grapes is practiced widely, especially when vineyard conditions are cool and moist (Jackson & Lombard, 1993). Partial defoliation can increase titratable acidity and lower must pH and improve sensory quality of wines (Hunter, et al., 1995). Leaf removal can also increase sugars and skin phenolics (mostly flavonols), and decrease acids and diseases incidence (Jackson & Lombard, 1993; Pereira et al., 2006). Leaf removal has been shown to decrease the occurrence and severity of bunch rot in several grape varieties (English et al., 1993; Percival et al., 1994)

Jackson and Lombard (1993) reported that wines made from Cabernet Sauvignon defoliated at veraison have higher overall quality than wines made from non-defoliated vines. Fruit zone leaf removal is also a common summer practice for canopy management in many vineyards for disease control, light exposure, and air circulation (English, et al., 1993; Main & Morris, 2004; Percival, et al., 1994; Poni, et al., 2006).

Removal of the first six basal leaves on each shoot in Sangiovese grapes showed an increase in must concentration of titratable acidity, total phenolics, total anthocyanins, and °Brix (Poni et al., 2006). A similar leaf removal study on 'Ruby Seedless' grapes in Morocco reported a significant increase in total soluble solids and a decrease in titratable acidity, but no significant change in total fruit yield or juice pH (Ezzahouani & Williams, 2003). However, leaf removal in Riesling grapes in the Canadian Niagara Region reported no differences in sugars, pH or TA (Percival et al., 1994). In a three year study in Arkansas, Cynthiana (Norton), leaf removal had no effect on cluster weight, cluster number, and berry weight and no consistent effect on TA, TSS, or organic acids (Main & Morris, 2004). Keller et al. (2000) indicated that pruning vines during the critical bloom period decreased stilbenes, which could lead to latent botrytis infections in the grape berry.

Vintners in Central Illinois often need tools for improving fruit quality as well as aiding in disease management. Canopy management can be used as a tool for this and has not been sufficiently explored in this region and has been explored little on many of the grapes grown here. Therefore, the objective of this study was to determine if removing leaves in the fruiting zone of three different cultivars will affect the concentration of monosaccharides and the concentration of principle organic acids in the berries and if so, what degree of thinning would provide the optimum levels of these compounds.

Materials and Methods

The experiment was conducted in an established commercial wine grape vineyard in El Paso, IL in 2007, and in an established commercial wine grape vineyard in Peru, IL in 2008. Three wine grape varieties Frontenac, Vignoles, and Norton were used in the study in both vineyards. The rows in El Paso ran East-West with 50 grape vines of a single variety planted in each row and trained in a Geneva High-Wire system with two cordons, one on the North side and one on the South side of the row. Vines were spaced 8 feet apart in rows 13 feet apart. Vines were planted in 2001 on their own roots. The field in Peru is oriented similarly, with the plants trained on a double high-wire system. Vines were planted in 2003 on their own roots, except Norton which was grafted on 3309, and spaced 7 feet apart in rows 10 feet apart. Ten plants of each variety were selected at random in a one row, and 6 grape clusters on the plant were selected at random. In El Paso the clusters chosen were on the north cordon to compensate for variation in solar radiation between the two sides of the cordons. Leaves of fruit bearing shoots were pruned to 0, 2, 4, 6, 8, or 10 (control) leaves. One cluster was kept on each shoot and the pruning was done before the fruit reached veraison. Experimental clusters were harvested at maturity according to the vintners. At harvest, the clusters were divided into two subsamples. One subsample was juiced with an Acme Juicerator (Sierra Madre, CA) and juice frozen at -20C and another subsample was freeze dried in a Virtis freeze dryer (SP Industries, Gardiner, NY) and ground to a powder using a coffee grinder.

Juice ^{o}Brix was determined by a temperature compensated handheld refractometer (Leica 10430, Buffalo, NY). Juice pH and titratable acidity were determined according to Ough (1988). Carbohydrates were measured via HPLC as follows. A 100-200 □L juice sample was dissolved in 1.4-1.3mL of HPLC grade water. The mixture was centrifuged at 8160*g* for 30 min and filtered through 0.22 micron filters. The carbohydrate standard consisted of 1.00 g/L D-glucose and 1.00g/L D-fructose dissolved in HPLC grade water. Analysis was performed using a Hitachi L-6200A Intelligent solvent delivery unit, Hitachi AS-2000 autosampler with 200□L loop, FlAtron CH-30 column heater with TC-50 temperature controller, Altex refractive index detector, and an HP 3393A Integrator. The column is a Rezex 300 x 7.80 mm Monosaccharide Column (Phenomenex, city, CA) with 50 x 7.80 mm guard column. Chromatographic conditions were as follows: flow rate is 0.8mL/min, with an injection volume of 10□L, a mobile phase of HPLC grade water, and column temperature set at 75^{o}C.

Organic acids were measured via HPLC using the same sample prepared for the carbohydrate analysis. The organic acid standard consisted of 2.00 g/L malic acid, and 2.00 g/L tartaric acid in HPLC grade water. Organic acid analysis was performed using a Hitachi L-6200A Intelligent solvent delivery unit, Hitachi AS-2000 autosampler, Beckman 163 Variable Wavelength Detector, and a HP 3393A Integrator. The column was a Rezex 10□ 8% H, 300 x 7.80 mm Organic Acid (Phenomenex, Torrence, CA) with a Rezex 50 x 7.80 10□ 8% H. guard column. The mobile phase is 0.004N H_2SO_4 (in HPLC grade water). Chromatographic

conditions consisted of the following: flow rate 0.6mL/min, absorbance at 210nm, and column temperature is at ambient (22°C).

A fructose standard (20.00g/L) was run independently on the same column. The amount of fructose in each sample was determined by the previous procedure, and the area which that amount would contribute to the malic acid peak was calculated based on the fructose standard. This area was subtracted from the total area for each sample, and malic acid was determined from the remaining area.

Statistical analysis was done using SAS 9.1 statistical software (SAS corp.) using proc mix. Least squared means were adjusted using Tukey $P = 0.05$.

Results

The results of the experiment show that all six levels of leaf removal had no significant effect on °Brix, titratable acidity (TA), pH, or concentration of D-glucose, D-fructose, L-malic acid, or L-tartaric acid in both years (Tables B7-B12). In 2007, °Brix, pH, and TA were all statistically different between varieties (table 4). Vignoles had the highest °Brix (19.7%) and lowest TA (0.91%). Norton had the highest TA and lowest pH (1.49% and 2.95). In 2008, °Brix did not vary between varieties, but Norton again had the highest TA and lowest pH (1.14% and 2.64) (table 4). While Vignoles continued to have the lowest TA in 2008 (0.91%). In 2007 and 2008, Norton had the lowest concentrations of glucose (50.87 mg/g and 46.29 mg/g) as well as fructose (59.38 mg/g and 37.98 mg/g) (tables 5 & 6). Vignoles had the highest glucose and fructose concentrations in both years: 95.73 mg/mL and 100.22 mg/mL in 2007, and 99.75 mg/mL and 103.87 mg/mL in 2008. Frontenac had the highest concentration of L-tartaric acid and L-malic acid in both years: 9.11 mg/mL and 13.51 mg/mL in 2007, and 7.86 mg/mL and 15.57 mg/mL in 2008 (tables 5 & 6).

Although not measured in 2007, in 2008 the crop load was not significant for each replication within variety and between varieties, it was higher in Norton than Vignoles and Frontenac, which were the same (Table B21).

The average berry weight was different among varieties; however it was not significantly different between treatments within variety (tables B1-B6).

PAR was measured in the canopy for each grapevine in 2007 and for each treatment in 2008. There were no significant differences between the replicates in 2007 and no significant difference between treatments in 2008 (data not shown).

