

**NCERA – 208 Soybean Rust Technical Committee Meeting
March 4-5, 2014 – Pensacola Beach, FL**

NCERA 208 – Response to Emerging Threat: Soybean Rust

Minutes of the Annual Meeting
Pensacola Beach, FL
March 12-13, 2013

Administrative Advisor:

Dr. Steven Slack
Director, OARDC
1680 Madison Ave.
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Chair:

Dr. Nicholas S. Dufault
Department of Plant Pathology
University of Florida
Gainesville, FL 32608

Secretary:

Dr. Daren Mueller
Department of Plant Pathology and Microbiology
Iowa State University
Ames, IA 50011

Immediate Past Chair:

Dr. Kiersten Wise
Department of Botany and Plant Pathology
Purdue University
West Lafayette, IN 47907

Members and guests in attendance:

NCERA 208 Meeting

2013 – Pensacola Beach, FL

Carl Bradley, (Univ. Illinois), Albert Tenuta (OMAFRA, Ontario, Canada), Ed Sikora (Auburn), Doug Jardine (Kansas State Univ.), Teresa Hughes (Monsanto), Scott Isard (Penn State Univ.), Loren Giesler (University of Nebraska), Steve Slack (The Ohio State Univ.), Kiersten Wise (Purdue Univ), Laura Sweets (Univ. Missouri), Dean Malvick (Univ. Minnesota), Martin Chilvers (Michigan State Univ.), Daren Mueller (Iowa State University), Damon Smith (Univ. Wisconsin-Madison), Anne Dorrance (The Ohio State Univ.), Don Hershman (Univ. Kentucky), Jim Haudenshield (USDA-ARS @ UIUC), Heather Kelly (Univ. Tennessee), Kelly Whiting (United

Soybean Board), Aardra Kachzoo (Univ. Kentucky), Yannis Tzanetakis (Univ. Arkansas), Feng Qu (Ohio State Univ.), Jim Marois (Univ. Florida), John Rupe (Univ. of Arkansas), Tom Allen (Mississippi State Univ.), Steve Whitham (Iowa State Univ.), Yuba Kandel (Iowa State Univ.), Clayton Hollier (Louisiana State Univ.), Les Domier (USDA-ARS, Univ of Illinois), Travis Faske (Univ. of Arkansas), Saghai Maroof (Virginia Tech.), Trey Price (Louisiana State Univ.), Myra Purvis (Louisiana State Univ.), Patricia Bollich (Louisiana State Univ. AgCenter), Alemu Mengistu (USDA-ARS, Jackson, TN), Reza Hajimorad (Univ. Kentucky), Dennis Delaney (Auburn University), Mary Delaney (Auburn University), Nathan Kleczewski (Univ. of Delaware), Tom Fontana (Ohio Soybean Council), Ray Schneider (Univ. of Louisiana)

Minutes:

The tenth meeting of the Soybean Rust Working group was held at the Hilton Pensacola Beach, Pensacola Beach, Florida on March 4-5, 2014. Dr. Nick Dufault, the committee chair, opened the meeting at 9:00 am on March 4. Group introductions followed the welcome.

Overall objectives:

1) To develop and implement a coordinated soybean rust survey and monitoring system based on identifying overwintering inoculum sources and the host range of this pathogen.

Overwintering and early-season scouting for soybean rust continues in the key southern states – Florida, Georgia, Alabama, Mississippi, Louisiana, and Texas. The development of soybean rust during the season triggers scouting efforts in states further north. Details of activities addressing this objective can be found in individual state reports.

2) To identify and evaluate the best disease management strategies for soybean rust in the U.S. including host resistance, fungicide application, cultural measures, and predictive models based on sound epidemiological research.

We continue to find ways to provide direction on management of soybean rust. In 2013, a group from NCERA-208 led the publication of a national book on fungicide use on field crops, which was published through the publishing arm plant pathology society – APS PRESS. The average quantity of APS PRESS sales for all publications per year is 22,430. Our publication sold 14,396 in the first year. It was purchased in 33 different countries and 43 different states. Comparable publications are some of the popular compendia, which average less than 2,000 copies sold in the first year. There is now an eBook version of it available as well.

