Minutes from the:

SAES-422 Multistate Research Project W1008 "Biology and Management of IYSV and Thrips in Onion"

ANNUAL MEETING

Spring Hill Suites
Las Cruces, New Mexico

December 8 & 9, 2011

W1008 Committee Officers – 2011
Chair: Hanu Pappu (absent)
Vice-Chair: Shannon Pike
Secretary: Brian Nault

Participants:

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December 8, 2011

Meeting began at 8 am

I. INTRODUCTION

Shannon Pike, who filled in for Hanu Pappu, served as chair of the meeting and made introductory welcome remarks and announcements.

Shannon mentioned that a draft of the objectives for the proposed W2008 project were discussed and approved at the National Onion Association (NOA) annual meeting that was recently held in Mexico. Such support from NOA should improve chances that our proposed W2008 project will be approved. Following the W1008 meeting, Howard and Shannon obtained a letter of support from NOA Executive Vice President Wayne Mininger for the W2008 Proposal; a copy will be appended to the proposal upon submission.

Shannon also reported that there is interest in combining NOA and National Allium Research Conference (NARC) meetings in the future. This comment was reiterated by Wayne Mininger through a call during the meeting. Shannon mentioned that the 2012 NOA Annual Meeting will be held in Palm Springs, CA and the 2012 NARC meeting will be held in Las Cruces, NM.

Lee Sommers, administrative liaison to W1008, discussed National Institute of Food and Agriculture (NIFA) leadership changes. Cathie Woteki is now USDA Undersecretary for Research, Education and Economics as well as Chief Scientist on an interim basis. Roger Beachy, former Director of NIFA, resigned on May 20 of this year and returned to his former position in St. Louis.

Lee stated that the W1008 organizational duties (future W2008) must be improved so that annual reports and other documents can be submitted in a timely fashion. The 2010 annual report was submitted well past the deadline.

The W2008 proposal is due January 15, 2012. This proposal will be reviewed by 5 academic/industry professionals in March 2012; their recommendation will be passed on to the Committee of Agricultural Experiment Station Directors for their review and final decision on approval of the W2008 Proposal. We need to submit names and emails of potential external (ad hoc) reviewers for this project who are knowledgeable about the science of the project and who work in related areas, but are not members of the W1008.

In both the final W1008 report and the W2008 proposal, impact statements are needed – social, environmental and economic data. Include the significance of this project and advancements that could be made for our disciplines; anecdotal information is fine. Essentially, the 'so what' question must be addressed! Also, there must be accountability demonstrated for project. If the project is approved,by the AES Directors, it would begin October 1, 2012 for a 5-year period.

The W1008 annual report for 2011 should be submitted before January 15, 2012. All who are interested in participating in the W2008 project (Wtemp3421) should complete Appendix E, which can be accessed easily through the NIMSS website. Alternatively, contact Lee Sommers

as soon as possible; especially for those that are not associated with a land grant institution. Lee sent an email message earlier to the group describing a step by step procedure for how to sign up.

II. STATE REPORTS

1. New York (B. Nault, C. Hsu, S. Beer and C. Hoepting)

A. Brian Nault

1. Insecticide registration update
   - Agri-Mek 2SC is now labeled for use on onion to control thrips (Section 3 label).
   - Labels for thrips control on onion for Movento, Benevia (HGW86 10 OD [cyazypyr]) and Tolfenpyrad 15EC are anticipated for early 2013, late 2012 and 2014, respectively.
   - Movento (and maybe Agri-Mek in NY) will need a Section 18 for 2012 season.

2. Insecticide studies

   a. Efficacy trial results
   - Radiant and Benevia (HGW86 10 OD) were excellent for controlling onion thrips.
   - Movento provided a fair level of control in this trial (control good early, but poor late; more explanation later in presentation).
   - Tolfenpyrad 15EC provided a fair level of control; control improved when tank mixed with Lannate LV (synergism).
   - Lannate LV did not perform well against thrips.
   - M-PEDE did not control onion thrips; mixing with Lannate did not provide better control than Lannate alone.

   b. Tank mix studies with new insecticides and fungicides
   - Movento and Agri-Mek must include a penetrating surfactant to maximize thrips control.
   - Chloronil co-applied with either Movento or Agri-Mek reduced thrips control.
   - Dithane F45 Rainshield, Rovral 4F, Scala SC and Quadris F co-applied with either Movento or Agri-mek did not reduce thrips control.
   - Higher rates of Induce improved thrips control in tank mixes of Movento and Chloronil.