Discussion

The results show pH, °Brix, TA, monosaccharide and organic acid concentrations were not affected by the different levels of leaf removal.

In both years, grapes were harvested at commercial maturity as determined by the vintners. In 2007, °Brix varied by variety, but were within the range at which vintners find acceptable. In 2008, °Brix did not vary by variety and were lower than all varieties in 2007 (table 4). These lower values may be in part due in part to a very rainy season immediately before fruit maturity, particularly for the cultivar Norton. Jackson & Lombard (1993) found that high rainfall during veraison could delay ripening and lead to immature fruit, especially in cooler zones.

Titratable acidity and pH were higher in 2007 than in 2008, which may be due to the differences in training systems—the vineyard in El Paso (2007) used a Geneva double curtain system, which places more of the canopy above the fruit, possibly limiting photosynthetic

radiation, as supported by measurements in the field. Jackson and Lombard (1993) also indicate that vines with shaded clusters will show an increase titratable acidity. This is also in agreement with observations in the field. It is also possible that the differences might have been the result of the heavy rain in 2008.

To the best of our knowledge, this is the first study that has examined the chemical composition of Frontenac, Vignoles, and Norton. Therefore, it is difficult to compare many of the chemical concentrations found in these varieties with others in published literature. Liu et al. (2006) examined sugar and organic acid composition of 98 grape cultivars in China. The North Plains of China where these grapes were grown has a continental climate and rich fertile soil similar to those in central Illinois. Some of the cultivars examined in these studied are also grown in Illinois. The range of all of the varieties studied for glucose was 45.86 to 122.89 mg/mL and the range for fructose was 47.64 to 131.04 mg/mL Glucose in the varieties analyzed ranged from 46.30 to 99.75 mg/mL and the range of fructose was between 37.98 to 103.87 mg/mL, both of which compare favorable to the ranges found by Liu et al., (2006). Sugars in Norton were less concentrated than those reported by Main and Morris (2003) in Arkansas, who found 85-92 mg/mL glucose and 80-99 mg/mL fructose over 3 years. The crop load for Norton in this study was three times higher (3kg/ vine) than that of Vignoles and Frontenac in 2008, which may have played a part in reducing sugar levels. Numerous studies have shown that high crop loads will reduce sugars as well as increase acids (Jackson and Lombard, 1993). Mean total sugars (glucose + fructose) and ^{o}Brix show a linear relationship (R^2 .9907) when both the data from Main and Morris (2004) and from this study are included, lending confidence to the results from this study.

Liu et al. (2006) also analyzed tartaric acid and malic acid. They reported ranges from 1.54 to 9.05 mg/mL and 0.36 to 7.06 mg/mL, respectively with the tartaric acid range being similar to that found in this study (5.06 to 9.12 mg/mL). Mansfield (2006) reported that grapes grown in northern regions have higher acids than those from southern regions with tartaric acid ranging from 2-19 mg/mL. Our data fit the range for northern grapes. Main and Morris (2004) reported tartaric acid ranges of 6.0 to 8.2 mg/mL for Norton. In this study, the concentration of tartaric acid was 5 mg/mL in 2008 and 9mg/mL in 2007.

Malic acid concentrations observed in this study (7.37 to 15.57 mg/mL) were much higher than those found in other studies. As stated before, the range found by Liu et al. (2006) from 98 cultivars in China was 0.36 to 7.06 mg/mL. Those found by Main and Morris (2004) for Norton ranged from 4.5 to 7.4 mg/mL, whereas in this study, Norton was 11.00 mg/mL in 2007 and 9.31 mg/mL in 2008. However it should be noted that the grapes studied by Main and Morris (2004) were grown in Arkansas, a southern state, with malic acid being reported to be broken down more readily during ripening in warmer climates than in cooler climates (Jackson & Lombard, 1993). The cooler conditions during ripening in Illinois may be the reason for higher malic acid concentration in all of the grapes studied. Frontenac was bred at the University of Minnesota for cold hardiness. It is described as "highly acidic" and always requiring malolactic fermentation for winemaking (Appellation America Inc., 2003-2009). Although there are no published values for malic acid level in Frontenac with which to compare, the levels observed in this study are in agreement with existing data for other cultivars.

The presence of fructose can interfere with the HPLC procedure for malic acid measurement due to their similar absorbance at 210nm and co-elution (Walker et al., 2003). It was found that using the type of cationic exchange column employed in this study, fructose will always co-elute with L-malic acid unless separated before HPLC analysis. Although some

studies have employed cationic exchange to separate the sugars and acids from each sample before analysis, and others removed phenolics before measuring malic acid by a differential refractometer, cost of equipment and sample preparation was prohibitive (Hunter, et al., 1991; Liu et al., 2006; Walker et al., 2003). The procedure used in this study is the most common procedure for organic acid separation in wines (Walker et al., 2003), and many researchers have used this procedure for musts as well as wines (Hunter et al., 1991). Given the concern for fructose interference, standards were ran using the same conditions for organic acids and the area contributed to the malic acid peak by the concentration of fructose was subtracted.

Another concern is interference of phenolic compounds in organic acid measurement (Walker et al., 2003). Based on the volume of juice used for organic acid and sugar determinations, the amount of phenolics present is too small to interfere with the measurements.

Several studies have examined changes in sugar and acid content in relationship to leaf removal in several grape cultivars. Results of these studies have been mixed depending on the timing and severity of removal, and annual weather conditions. A study done with Norton (Cynthiana) in Arkansas showed that in 1997 and 1999, leaf removal 30 days before veraison had no effect on juice composition. By contrast, in 2000 daytime temperatures were excessively warm during veraison, and leaf removal 30 days before veraison was effective in reducing L-malic acid (Main & Morris, 2004). A study in Italy with various *Vitis vinifera* cultivars leaf thinned at veraison resulted in an increase in Barbera and a decrease in Croatina of total soluble solids (TSS) under the same cool conditions at harvest. In warmer seasons, only Croatina showed an increase in TSS (Bavaresco, et al., 2008). Similar to our results, leaf removal at veraison in the fruiting zone of Riesling grapes in the Niagra region of Canada yielded no significant effects on pH, sugars, or TA (Percival et al., 1994). The study, however, documented a reduction in the incidence and severity of bunch rot (Percival et al., 1994) However, leaf removal in the seedless table grape "Ruby Seedless" at veraison resulted in an increase in TSS and a decrease in TA (Ezzahouani & Williams, 2003).

In the first year, auxiliary leaf buds were allowed to grow after the initial leaf removal; however, in the second year any newly formed leaves were removed. The similarities of the results in both years show these extra leaves did not have significant effect on fruit quality.

Differences in berry size are an important consideration with respect to concentrations of chemicals in the berry (Crippen & Morrison, 1986). As the berry sizes, and by extension the exposed surface area and volume, did not differ between treatments in the same variety, we can assert that these types of variations were not affecting our results. With respect to differences in variety, no clear trends were observable with respect to berry weight.

Changes in crop load can affect sugars and less frequently, acid levels (Jackson and Lombard, 1993). In 2008, the crop load was not significant between replicates for any variety (table B21).

Photosynthetically active radiation (PAR) has also been shown to increase sugars, decrease acids, and increase phenolics (Jackson & Lombard, 1993). PAR was measured in the canopy for each grapevine in 2007 and for each treatment in 2008. There were no significant differences between the replicates in 2007 and no significant difference between treatments in 2008. This suggests that PAR was not functioning as a confounding variable in the experiment, as sufficient PAR is reaching the canopy in all the treatments. It may be possible that pruning alters the amount of PAR reaching each cluster more than it alters the source/sink balance of the vine. More studies are needed to confirm this claim.