The group, led by Dr. Kiersten Wise, also published a fungicide efficacy table to assist the industry with fungicide selection and recommendations for soybean diseases. This table was based off of the wheat and corn tables used by plant pathologists throughout the U.S. Updates for this table were discussed in this meeting.

3) To provide forums for meetings to exchange and share research data among the land grant participants and with industry and commodity groups.

For many of the northern states, so formal soybean rust presentations were made during 2013. However farmers are aware of the disease and rust enquiries were addressed during summer and winter meetings. For southern states, especially those that had significant soybean rust in 2013, multiple avenues were taken to get the message about soybean rust management to the

farmers. The NCERA-208 meeting also provided a very important venue for exchanging ideas with stakeholders. For example, Kelly Whiting from the United Soybean Board and Tom Fontana from the Ohio Soybean Council attended the meeting. They provided feedback on the restructuring of their organizations, needs of US farmers, and logistics of future training opportunities at the 2015 Commodity Classics. Details of activities addressing this objective can be found in individual state reports.

4) To develop educational materials for identification and management of soybean rust in the U.S.

We continue to update extension materials, either at a state level, or nationally. As new diseases emerge such as soybean vein necrosis virus, farmers may confuse these diseases with soybean rust.

State Reports:

Alabama (Ed Sikora):

Alabama soybean farmers harvested 420,000 acres of soybeans in 2013 with an average yield of 43 bushels per acre. Due to wet field conditions early in the season a significant number of acres were planted later than normal. By mid-June only 62% of the soybean acreage was planted compared to an 80% average over the previous five-year period. Fields were still being planted in mid-August putting them at greater risk to exposure to soybean rust (SBR) at an earlier stage of development.

SBR survived the winter (2012-2013) on kudzu in multiple locations (five counties confirmed). An SBR-infected kudzu patch in Selma, Alabama was determined to be the farthest north the disease has ever successfully overwintered in the U.S. Because of a relatively cool, wet spring and summer period the pathogen quickly spread from south to north within the state during the soybean-growing season. SBR appeared to move about 3-4 weeks faster in 2013 compared to 2012 based on observations from soybean sentinel plots and commercial fields. SBR was found throughout central Alabama by late July and was detected in North Alabama near the Tennessee border during the first week of August. Eventually the disease was found in all 67 counties in Alabama (for the second consecutive year).

Losses in commercial fields from SBR were observed in North Alabama for the first time. Damage from the disease in previous years was usually restricted to southern section of the state. Yield losses up to 40% were estimated in some unprotected or poorly protected fields in 2013. Estimated yield losses were based on conversations with growers, extension agents and crop consultants in combination with data collected from fungicide trials. We suspect yield losses would have been greater if not for an increase in fungicide use in North Alabama in response to alerts provided by the Auburn University SBR monitoring program and a late season drought from mid-August through the end of September.

The rapid early season spread of the pathogen coupled with over 60% of soybean acreage planted after June 15th meant that a high percentage of soybeans were exposed to the disease at an earlier stage of crop development. End-of-year estimates suggest the disease reduced yields by 2.5% statewide. Numerous farmers in North Alabama sprayed a fungicide for

the first time in response to alerts provided by the Auburn University SBR monitoring program resulting in an estimated 20% increase in the number soybean acres treated with a fungicide. The monitoring program was estimated to have saved the soybean industry in Alabama over \$2.5 million in 2013 by providing early season warnings about SBR and suggesting the use of well-timed fungicide applications to prevent yield loss from the disease.

Arkansas (Travis Faske):

Three farmers in 2013 exceeded the 100 bu/ac yield challenge in Arkansas. Conditions were favorable for frogeye leaf spot (FLS), aerial blight, and sudden death syndrome (SDS) north of I-40 with some isolated issues with FLS and SDS in southern AR. SBR was detected in early August in two southern counties, but dry conditions restricted movement until mid-October when it was identified in 18 additional counties along the Mississippi Delta. For 2013, root knot nematode (RKN), soybean cyst nematode (SCN), SDS, and FLS were estimated to be among the most important soybean diseases in the state.

Florida (Nick Dufault and Jim Marois):

Soybean rust was observed at multiple locations in Florida during the 2013 growing season. Many farmers across the state continue to use a two-spray program consisting of tebuconazole and azoxystrobin for general disease control. In general, very few farmers experienced yield losses from soybean rust and very few samples were delivered to extension personnel at the University of Florida.