   c. Action thresholds for thrips control
   - Movento should be timed following a threshold of 1 larva per leaf; do not use later in the season
   - Agri-Mek SC should be timed following a threshold of 1 or 3 larvae per leaf
   - Radiant SC should be timed following a threshold of 3 larvae per leaf

3. Thrips dispersal and biological control
   a. Dispersal – Mentioned that understanding thrips dispersal is important for predicting infestation patterns in fields, estimating the likelihood of insecticide resistance development and estimating the spread of IYSV in time and space. Approaches for studying dispersal were discussed (e.g., sticky cards and model planes).

   b. Biological control – Mentioned that alternative management strategies for thrips are needed and that the role of natural enemies in reducing thrips populations in onion is not known. This is a good time to study biological control because more selective products are being used to manage thrips and are not as harmful to natural enemies.

B. Cynthia Hsu

1. Impact of N on thrips populations
   a. In 2011, compared N rates at 75 and 150 lbs per acre; result was a 20 to 40% reduction in thrips densities over the season in sections of field that had 75 lbs per acre.
   b. In 2010, more bulb rot in treatments that had higher levels of nitrogen applied.

2. IYSV epidemiology and spatial patterns of thrips in onion fields
   a. IYSV movement within onion plants. Only found IYSV in leaves that were younger than ones infected. Only worked in 1 out of 3 attempts.
   b. IYSV spread in onion fields. Higher incidences later in the season; higher overall levels in direct-seeded fields compared with transplanted fields.
   c. Discussed reasons why IYSV may increase in fields through time.
   d. Found that IYSV increases at same rate through time, regardless of whether the field was transplanted or direct-seeded.
   e. IYSV causes a reduction in marketable yield in New York.
   f. Adult thrips tended to be more clustered spatially in transplanted fields compared with direct seeded ones. Reasons why this might occur were mentioned.
   g. Larval thrips were clustered similarly in transplanted and direct-seeded fields.
   h. IYSV was only clustered in direct-seeded fields.
   i. Future analyses will focus on identifying whether IYSV progressed through time via primary or secondary spread. Ron Gitaitis asked questions about how these analyses were conducted and discussed past work that he had done with TSWV.

C. Christy Hoepting

1. Using cultural practices to manage bacterial diseases of onions.
   a. Research was conducted on small, diversified farms. Wide plant spacing was favorable for bacterial decay. Narrowing plant spacing by 2 to 4 inches from 36-48 $inch^2$ per bulb to 24 to 32 $inch^2$ reduced rot dramatically (44 to 66%).
   b. Reflective metallic silver plastic seemed to delay build-up of thrips in previous studies.
   c. Rot was reduced significantly by NOT using black plastic mulch. Weeds were a problem on bare ground.
   d. Non black plastic mulch provided 59 to 75% control of rot.

e. Stop the rot campaign - grower adoption of reduced plant spacing and alternatives to black plastic mulch were high in 2011.
f. Diversify plant spacing to take advantage of bulb sizes and rot.
g. As N increased, so did bacterial rot of bulbs. Significantly less rot occurred in plots receiving 94 lbs vs. 125 lbs of N per acre.

2. Investigated inoculation of onions with bacteria to conduct small plot research.
- Inoculated *Pantoea ananatis* (center rot) successfully using toothpicks dipped in suspensions of bacteria and *Burkholderia cepacia* (sour skin) by injection into the leaf lacuna. Both techniques were developed first in the laboratory and greenhouse by Steve Beer and associates.

3. Examined the types and frequency of adjuvant application in levels of bacterial problems. Data analysis in progress.

4. Examined induced resistance as a means to manage bacterial diseases caused by *Pantoea ananatis* (center rot) and *Burkholderia cepacia* (sour skin) in collaboration with Steve Beer and associates.
- Actigard and Employ seemed to have potential for reducing bacterial decay, especially when applied 7 to 15 days prior to artificial inoculation.

Broke for lunch @ noon (sponsored by ENZA, Sakata Farms, and Hazera Inc.)

D. Steve Beer

1. Introduction
a. In NY, bacterial diseases account for annual losses of 10%, sometimes 40%.
b. First step taken was to determine the bacterial species responsible for causing rot in onions.