Conclusions

This study has shown that limited leaf removal in the fruit bearing shoots has no significant impact on ^{o}Brix, TA, pH, glucose, fructose, tartaric acid, or malic acid for Frontenac, Norton, or Vignoles wine grapes grown in Illinois. Results suggest that grape clusters are strong sinks that can attract sufficient photosynthates, for development, from other regions in the canopy. Results also suggest that leaf removal, at or after veraison, may be used as a tool to increase air circulation to control fungal growth without any detrimental effect on must quality. This strategy allows growers in geographical areas conducive to warm moist conditions, such as the Midwest to reduce fungicide use while protecting the crop from disease during ripening. This study has also shown there are significant differences in ^{o}Brix, TA, pH, D-glucose, D-fructose, L-tartaric acid, or L-malic acid between the three varieties.

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Table 4. Mean harvest chemistry for three grape varieties grown in Central Illinois. Total soluble solids (°Brix), percent titratable acidity (%TA) and pH is listed for the same varieties in El Paso, IL (2007) and Peru, IL (2008).

	2007			2007		
Variety	°Brix	%TA	pH	°Brix	%TA	pH
Frontenac	18.0 C	1.44 B	3.11 A	16.3860 A	1.0670 B	2.6577 B
Vignoles	19.7 A	1.22 C	3.06 B	16.1847 A	0.9099 C	2.7468 A
Norton	18.2 B	1.49 A	2.95 C	16.5495 A	1.1376 A	2.6387 B

Values with the same letter are not significantly different at p=.05 using Tukey adjustment.

Table 5. Mean glucose, fructose, tartaric acid, and malic acid concentrations for three grape varieties grown El Paso, IL harvested in late August (Frontenac and Vignoles) and early September (Norton) of 2007.

Variety	Glucose (mg/mL)	Fructose (mg/mL)	Tartaric Acid (mg/mL)	Malic Acid (mg/mL)
Frontenac	81.2769 A	70.0450 B	9.1153 A	13.5086 A
Vignoles	95.7260 A	100.220 A	6.2862 B	9.2310 B
Norton	50.8699 B	59.3831 B	8.1827 AB	10.9958 AB

Values with the same letter are not significantly different at p=.05 using Tukey adjustment.

Table 6. Mean glucose, fructose, tartaric acid, and malic acid concentrations for three grape varieties grown Peru, IL harvested in late August (Frontenac and Vignoles) and early September (Norton) of 2008.

Variety	Glucose (mg/mL)	Fructose (mg/mL)	Tartaric Acid (mg/mL)	Malic Acid (mg/mL)
Frontenac	87.8146 A	46.7231 B	7.8594 A	15.5748 A
Vignoles	99.7507 A	103.87 A	5.5190 B	7.3662 C
Norton	46.2956 B	37.9830 B	5.0616 B	9.3092 B

Values with the same letter are not significantly different at p=.05 using Tukey adjustment.

Glucosinolate Content of Potential Brassicaceae Biofumigant Crops

Mosbah Kushad, John Masiunas, and Stephen Bossu

Glucosinolates, sulfur containing thioglucosides occurring in aliphatic, aromatic, and indoles forms, are defensive compounds found primarily in the Brassicaceae (mustard) family. In damaged tissue, myrosinase degrades glucosinolates into isothiocyanates, nitriles, epithionitriles, and thiocyanates. The predominant breakdown products, isothiocyanates, are generated from aliphatic glucosinolates. Isothiocyanates remain active in soil up to a few weeks, and are general biocides. Green manure crops in the Brassicaceae family have been used as biofumigants but the effectiveness of specific accessions depend on the specific glucosinolates profile and concentrates. Few studies have examined the level of intact glucosinolates in accessions of Brassicaceae. Our objective was to determine levels of aliphatic, aromatic, and indole glucosinolates in a wide range of Brassicaceae potential biofumigants. We evaluated accessions from *Brassica barrelieri* (1 accession), *B. juncea* (10 accessions), *B. napus* (6 accessions), *B. nigra* (3 accessions), *B. oxyrrhina* (1 accession), *B. rapa* (4 accessions), *Camelina sativa* (2 accessions), *Enarthrocarpus arcuatus* (1 accession), *E. sativa* (1 accession), *Sinapis alba* (3 accessions), *S. arvensis* (1 accession), and *S. flexuosa* (1 accession). The seed were obtained from commercial sources and the USDA Mustard Germplasm Repository in Ames, IA. The accessions were seeded in 10 cm pots filled with SB500 greenhouse mix (Sun Gro Horticulture). The experiment was a randomized complete block design with four replications. The mustards were thinned to two plants per pot and allowed to grow until first flowers. Shoot tissue was harvested, mass determined, freeze-dried, and glucosinolates analyzed. Shoot mass at flowering ranged from 2.97 (PI263866) to 39.71 (PI597864) g/plant. Generally, total glucosinolates levels were similar among accessions. Ida Gold mustard (*Sinapis alba*, L.A. Hearne Seeds) and Red Giant mustard (*Brassica juncea Integlifolia* Group, Seeds of Change) had higher total glucosinolate levels than accessions such as Jupiter rapeseed (*Brassica napus,* Ames 6100, USDA Mustard Germplasm Repository). Ida Gold is sold as a high-glucosinolate containing cultivator for biofumigation while Jupiter is an older European rapeseed cultivar. Gluconapin and Sinigrin are the predominant glucosinolates in most of the accessions, with Ida Gold containing the most gluconapin (271 $\mu g\ g^{-1}$ dry weight) and Red Giant containing the most sinigrin (128 $\mu g\ g^{-1}$ dry weight). Progoitrin and glucoalysin were the other two common aliphatic glucosinolates. Shoots of Red Giant mustard and Jupiter rapeseed contained the largest amount of the aromatic glucosinolate, gluconastrutiin. Ida Gold, Jupiter, and Red Giant shoot mass were approximately 12 g/ plant. The biofumigant ability of mustard plants will depend not only on the amount of glucosinolates, but also on their shoot mass.

Antioxidant Levels in Illinois Grown Hot Pepper (*Capsicum* spp.) Cultivars

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Abstract

Thirty eight varieties of hot peppers were grown in the field to commercial maturity. Samples of mature fruit were harvested, freeze dried, and analyzed for total antioxidant activity using the 1,1-diphenyl-2-picrylhydrazl (DPPH) and 2,2'-azinobis(3-ethylbenzthiodiazoline-6-sulfonic acid (ABTS) methods, phenolics analyzed according to the Folin-Ciocalteu colorimetric method, and ascorbic acid analyzed using high pressure liquid chromatography. Total antioxidant activity, total phenolics, and ascorbic acid were different among the cultivars, however, the differences were not correlated to degree of hotness. Total phenolics were highest in "Bangalore Torpedo"," Scotch Bonnet Jamacan Red", "Fatalii" and "Habanero Chocolate". In contrast to total antioxidants, total phenolics varied among the different colored Habanero cultivars with "Chocolate" having higher total phenolics than "White Bullet", "Craig's 3X Hot Orange", and "Mustard".

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Changes in total antioxidant activity, total phenolics, organic acids, and other health promoting compounds will be examined in relation to color and total hotness of these cultivars.

Introduction

In the last decade there was a great increase in research involving antioxidants in food. Consumption of foods high in antioxidants can reduce the risk of cancer, neurodegeneration, and cardiovascular disease including atherosclerosis (Harborne and Williams 2000, Halliwell 1996, Hollman and Katan 1999). Antioxidant compounds are necessary for aerobic life because of their ability to slow damaging chain reactions from reactive oxygen species (ROS) and other free radicals (Halliwell 1996). Peppers (*capsicum* spp.) are high in many antioxidants including vitamins A, , α-Tocopherol (vitamin E), ascorbic acid (vitamin C), and phenolics including flavonoids and carotenoids, all of which the human body cannot synthesize (Howard et al 1994, Materska and Perucka 2005). It is valuable to investigate the levels of antioxidants present in locally grown peppers because of their reported health benefits and anticarcinogenic properties, as well as an increased interest in ethnic foods. These properties make peppers a valuable food that is increasing in consumption.