University of Florida does have soybean rust monitoring program and will continue to monitor for this disease in 2014. Informal monitoring of Kudzu and grower production fields will also be done throughout the season. Researchers will also continue fungicide trials and will assist researchers breeding for resistance.

Georgia (Bob Kemerait):

Soybean rust was found in 107 counties in Georgia during the 2013 season.

Illinois (Glen Hartman and Carl Bradley):

Soybean rust was observed in 4 counties in southern Illinois (Massac, Pope, Pulaski, and Union Counties) during the first week of October 2014. No yield reductions due to soybean rust occurred in Illinois in 2014, since the pathogen did not arrive until very late in the season. These observations were collected as part of a mobile scouting effort that was triggered by the findings of soybean rust in Kentucky and Tennessee.

Indiana (Kiersten Wise):

Indiana does not have a formal soybean rust monitoring system in place. Purdue Extension Agricultural farms provided non-sprayed soybean fields in case fields were needed for soybean rust monitoring. Soybean rust was not detected in Indiana in 2013.

Iowa (Daren Mueller):

Five ISU research farms agree to keep a plot of land non-treated with fungicides in case we need to start scouting. Because the treat of soybean rust did not trigger an action plan, no scouting was done for soybean rust in Iowa in 2013. No rust was reported in Iowa in 2013.

Kansas (Doug Jardine):

Kansas had no soybean rust in 2013. At Extension meetings Doug Jardine continue to remind farmers that it is out there, but we are likely to only occasionally see it here in Kansas. We remain ready to begin mobile scouting should the disease become established in northern Texas or Oklahoma. During the summer months, commentary for Kansas is occasionally uploaded to the iPIPE public web site.

Kentucky (Don Hershman):

During 2013, we monitored soybean rust in five (5) soybean sentinel plots and two single observation sites, strategically located in west Kentucky (Fig 1). Like has been done since 2011, the 2013 network focused exclusively on monitoring SBR in soybean since we have ascertained that kudzu, while a valuable host crop to monitor in the South over the winter, is highly unlikely to show SBR before soybeans in KY. Samples were collected weekly from beginning flowering to maturation. Once the primary site reached maturity, another nearby site of green soybeans (typically doublecrop soybean) was sampled through October 5. Samples consisted of 100 leaves collected from the mid- to lower canopy at each site.

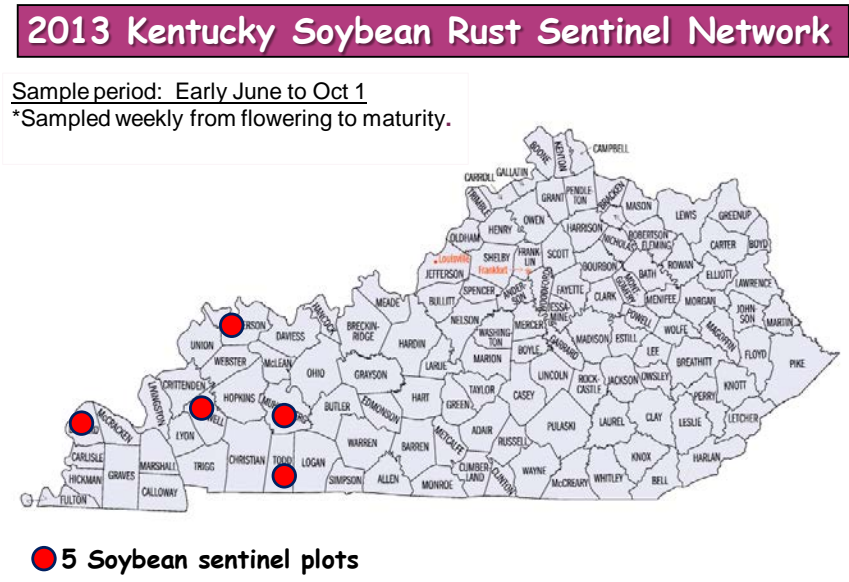


Fig 1. 2013 KY Soybean Rust Monitoring Network.