2. Obtained rotten bulbs from a number of onion growers in Oswego, Genesee and Wayne counties.
a. Tentatively identified at least 5 species of known rot-causing bacteria based on culturing and molecular analysis (*Burkholderia spp., Enterobacter spp., Pantoea spp., Pseudomonas spp.*)
b. *Pseudomonas* spp. and *Rahnella* spp were the most commonly detected bacteria in rotten onion bulbs.

3. Determining bacterial strains that are pathogenic to onion
a. Inoculating onions with bacteria using toothpicks seemed to work very well.
b. *Rahnella* spp., *Pantoea ananatis*, Enterobacter sp. seems to be pathogenic.
c. *Rahnella* strain will multiply at 4°C, whereas the others do not. So, *Rahnella* might continue to reproduce in storage, whereas others may not.

4. Where do the bacteria come from?
a. Tested weeds, volunteer onions, soil, seed, transplants and thrips for bacteria using molecular methods and then sequenced DNA.

b. Some onion seeds were found to have bacteria, but none had pathogenic bacteria. Thus, it is concluded that onion seed is not likely a source of pathogenic bacteria. Ron Gitaitis mentioned that a larger sample size is needed to be more confident to rule this possibility out.
c. Some transplants (2 of 15 transplant batches) had pathogenic strains of *P. agglomerans.*
d. Pathogenic strains of *B. cepacia, E. cloacae*, *P. ananatis* and nonpathogenic strains of *Pseudomonas spp.* were detected in muck soils.
e. A total of 309 strains of bacteria were identified from 78 lots of muck soil (At least 8 species of bacteria).
f. In 2009, onion thrips also were sampled and 4 strains of *P. ananatis* were detected.
g. In 2011, 22 different strains from surface and 37 strains from guts were found from onion thrips.
h. Some but not all tested strains were pathogenic in onion sets.
i. *Enterobacter cloacae* was recovered from 6 external strains and 8 internal strains.

5. Summary
   a. Many different bacteria are responsible for the major problems in NY.
   b. Most pathogens were found in the soil.
   c. Control strategy might involve reducing inoculum and enhancing plant resistance.

6. Projects planned for 2012 (include list of 6 items)
   a. Role of *Rahnella* spp. in onions
   b. Techniques to reduce soil populations (e.g., cover crops and soil treatments)
   c. Initiating more center rot and sour skin studies
   d. Thrips as possible vectors of bacteria
   e. Effects of 3 resistance inducers on the incidence of bacterial decay.
   f. Extend and repeat studies in 2012.

2. Colorado (H. Schwartz and T. Gourd)

A. Howard Schwartz

1. Highlights on germplasm – field responses
   a. In studies conducted from 2009-2011, a number of PIs and cultivars appeared promising for field tolerance to IYSV/thrips (less damage, fewer thrips and lower levels of IYSV)

   - <u>2009 & 2010 - CO (** and NM):</u>

PI 258956	Chile "Calderana"
PI 264320 **	Spain
PI 546140 **	U.S.A. "San Joaquin"
PI 546188	U.S.A. "Yellow Sweet Spanish Winegar"
PI 546192	U.S.A. "Yellow Sweet Spanish"

   <u>- 2009 - CO Variety Trial:</u>

Nunhems	NUN7606ON
Crookham	OLYS03-207, 05N5, 03-209; OLYX06-25

D. Palmer "Mesquite"
- 2011 - CO: selections from PIs 258956, 288909, 343049, 546188, Mesquite 05N5, B5336C (P53-364-2C)

2. Potential for IYSV seed transmission
   a. Used ELISA and PCR to test for IYSV in dried scapes, umbels & seeds collected from plants with apparent IYSV-symptoms in the field in 2010 and 2011
   b. Planted seed from infected plants in greenhouse.
   c. No IYSV detected in 3-4 week old seedlings grown from these infected plants
   d. Some germinated seed from a few infected umbels tested positive by ELISA; confirmation with additional seed and other methods (PCR) pending

3. Examining volunteer onions for thrips and IYSV
   a. 20% of plants had IYSV; 30% of thrips harbored IYSV during early season/
   b. Number of volunteers with IYSV and % of viruliferous thrips increased through time; reaching 100% of volunteers and 90% of thrips from volunteers 4 weeks later.
   c. Potential for thrips overwintering surviving and harboring IYSV detection in onion cull piles; using the NSs serological assay to identify thrips that are viruliferous. In addition, they are monitoring cull pile temperatures at different depths throughout the winter in relation to thrips survival.