Pepper fruit can be consumed at both the immature or mature stage. The overall antioxidant cpacity changes with the maturity of the fruit, typically increasing when the fruit is ripe (Matsufuji et al 2007, Howard et al. 2000, Gnayfeed et al. 2001). Sun et al. (2007) used the DPPH assay to determine the total antioxidant capacity of green, yellow, orange, and red bell peppers to be 2.1, 3.2, 3.5, and 3.9 TEAC/g fresh weight respectively, supporting the trend that antioxidant capacity increases with ripeness in peppers. Howard et al. (1994) found mature hot peppers contained 95% more ascorbic acid than green peppers. Factors including field

conditions, weather, and storage also significantly affect the antioxidant capacity of peppers (Russo and Howard 2002, Markus et al. 1999, Howard et al. 1994, Sun et al. 2007). Furthermore, there exists wide variations in antioxidant capacity between pepper cultivars (Deepa et al. 2006, Sun et al. 2007, Lee et al. 1995, Hanson et al. 2004, Horneo-Mendez et al. 2002). The understanding of the differing antioxidant activity between pepper cultivars can better direct the development of peppers as functional foods with health benefits.

Ascorbic acid is an essential nutrient that has many metabolic functions including antioxidant activity. The antiradical properties ascorbic acid prevents free radical formation in cells. The level of ascorbic acid in most cultivars varies significantly between seasons. Deepa et al. (2006) found the ascorbic acid concentration in sweet peppers ranged from 48.23 to 192.63 mg $100g^{-1}$, a 3.99-fold variation in ascorbic acid among cultivars in a single season. The variation was attributed to temperature fluctuations, cultivar response, and sampling variation.

Phenolics are ubiquitous in plants as secondary metabolites that protect the plant from stress by acting as "reducing agents, hydrogen donating anti-oxidants, and singlet oxygen quenchers" (Rice-Evans et al 1996). The polyphenolic flavonoids quercetin and luteolin are found in "moderate to high levels in peppers" (Deepa 2006, Lee et al. 1995). Quercetin and luteolin are found in peppers at levels up to 68.27 and 43.65 mg $(kg)^{-1}$ fresh weight respectively (Howard et al. 2000). Howard et al. (2000) found the highest total flavonoid concentration, 81.30 mg $(kg)^{-1}$ fresh weight, in cv. Inferno. The antioxidant activity of quercetin according to the TEAC assay is more than twice that of luteolin (Rice-Evans et al 1996). The free radical scavenging potential of quercetin comes from a hydroxyl group attached to a double bond in the C ring. Luteolin has an identical unsaturated C ring, but without the 3-OH, indicating the importance of a hydroxyl group to free radical scavenging (Rice-Evans et al. 1996).

Flavonoid concentrations are higher in hot pepper than semihot pepper, indicating pepper hotness may be correlated with total phenolic levels (Materska and Perucka 2005). Total phenolics can be estimated by the total reducing content (TRC), which is mainly composed of total phenolics. Deepa et al. (2006) found the TRC of their capsicum cultivars to range between 28.88-75.23 mg $100g^{-1}$, whereas Howard et al. (2000) reported a higher concentrations ranging from 256.5-308.5mg $100g^{-1}$. Deepa et al. (2006) attribute the difference to the presence of seeds in the samples of Howard et al, because seeds are a source of phenolics and carotenoids. Sun et al. (2007) determined the total phenolics using the Folin- Ciocalteu method in green, yellow, orange, and red bell peppers to be 2.4, 3.3, 3.4, and 4.2 μmol catechin equivalent/g fresh weight respectively.

There is mixed evidence supporting a positive correlation between the concentration of flavonoids and the antioxidant capacity in peppers (Deepa et al. 2006, Lee et al. 1995). The methods of determining antioxidant capacity and phenolics are often related assays, so it is not suprising to see a correlation between them. Deepa et al. measured the total antioxidant activity by DPPH ranged from 20-72% (% inhibition compared to control) between different cultivars, to which they attribute to differences in the phenolics profile of different cultivars.

The goal of this study was to determine the levels of total phenolics, ascorbic acid, and total antioxidant capacity of 38 different sweet and hot pepper cultivars. Through this we can help direct the cultivation of both the health benefits and taste of these peppers.

Materials and Methods

Pepper Samples

38 commercial pepper cultivars were grown in an University of Illinois, Urbana-Champaign research plot. All varieties were grown under the same soil, water, and fertilization conditions. All fruits were harvested in September, weighed, then frozen in liquid nitrogen and kept in -70˚C. The samples were then freeze dried, de-seeded, and pulverized in a food processor for analysis

Total Antioxidants

Total antioxidants were determined using ABTS (2,2'-azino-bis(3-ethylbenzthiazoline-6-sulphonic acid) and DPPH (2,2-Diphenyl-1-picrylhydrazyl) (Sigma, St. Louis MO) assays with slight modifications (Kim et al. 2002). pepper powder (0.0200g) was extracted with 8.5mL of 80% methanol (aqueous) for two hours at room temperature in a shaker at 200 RPM and centrifuged at 8000 RPM for 10min at 4^{o}C. The supernatant was collected and the pellet re-extracted with 4mL of 80% methanol. The extract was placed in the shaker for an additional 30min, and centrifuged as before and the supernatants combined. ABTS at 2.5mM was prepared in phosphate saline buffer (PBS) solution (100mM Phosphate buffer, 150mM NaCl) and activated with 1.0mM AAPH (2,2'-azobis(2-amidino-propane) dihydrochloride) for 13min at 68^{o}C. A standard curve consisting of 0.1M ascorbic acid in 80% methanol was used and 50□L of pepper extract was reacted. The mixture was incubated at 37^{o}C for 10min, and absorbance read spectrophotometrically at 734nm (Shimadzu UV160U, Kyoto Japan). DPPH was prepared in 80% methanol at the concentration of 100□M and reacted with the extract in the dark for 30 minutes and the absorbance read spectrophotometrically at 515nm. Each pepper variety was sampled 3 times, and results averaged.

Total Phenolics

Total soluble phenolics were measured using a colorimetric procedure (Singleton and Rossi 1965) with some modifications. 0.1g of tissue was combined with 2 mL of 50% HPLC grade methanol and extracted in a water bath-shaker for 2h at 200 rpm and 22^{o}C. The mixture was centrifuged at 10,000 RPM for 15 min at 20^{o}C. The supernatant was collected and the pellet re-dissolved in 2 mL methanol, and placed in the shaker for an additional 30 min and centrifuged at 10,000 RPM for 15 min. The supernatant was collected and combined with the previous fraction. A 50□L fraction of the extract was used to determine total soluble phenolics. A standard curve was developed using 0, 5, 10, 20, 25, and 30 □g gallic acid in 50% methanol. Gallic acid standards and sample extracts (50 □L each) were placed in 25 mL test tubes. To each tube, a 1.5mL of 10% Folin-Ciocalteu solution will be added and incubated for 5 min at room temperature. 1.5mL of a 75g/L (15%) Na_2CO_3 solution was added to each tube and incubated for 90 min at room temperature. Absorbance was measured at 750nm. Each pepper variety was sampled three times, and results averaged.

Results and Discussion

Total Antioxidant capacity

Vitamin C equivalent antioxidant capacity (VCEAC) was used to quantify results rather than Trolox equivalent antioxidant capacity (TEAC) because vitamin C occurs naturally and in abundance in peppers and so is a more logical standard than Trolox (Kim et al. 2002). The DPPH method measured a greater level of antioxidants than the ABTS in every sample except the chilitepin (Table 2). Tepin is an anomaly because although it is one of the hottest peppers analyzed, all three assays recorded relatively low concentrations of antioxidants. This may be

due to the Illinois climate being too cold for Tepin cultivars. DPPH may have recorded higher values than ABTS because it more readily detects lipid soluble contiuents, and so may have detected more capsacin in the peppers than the ABTS method. The DPPH method measured the highest antioxidant capacity in Aji Yellow, Pujab, and Habanero White Bullet. The ABTS method measured the highest antioxidant capacity in Aji Yellow, Fatali, and Hanero Chocolate (Table 2). A hotness rating (1-10) was assigned to each pepper based on taste tests and existing literature. Both the DPPH and ABTS methods produced a very weak correlation (r=0.11, 0.01) between pepper hotness and antioxidant capacity (Fig. 3, 4).

Total Phenolics

The total phenolics measure in gallic acid equivalent (GAE) averaged in between the ABTS and DPPH estimates of antioxidant capacity. The Highest phenolics were found in Fatali, Habanero Chocolate, and Scotch Bonnet Caribbean Red (Table 2).Huang et al (2005) argues the Folin-Ciocalteu reagent, DPPH, and ABTS assays are all based on similar redox reactions, so there should be a correlation between total phenolics and antioxidant activity as measure by these methods. We found a weak correlation between total phenolics and antioxidant capacity as measured by DPPH (r=0.273) and a moderately strong correlation when antioxidant capcity was measured by ABTS (r=0.721). (Fig. 1, 2). Deepa et al. (2006) also found a weak correlation between total phenolics and antioxidant activity as measured by both DPPH or ABTS. Although the three methods operate under similar redox reactions, each is more or less sensitive to specific compounds. FCR also reacts with simple phenols which do not act as antioxidants, indicating 'total phenolics' may be a misleading measure of antioxidant capacity.

Conclusion

The hot peppers analyzed varied greatly in the antioxidant capacity and total phenolics measured. Aji Yellow and Habanero Chocolate had the highest concentrations of the 38 cultivars sampled.

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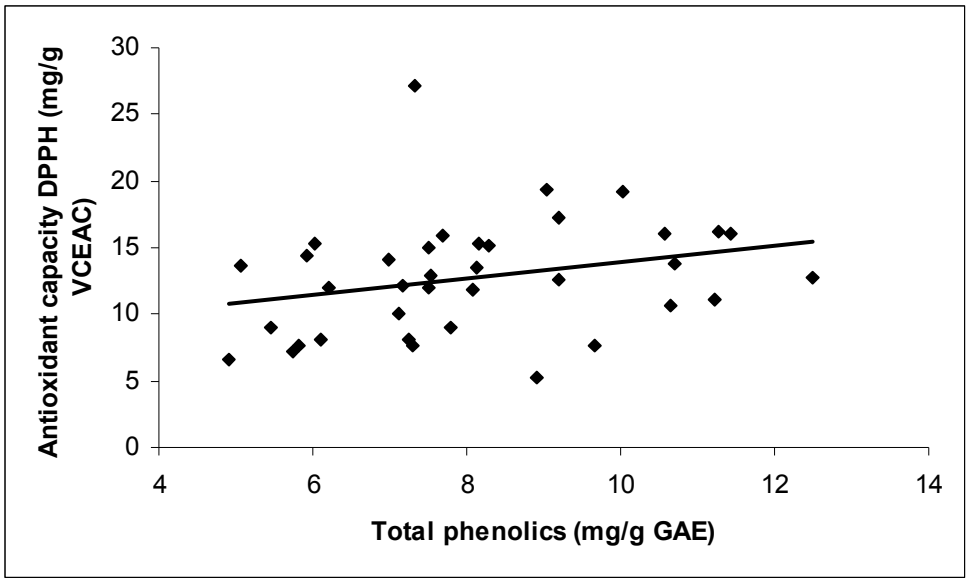

Figure 1. Correlation between total phenolics and antioxidant activity (DPPH) in capsicum spp. y = 0.6x + 7.9. r = 0.273

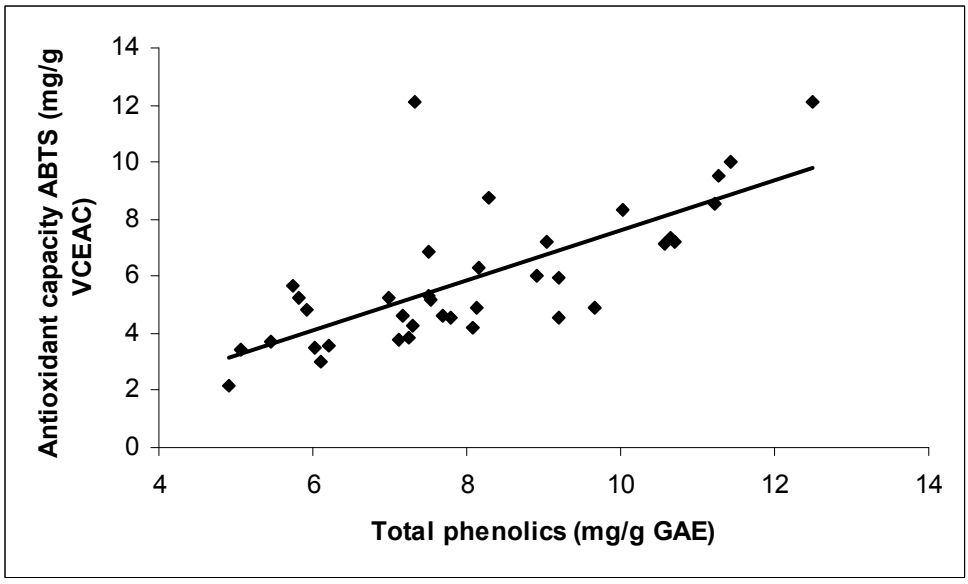

Figure. 2. Correlation between total phenolics and antioxidant activity (ABTS) in capsicum spp. y = 0.9x - 1.2. r = 0.721

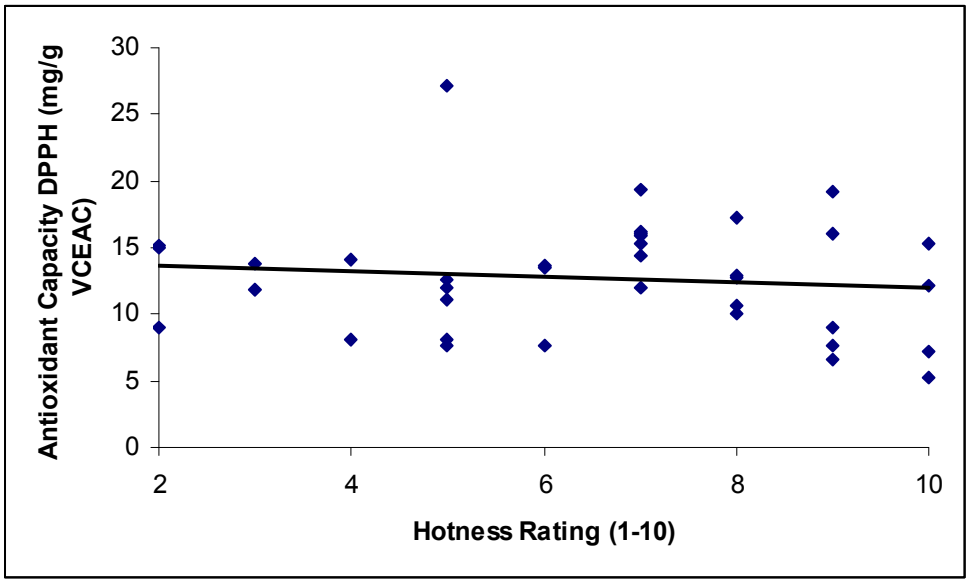

Figure 3. Correlation between pepper hotness and antioxidant capacity (DPPH) in capsicum spp. y = -0.1999x + 14.051, r= 0.11