4. W1008 Committee Updates IYSV and Thrips website can be found on Allium.net web site – please provide Howard with new material. Following the W1008 meeting, web site updates were made to highlight W2008 Objectives, add links to Onion resources, and reorganize the section on archived W1008 Minutes and Reports.

B. Thad Gourd

Effects of Living Mulch on Thrips
   a. Sampled beneficial insects in onions grown with living mulch of barley (early season only, like what is done in northeastern NA). A Stihl Shredder/Vacuum with a No-Thrips Screen was used to recover insects from each sample site.
   b. Found ladybird beetle larvae, nabids, lacewings, big-eyed bugs, braconid wasps, syrphid fly larvae. Also found leaf beetles, mites, aphids, grasshoppers and leafhoppers.
   c. Fewer thrips found on onion plants when at least 0.3 ladybird beetle larvae were observed per square ft.

3. Washington (T. Waters)

Tim Waters

1. Introduction and update on 2011
   a. Mostly onion thrips in WA, but sometimes as much as 20% western flower thrips.
   b. Lower thrips pressure in 2011 than in past 2 years; could be the result of new test site.
   c. Better control with newer products compared with past years; Section 18s important.

d. IYSV only a significant problem in Walla Walla area, probably because of proximity of seed onion (overwintered) fields to bulb crop. Thrips may also overwinter in straw (grain) near new fields of onion.

2. Conducted several insecticide screening trials
   a. Adult and larval populations in UTC peaked around 30 per plant.
   b. Looked at sequences of products (all did better than the UTC). The "New York resistance management program" had the least amount of thrips and the greatest net financial returns, but this program did not differ significantly from many of the other programs.
   c. Recommended that if thrips populations are low at beginning of season to use the following sequence: Movento, Movento, Radiant Agri-Mek, Radiant and then Lannate. In contrast, if initial populations are high, use the following sequence: Radiant, Movento, Movento, Radiant, Agri-Mek and Lannate.
   d. Standard efficacy trial results; Radiant best, followed by Lannate and Agri-Mek.
   e. In organic trial, Entrust only one that worked well.

3. Conducted chemigation simulation study
   a. Applied 0.1 inch of water per pass (2700 gal/Acre)
   b. Lannate, Radiant and Movento reduced thrips populations when applied in this manner.
   c. Cyazypyr controlled thrips; worked well when applied as foliar spray as well as through chemigation

4. Other points to consider when managing thrips
   - Rotate chemistries w/different modes of action
   - Leave spray tracks in field
   - Use good surfactants
   - Scout fields often, attack before they spike
   - Plant varieties that are less susceptible
   - Buffer spray solution when recommended by label

5. Future projects
   - Do nitrogen trial in an area with low N to start with
   - Evaluate cultivar differences
   - Evaluate season long programs
   - Evaluate new chemistries

4. Georgia (R. Gitaitis & B. Srinivasan)

A. Ron Gitaitis

1. Observation that IYSV survives overwinter in cull onion and in thrips.
2. There are differences in the type of N (NO_3 vs. NH_4) used in how they may affect onion growth, including bolting.
3. Florida pusley is a host for *Pantoea ananatis*.
4. The host plant on which thrips feed seems to influence whether the thrips is carrying a virulent or non-virulent strain of *P. ananatis*.

5. Must sample a lot of seeds to be able to confidently determine that seeds are not a seed-borne problem. A minimum of 10,000 seeds should be sampled, but ideally 30,000.

B. Babu Srinivasan

1. Introduction
   a. Identify another host to help answer basic questions about interactions between thrips and IYSV.
   b. Determine if other thrips species can transmit IYSV.
   c. Examine thrips biotypes to determine where they came from
   d. What are the alternate hosts of IYSV and understand the epidemiology

2. Lisianthis was examined as an indicator host for IYSV (shows symptoms in 2-3 days post inoculation).
   a. High percentage of infection 80%; mechanical inoculation of IYSV from lisianthus to lisianthus or onion to lisianthus successful.
   b. What is distribution of IYSV in lisianthus?
      - Top leaves had the most, followed by bottom leaves, middle leaves, stem and root
   c. Investigated different plant tissue bioassays to identify IYSV.
      - Whole leaves and stems worked best; not leaf disk.
   d. Effect of temperature on IYSV symptoms in lisianthus
      - Symptoms most obvious at 25-30^{o}C, less obvious at 18-23^{o}C and 30-37^{o}C.
   e. IYSV transmission by adults and larvae were identical (very well at 60 to 65%).

3. Can *Frankliniella fusca* transmit IYSV?
   - Yes, *F. fusca* can transmit IYSV to lisianthus; transmission efficiency is much lower compared with *T. tabaci*.

4. Were new thrips biotypes introduced from Peru?
   - *T. tabaci* are coming into Georgia from Peru and are genetically distinct from others. However, there is no evidence of establishment of Peruvian *T. tabaci* biotypes in Georgia.

5. Is sow thistle a dead end host?
   - Yes, IYSV can be transmitted by *T. tabaci* from onion to sow thistle (57.5% efficiency).
   - *T. tabaci* can reproduce on sow thistle, making it a legitimate inoculum source for the virus.

5. New Mexico (C. Cramer, M. Uchanski)

A. Chris Cramer

1. Methods and approach for evaluating onion germplasm for IYSV resistance
   a. Tolerant and resistant lines were self-pollinated and also crossed with male sterile lines
   b. Performance of selected material compared with original material.
   c. Mentioned that thrips may be more likely to harbor IYSV when overwintering rather than bulbs

d. Described in detail the experimental system for evaluating cultivars that might be resistant to IYSV
e. Rated color and waxiness on scales of 1 to 4.
f. Rated IYSV severity on scale of 0 to 4.
g. Harvested and graded bulbs.
h. All entries showed symptoms of IYSV, however there were some entries that had much less severe symptoms than others and some had many fewer thrips.

2. Detailed results were presented in two handouts
a. no absolute resistance identified to either thrips or IYSV.
b. some lines were much less attractive to thrips than other entries.
c. nearly all entries had IYSV symptoms, but severity differed among them.
d. entries that had fewer thrips or minor IYSV symptoms will be selected for future breeding.

B. Mark Uchanski

- Commented on scouting results for diseases and pests as part of the SCRI Onion ipmPIPE project.
- Discussed weather effects impact on the crop.
- Thrips were the predominant pest, but populations were relatively low because of cool weather early and effective control with insecticides

6. Oregon (C. Shock)

Clint Shock

Discussed how irrigation, N fertilization, and variety affect the expression of IYSV in onion (compilation of several years)

- Objective: manage stress on onion as a means to control the expression of IYSV. Water stress, N level, varieties and irrigation systems compared.
- In 2010, onion growth with most drip irrigation treatments produced significantly greater yield than onion growth with sprinkler irrigation (in 3 of 4 years).
- In 2007, 2008 and 2010, as soil water tension (cb) increased, yield decreased.
- IYSV severity had no relationship with average soil water tension 2007, but did in 2008.
- As IYSV severity symptoms increased (between a rating of 1 to 2 on a 4 pt scale), yield decreased dramatically.
- From 2007-2010, no yield benefit of increasing N from 100 lbs and 200 lbs of N per acre, regardless of irrigation scheme; a significant decrease in one year out of 4.
- Vaquero yields respond poorly when infected with IYSV.
- Sprinkler irrigation did not impact thrips pressure.
- Very modest water stress resulted in yield loss, aggravated by higher IYSV symptoms in 2008.
- Varieties varied in response to IYSV pressure.
- Bulb decomposition out of storage averaged 4%; mostly due to Botrytis or other fungi.

7. Florida (S. Reitz)

Stuart Reitz

1. Introduction
   a. Three species colonize onions in Florida: *F. occidentalis, F. fusca* and *T. tabaci*.
   b. Thelytokous and arrhenotokous populations of *T. tabaci* exist.
   c. Differences in location of these species on plants
      F. occidentalis is found throughout plant
      F. fusca tends to prefer upper foliage
      T. tabaci initially tend to aggregate in the basal part of the plant when populations are low, but are found throughout the plant at higher populations

2. Kaolin (Surround) was investigated for thrips management in onion.
   a. Applied weekly; residue covered about 70% of leaves.
   b. Reduced thrips densities, feeding damage and incidence of purple blotch.
   c. Thrips appeared to be repelled by Surround in no-choice trials.
   d. Thrips fed less on Surround-treated foliage in no-choice tests