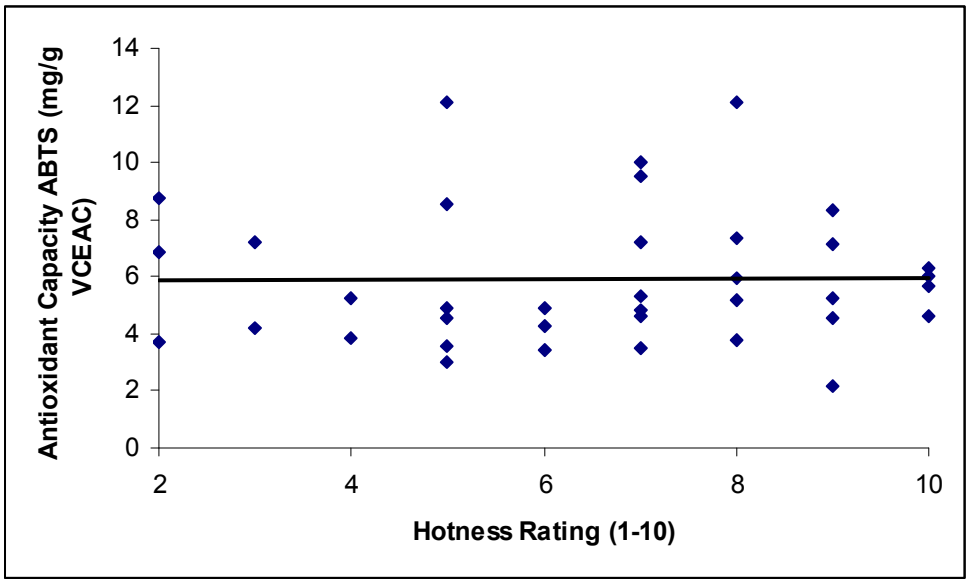

Figure 4. Correlation between pepper hotness and antioxidant capacity (ABTS) in capsicum spp. y = 0.0105x + 5.8391, r=0.01

Table 1.

Variety Name	Species	Description
Atomic Starfish	C. annuum	flat, star shaped peppers that are very hot, and turn from green to bright red when ripe.
Bangalore Torpedo	C. annuum	A long thin Indian pepper, reaching 5 ¼” by ¼”, this pepper twists and turns red when mature.
Cali Mild	C. annuum	a large American mild pepper, the fruit grows 6-10”. Often consumed when green, the ripe fruit will turn from dark red to purple.
California Mild	C. annuum	a large American mild pepper, the fruit grows 6-10”. Often consumed when green, the ripe fruit will turn from dark red to purple.
Cayenne Long	C. annuum	Long thin fruits 5" long by 1/2" thick. Red when ripe, and tends to twist. Very hot.
Cayenne Long Slim	C. annuum	Fruit grows 4” long by 1” across, red when mature. Medium heat.
Chiletepin	C. annuum	¼” round red fruit that grows on a weedy compact plant. Extremely hot.
Elephant's Trunk	C. annuum	Fruits grow to 11” and bend to resemble an elephant’s trunk, moderate heat, turns bright red when mature.
Explosive Ember	C. annuum	A compact ornamental plant with purple leaves and fruit that turns from purple to red. Peppers grow upright.
Fluorescent Purple	C. annuum	Plant has dark green leaves. The small peppers turn from dark green, to purple, to deep red when ripe.
Holy Mole	C. annuum	An American hybrid with vigorous growth. The dark green fruits turn brown when mature, and retain moderate heat.
Indian PC-1	C. annuum	From Assam, this very hot pepper grows about 2” long, and turns brught red when mature. Often mistaken with Bhut Jolokia.
Jalapeno Early	C. annuum	A highly productive Mexican variety with medium-high heat. The 3 ½” long fruits are red when mature, but often consumed when green.
Onza Armarillo	C. annuum	Very hot peppers, yellow when ripe. A wrinkled fruit, about 3” long.
Onza Rojo	C. annuum	Peppers grow to 2” long, .8” wide. They are very hot, and mature to red or orange.
Pequin	C. annuum	a weedy looking bushy plant, produces 2cm fruits that turn bright red when mature. Very hot. Also known as the bird pepper.
Sadabahar	C. annuum	Fruits grow upright in clusters, 2” long by ¼” wide. Extremely hot peppers that turn red when ripe.
Aji Yellow	C. baccatum	The fruit is 5” long, 1” wide. The yellow peppers have medium heat.
Bishop's Cap Red	C. baccatum	1 ½” long by 2” wide. Brazilian hot peppers that turn red when mature. The fruit is shaped like a hat.

Habanero Chocolate	C. chinense	Very hot peppers that are brown when ripe. Square shaped, 2” long, that can have a fruity flavor.
Habanero Gold Bullet	C. chinense	A productive small bush that grows 1” fruit, gold when mature. Very hot, the hottest of the habeneros.
Habanero Mustard	C. chinense	Capsicum chinense. Wrikled orange fruit 2” by 1”. Very hot.
Habanero Orange (Craig's 3x hot)	C. chinense	Capsicum chinense. a square shaped orange fruit 2” long. Very hot.
Habanero Paper Lantern	C. chinense	Hanging fruit 2” by .6”. Quick to ripen to red, and ornamental look to the peppers.
Habanero White Bullet	C. chinense	Capsicum chinense. A 1” by ½” white fruit. This highly productive plant produces extremely hot peppers.
Scotch Bonnet Carribean Red	C. chinense	Capsicum chinense. Fruits resemble habaneros, 1.5” by 1.2”. Very hot peppers that turn red when mature.
Scotch Bonnet Fatalii	C. chinense	Extremely hot. The fruit is 2.5” long, 1” wide, ending in a point. They turn yellow when ripe.
Scotch Bonnet Jamaican Red	C. chinense	A red Scotch Bonnet, a tall and vigourous plant with extremly hot fruit.
Scotch Bonnet Yellow Jamaican	C. chinense	Capsicum Chinense. A very hot pepper with Caribbean origins. Yellow fruit 1.2” across by 1” long.
Tazmanian Habanero	C. chinense	Capsicum chinense. Fruit has an enlarged midsection, and pointed end, very hot red peppers.
Punjab	C. frutescens	The ripe fruit turns dark purple and red, and is extremely hot. They hang, and are 2” long, ¼” wide.
Sudanese	C. frutescens	A very hot pepper, red when ripe. Long thin with a rounded end.
Tabasco	C. frutescens	4cm fruits turn yellow and orange to red when mature. Moderate heat, the fruits are not dry on the inside.
Thai Bangkok Upright	C. frutescens	Fruit grows upright on the 3 feet tall plants. Peppers are red when mature with moderate heat.
Thai Hot	C. frutescens	Extremely hot with upright fruit 11/2" long that turn red when mature. An ornamental type plant.
Twilight	C. frutescens	Compact plant with dark leaves, with hundreds of upright peppers. Colors range from purple to yellow to orange and red.
Tapine (Skirvin's)		Dr. Robert Skirvin's cultivar, tiny red peppers. Extremely hot.

Table 2.