III. International Report from South Africa

From Lindsey DuToit presented by Howard Schwartz

IYSV in South Africa

a. IYSV confirmed in onion in 2006 and again in 2008. Much more common in 2010-2011. Common in seed fields.
b. Symptoms at high levels of *Allium fistulosum*
c. Lindsey and team of collaborators in South Africa, are in the process of comparing isolates of IYSV

IV. USDA Specialty Crops Research Initiative Onion ipmPIPE & Diagnostics Project Activity Update

Report from Howard Schwartz

A. Three main objectives of Onion ipmPIPE
   1. Create an Onion ipmPIPE network that focuses on IYSV and thrips with general support for other pathogens like bacteria and fungi.

   2. Develop, improve and enhance macroarray diagnostic tools for fungal and bacterial pathogens of onion.

   3. Relate disease assessment models and IPM strategies

B. An Onion APP is in the process of development to collect data for the Onion ipmPIPE; compatible with tablets and laptops; developed by GISit; the APP will be available in early 2012.

C. Links to additional resources

V. Miscellaneous

- California Garlic and Onion Association has funds to support research

- Information will be coming about the relative susceptibility of onion to human food-borne illness risks

- New secretary for W2008 will be Joel Canestrino; Shannon Pike will be Chair and Brian Nault will be Vice-Chair.

- Brian Nault will complete the Annual W1008 report for 2011 by December 23, 2011.

- W2008 annual meeting may be scheduled for Friday, Dec. 14 after NARC.

VI. Approach to finalize W2008 draft for 12/9/2011

- Minor edits must be completed.
- Broaden materials and methods section to be most inclusive.
- Review objectives and milestones.
- Include list of projects to include in W2008.
- Measurements of progress and results.
- Milestones
- Identify peer reviewers for project

Meeting adjourned at 5pm until participants could reconvene on 12/9/11

December 9, 2011

Meeting reconvened at 8am

Shannon Pike led a discussion to improve the W2008 project. The group discussed revising objectives of the W2008 project and agreed on the following:

Objective 1. Evaluate onion germplasm for greater levels of tolerance to IYSV, other pathogens and thrips.

Objective 2. Investigate thrips biology and IYSV epidemiology to improve management strategies.

Objective 3. Investigate the biology, ecology and epidemiology of other pathogens to improve management strategies.

Objective 4. Facilitate interaction and information transfer among W2008 participants, the onion industry and other stakeholders.

Meeting attendees divided themselves into four groups to discuss methods to be included to address each of the four objectives. Chris Cramer, Brian Nault, Christy Hoepting and Shannon Pike organized and recorded these methods for Objectives 1, 2, 3 and 4, respectively. Each person will be responsible for including them in the next draft of the W2008 document.

The group identified and ranked potential reviewers for the W2008 project in several disciplines/organizations that were considered most relevant to our project.

1. Virologist (1- John Sherwood: sherwood@uga.edu; 2- Anna Whitfield: aewtospo@ksu.edu)

2. Plant Pathology (1- Natalie Goldberg: ngoldber@nmsu.edu; 2 – John Damacone: john.damicone@okstate.edu; 3- Albert Culbreath: spotwilt@uga.edu)

3. Entomology (1- David Riley: dgr@uga.edu; 2 – Joe Funderburk: jef@ufl.edu; 3 – George Kennedy: gkennedy@ncsu.edu)

4. Breeding/Production (1 – Ross Peters: RossP@hazera.com ; 2 – Louis Dinitto: louie.dinitto@bayer.com; 3 – Jan van der Heide: J.vanderHeide@bejoseeds.com)

5. USDA (1 – Scott Adkins: scott.adkins@ars.usda.gov; 2 – Linda Hanson: linda.hanson@ars.usda.gov; 3 - Richard Novy, Rich.Novy@ars.usda.gov)

The group's appreciation for Chris Cramer, Stephanie Walker, Mark Uchanski and others from NMSU who organized the meeting, and for Shannon Pike who chaired the meeting was recognized with applause.

Meeting Adjourned at noon

The minutes were compiled by Brian Nault and sent for the attendees' review on (12/19/11). Respectfully submitted by Brian A. Nault (12/23/11).