Variety Name	Total Phenolics Avg. Adj. Concentration (mg/g GAE)	DPPH Avg. Adj. Concentration (mg/g VCEAC)	ABTS Avg. Adj. Concentration (mg/g VCEAC)	Hotness Scale (1-10)
Bishop's Cap Red	5.459	9.063	3.704	2
Cali Mild	8.287	15.189	8.749	2
California Mild	7.512	14.971	6.874	2
Elephant's Trunk	10.709	13.805	7.201	3
Holy Mole	8.066	11.906	4.199	3
Cayenne Long	6.977	14.144	5.219	4
Cayenne Long Slim	7.252	8.066	3.845	4
Aji Yellow	7.335	27.093	12.103	5
Bangalore Torpedo	11.217	11.150	8.561	5
Explosive Ember	9.185	12.644	4.563	5
Jalapeno Early	6.112	8.148	2.984	5
Tabasco	9.660	7.662	4.889	5
Twilight	6.217	11.932	3.602	5
Fluorescent Purple	8.134	13.442	4.874	6
Sudanese	5.056	13.592	3.461	6
Thai Bangkok Upright	7.299	7.616	4.250	6
Atomic Starfish	6.022	15.235	3.496	7
Habanero Chocolate	11.425	16.117	9.995	7
Habanero Paper Lantern	7.679	15.909	4.616	7
Onza Rojo	5.916	14.419	4.844	7
Punjab	9.031	19.380	7.239	7
Scotch Bonnet Carribean Red	11.284	16.256	9.505	7
Thai Hot	7.507	12.006	5.330	7
Habanero Orange (Craig's 3x hot)	10.641	10.652	7.359	8
Scotch Bonnet Fatalii	12.505	12.718	12.116	8
Scotch Bonnet Jamaican Red	7.523	12.909	5.183	8
Scotch Bonnet Yellow Jamaican	7.104	10.092	3.801	8
Tazmanian Habanero	9.195	17.191	5.957	8
Habanero Mustard	10.579	16.031	7.124	9
Habanero White Bullet	10.027	19.144	8.305	9
Onza Armarillo	5.817	7.633	5.267	9
Pequin	4.903	6.529	2.201	9
Sadabahar	7.780	8.971	4.571	9
Chiletepin	8.911	5.255	6.027	10
Habanero Gold Bullet	8.160	15.343	6.314	10
Indian PC-1	7.169	12.089	4.588	10
Tapine (Skirvin's)	5.728	7.198	5.670	10

Buckwheat Cover Crop for Cucumber Production

Katherine Kelley and John Masiunas

Common buckwheat (*Fagopyrum esculentum* Moench) is both a widely grown psuedocereal cash crop and a soil improving cover crop. Buckwheat grows vigorously in warm weather, out-competing most weeds. It can be used as a short cycle cover crop reducing competition with weeds and improving the soil. Pickling cucumbers (*Cucumis sativus* var. Eureka) are highly susceptible to herbicide damage and have few effective herbicides registered. A buckwheat cover crop could reduce troublesome weeds but may inhibit subsequent late-planted cucumbers. It is necessary to determine the optimum growth and kill windows for buckwheat to reduce its potential to become a weed and negatively impact cucumber growth. During 2008 and 2009, field experiments were conducted in northern Illinois (St. Charles) and central Illinois (Champaign) to determine the effects of two different durations of buckwheat cover crops on cucumber growth and yield and weed populations. The field experiments were split plots in a RCBD and in 2008, examined the effects of buckwheat killing time (duration of buckwheat stand), and method of buckwheat killing (mowing or tilling) on cucumber growth and weed densities, and in 2009,method of killing was replaced with buckwheat planting time. Growing buckwheat suppressed broadleaf and grass weeds than the tilled bare ground treatments. Killing buckwheat with tillage resulted in lower weed AGBM than using mowing, and tillage was the only kill method used in 2009. The late buckwheat planting (in mid-June 2009) did not effectively control weeds. Planting and killing buckwheat earlier in the season lead to better weed suppression. Also, greenhouse experiments determined the effects of buckwheat residues (roots, shoots, roots and shoots) on the growth of cucumber plants in a CRD and cucumber interference with large crabgrass (*Digitaria sanguinalis*) in a replacement series experiment. Preliminary statistical analysis revealed no significant difference in cucumber vine and crabgrass length, AGBM of cucumber and crabgrass, or number of cucumber leaves and fruit between the buckwheat and bare control treatments, though there was a trend towards higher crabgrass AGBM in the bare control treatment. These results suggest that buckwheat does not negatively affect cucumber growth or yield and may be helpful in inhibiting weed establishment and growth in pickling cucumber production.

EVALUATION OF HERBICIDE COMBINATIONS FOR PUMPKINS

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Table 1. Herbicide treatments

Treatment number	Herbicide treatment	Rate (lb/A)	Timing	1	2	3	4
1	Control (Untreated, Weedy)	-	-	101	213	313	407
2	Strategy	1.2 + 0.375	PRE	103	208	308	414
3	Strategy + Sandea	(1.2 + 0.375) + 0.035	PRE	106	201	309	405
4	Strategy + Reflex	(1.2 + 0.375) + 0.25	PRE	114	204	311	415
5	Dual Magnum	1.27	PRE	109	205	301	411
6	Dual Magnum + Sandea	1.27 + 0.035	PRE	108	202	315	404
7	Dual Magnum/Aim	1.27/0.031	PRE/DPOST*	113	207	312	401
8	Dual Magnum + Reflex	1.27 + 0.25	PRE	115	209	302	410
9	Dual Magnum + Reflex	1.27 + 0.31	PRE	102	203	306	409
10	Dual Magnum +Reflex	1.27 + 0.38	PRE	111	211	310	402
11	Dual Magnum + Reflex	1.27 + 0.50	PRE	104	215	314	413
12	Dual Magnum + Reflex	1.27 + 0.75	PRE	105	210	307	406
13	Dual Magnum + Reflex	1.27/0.38	PRE/DPOST*	112	214	304	412
14	Dual Magnum + Reflex	1.27/0.50	PRE/DPOST*	110	206	303	408
15	Dual Magnum + Reflex	1.27/0.75	PRE/DPOST*	107	212	305	403

*Shielded application to row middles

Replication 1

101 1 Control	102 9 Dual+ Reflex 1.3+.31	103 2 Strat	104 11 Dual+ Reflex 1.3+.50	105 12 Dual+ Reflex 1.3+.75	106 3 Strat+ Sandea	107 15 Dual/ Reflex 1.3/.75	108 6 Dual+ Sandea	109 5 Dual	110 14 Dual/ Reflex 1.3/.5	111 10 Dual+ Reflex 1.3+.38	112 13 Dual+ Reflex 1.3/.38	113 7 Dual/ Aim 1.3/.03	114 4 Strat+ Reflex	115 8 Dual+ Reflex 1.3+.25

Replication 2

201 3 Strat+ Sandea	202 6 Dual+ Sandea	203 9 Dual+ Reflex 1.3+.31	204 4 Strat+ Reflex	205 5 Dual	206 14 Dual/ Reflex 1.3/.5	207 7 Dual/ Aim 1.3/.03	208 2 Strat	209 8 Dual+ Reflex 1.3+.25	210 12 Dual+ Reflex 1.3+.75	211 10 Dual+ Reflex 1.3+.38	212 15 Dual/ Reflex 1.3/.75	213 1 Control	214 13 Dual+ Reflex 1.3/.38	215 11 Dual+ Reflex 1.3+.38

Replication 3

301 5 Dual	302 8 Dual+ Reflex 1.3+.25	303 14 Dual/ Reflex 1.3/.5	304 13 Dual+ Reflex 1.3/.38	305 15 Dual/ Reflex 1.3/.75	306 9 Dual+ Reflex 1.3+.31	307 12 Dual+ Reflex 1.3+.75	308 2 Strat	309 3 Strat+ Sandea	310 10 Dual+ Reflex 1.3+.38	311 4 Strat+ Reflex	312 7 Dual/ Aim 1.3/.03	313 1 Control	314 11 Dual+ Reflex 1.3+.38	315 6 Dual+ Sandea

Replication 4

401 7 Dual/ Aim 1.3/.03	402 10 Dual+ Reflex 1.3+.38	403 15 Dual/ Reflex 1.3/.75	404 6 Dual+ Sandea	405 3 Strat+ Sandea	406 12 Dual+ Reflex 1.3+.75	407 1 Control	408 14 Dual/ Reflex 1.3/.5	409 9 Dual+ Reflex 1.3+.31	410 8 Dual+ Reflex 1.3+.25	411 5 Dual	412 13 Dual+ Reflex 1.3/.38	413 11 Dual+ Reflex 1.3+.38	414 2 Strat	415 4 Strat+ Reflex

Sub-Plot Size:	30 x10 ft
Row Spacing:	60 in
Within Row Spacing	30 in
Number of Rows/Plot	1

Activities

1. Friday, July 10, 2009, we sprayed pumpkin plots

2. Tuesday, July 21, 2009, Dan Anderson rotor tilled the pumpkin plots and we hand planted, placing a single seed at every 30 inches, in a single row.

3. Friday, July 24, we watered the pumpkins, because it had not rained since the time we replanted.

4. Thursday, July 30, 2009, I did the **first weed count** on pumpkins

5. Wednesday, August 5, 2009, I did phytotoxicity assessment

6. Thursday, August 6, 2009, I did the **second weed count** on both pumpkins

7. Wednesday, August 12, 2009, Dan and I did phytotoxicity assessment

8. Thursday, August 13, 2009, I did the **third weed count** on both pumpkins

9. Friday, August 14, 2009, Dan and I applied post herbicides (shielded)

Table 2. Pumpkin was not injured by PRE or directed postemergence herbicide treatments.

Herbicide treatment	Rate	Timing	Phytotoxicity	
			Aug 5	Aug 26
	lb/A		--------- % ----------	
Control (Untreated, Weedy)	-	-	0	0
Strategy	1.2 + 0.375	PRE	0	0
Strategy + Sandea	(1.2 + 0.375) + 0.035	PRE	0	0
Strategy + Reflex	(1.2 + 0.375) + 0.25	PRE	0	0
Dual Magnum	1.27	PRE	0``	0
Dual Magnum + Sandea	1.27 + 0.035	PRE	0	0
Dual Magnum/Aim	1.27/0.031	PRE/DPOST*	0	0
Dual Magnum + Reflex	1.27 + 0.25	PRE	0	0
Dual Magnum + Reflex	1.27 + 0.31	PRE	0	0
Dual Magnum +Reflex	1.27 + 0.38	PRE	0	0
Dual Magnum + Reflex	1.27 + 0.50	PRE	0	0
Dual Magnum + Reflex	1.27 + 0.75	PRE	0	0
Dual Magnum + Reflex	1.27/0.38	PRE/DPOST*	0	0
Dual Magnum + Reflex	1.27/0.50	PRE/DPOST*	0	0
Dual Magnum + Reflex	1.27/0.75	PRE/DPOST*	0	0

*Shielded application to row middles

Table 3. Weed control

Herbicide treatment	Rate (lb/A)	Timing	Total weed control		
			July 20	Aug 6	Aug 13
			---------- % control ----------		
Control (Untreated, Weedy)	-	-	0	0	0
Strategy	1.2 + 0.375	PRE	70	60	56
Strategy + Sandea	(1.2 + 0.375) + 0.035	PRE	81	66	66
Strategy + Reflex	(1.2 + 0.375) + 0.25	PRE	85	94	87
Dual Magnum	1.27	PRE	80	79	69
Dual Magnum + Sandea	1.27 + 0.035	PRE	72	76	76
Dual Magnum/Aim	1.27/0.031	PRE/DPOST*	84	85	87
Dual Magnum + Reflex	1.27 + 0.25	PRE	97	98	98
Dual Magnum + Reflex	1.27 + 0.31	PRE	95	98	98
Dual Magnum +Reflex	1.27 + 0.38	PRE	91	100	97
Dual Magnum + Reflex	1.27 + 0.50	PRE	92	96	97
Dual Magnum + Reflex	1.27 + 0.75	PRE	100	100	100
Dual Magnum + Reflex	1.27/0.38	PRE/DPOST*	61	67	57
Dual Magnum + Reflex	1.27/0.50	PRE/DPOST*	72	37	56
Dual Magnum + Reflex	1.27/0.75	PRE/DPOST*	72	77	62

*Shielded application to row middles

Best Sustainable Management Practices for Perennial Weeds

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Perennial weeds are especially challenging for sustainable and organic farmers who are unable or unwilling to use synthetic herbicides. Recent research has identified techniques that hold promise in helping farmers with this problem. Our objectives were to increase farmer knowledge of when to control perennial weeds and what are the most efficacious strategies. Secondly, we wanted to use on-farm, participatory learning methods to provide farmers with the skills to integrate strategies to suppress perennial weeds. Fact sheets were developed on identifying and managing Canada thistle (*Cirsium arvense*) and quackgrass (*Agropyron repens*). These, along with additional resources were distributed to participating farmers and posted on the University of Illinois organic agriculture website (http://asap.sustainability.uiuc.edu/org-ag). With our three-member farmer advisory team, a mini-grant program was developed to recruit at least eight farmers to participate. The mini-grant offered $500 to participating farmers -- $250 up front, and $250 upon completion of the 2008 participation.

Twenty farmers applied for the mini-grant program in 2008. With the help of our farmer advisors, eight participating farmers were chosen. Once chosen, participating farmers were sent a resource packet, and contacted by phone to discuss in detail their operations and perennial weed problems. Each farm was then visited by a project coordinator, sometimes accompanied by a farmer advisor. Together, the participating farmer and project coordinator devised an integrated management plan that included practices such as timed tillage, mowing, and short-season,

annual cover crops, for perennial weeds present on the farm. A follow-up phone conversation with the participating farmers revealed that four of the eight were able to follow through with the plan and report results of their efforts. Only these four received the second $250 payment.

3. Improve Extension, scientist, and farmer awareness of how integrated approaches approach can be used to manage difficult-to-control perennial weeds.

The information and results from farmer participation in 2008 was captured and posted in report format on the organic website. Pictures are included. Reports of farmers' first-hand attempts at integrated perennial weed control are available to the public (see appendix). They can be found at http://asap.sustainability.uiuc.edu/org-ag.

Presentations were made at both the Illinois Specialty Growers Convention and the 2009 Midwest Organic Production and Marketing Conference. Two field days were held in 2009, both featured organic farms. Perennial weed management was discussed at these events. A total of at least 130 farmers, advisors, and Extension personnel attended these events.

Four of the eight participating farmers in 2008 reported positive results from implementing the integrated practices. Once a core number of farmers become proficient with the techniques, and Extension personnel see results and understand the concepts, adoption will spread across the Midwest, and the benefits will accrue exponentially.

Resources were developed and posted on-line outlining the latest research-based information regarding management of selected perennial weeds in sustainable and organic systems. A mini-grant program was developed to find and recruit farmers in Illinois and surrounding states exhibiting a need for knowledge and assistance in applying new integrated methods for perennial weed control. Eight farmers were chosen to participate in 2008, representing a variety of settings and situations. Initial results indicate that some of the participating farmers were helped. Resources and farmer results were posted on the organic website for public access.