Fifty-two hundred leaves representing 52 samples, from five counties were observed for SBR from early-June to Oct 5, 2013. SBR was detected in Caldwell County on Sept 26 (4% incidence, 1% severity), Muhlenberg County in doublecrop soybean on September 30 (5% incidence; 1% severity) and Todd County on October 1 (doublecrop soybean @5% incidence and severity). In

all three instances, the disease was found too late in the season to cause any damage to any fields in the state. Results of local, regional and national findings, as well as SBR risk assessments and management recommendations, were provided to stakeholders on a weekly to bi-weekly basis (June-Oct) using a variety of methods including, the Public SBR website, toll-free hotline and text messaging service, twitter, and a SBR listserv. It is estimated that the 2013 KY Soybean Rust Monitoring Network saved KY soybean farmers an estimated \$3 million in unnecessary fungicide sprays.

Louisiana (Clayton Hollier and Ray Schneider):

The Crop Loss Assessment Lab (Hollier and Bollich) oversaw the planting, maintenance and scouting of the 21 soybean sentinel plots and the approximately 40 naturally-growing kudzu sites. Soybean rust was found in January not only on kudzu that survived the warm winter but also on 6-inch tall volunteer soybean seedlings. Development was quite rapid with the early spring greenup. It appeared that the development of rust would be greater than in all previous years, but a late spring, early summer drought slowed the rust development. Soybean rust was found in 56 of the 64 civil parishes of Louisiana.

Schneider's group continued their work on the use of foliar applications of minor elements to manage soybean rust. Foliar applications of boron at R5 substantially suppressed disease severity, and there was a concomitant boost in yield. In addition, his group installed and rated a late-planted breeding nursery under the direction of Dr. David Walker, USDA at the University of Illinois.

Michigan (Martin Chilvers):

Project Personnel: Martin Chilvers, and Jan Byrne Department of Plant, Soil and Microbiology, Michigan State University, East Lansing, MI; Cooperators: Michigan State University Plant Disease Diagnostic Clinic, National Plant Diagnostic Network

No official scouting in Michigan for soybean rust was conducted in 2013, however the PIPE soybean rust map was monitored. The soybean rust listserv was also followed, which provided real-time information of soybean rust finds. In the absence of rust observations and the predicted low risk a recommendation to not apply fungicides for rust was made. The absence of rust precluded research trials in Michigan. No formal soybean rust presentations were made during 2013. However farmers are aware of the disease and rust enquiries were addressed during summer and winter meetings.

Mississippi (Tom Allen):

A total of 21 soybean sentinel plots were planted throughout MS. Sentinel plots served soybean farmers by acting as an early warning system for the purposes of economically damaging soybean diseases.

Soybean rust was detected in all 82 counties in MS (72 on soybean; 10 on kudzu). Although the disease was detected earlier than normal (July on soybean) and we were able to find the disease in all 82 counties, yield loss as a result of soybean rust was still low save for what may have occurred in a few fields in southwestern MS (specifically Lincoln County). Conversely, AL

reported some yield losses greater than 25% as a result of early infection and farmers not applying a fungicide in a timely manner.

As a final report for the 2013 soybean season several economically important diseases were observed in either sentinel plots or commercial soybean fields:

Foliar fungal diseases:

- aerial web blight
- brown spot
- Cercospora blight
- downy mildew
- frogeye leaf spot
- soybean rust
- target spot

Soilbore diseases:

- charcoal root rot
- Phytophthora root rot
- red crown rot
- southern blight
- stem canker
- sudden death syndrome

Viruses:

- Bean pod mottle virus*
- Soybean mosaic virus*
- Soybean vein necrosis virus*

Nematodes:

- reniform nematode
- root-knot nematode
- soybean cyst nematode

Missouri (Laura Sweets):

2013 Soybean Crop: Cool, wet spring conditions delayed soybean planting throughout the state of Missouri in 2013. As of May 19, planting was 16 days behind 2012 and 9 days behind average. The late planting could have favored the development of soybean rust to levels which could have reduced yield if inoculum had blown in from southern states mid to late season and environmental conditions had been favorable for disease development. However, those conditions did not occur. No tropical storm remnants or strong storms from the south reached Missouri during the 2013 season. Also, by mid-July, precipitation dropped off so that the remainder of the season was drier than average.

2013 Sentinel Plot Monitoring: For the 2013 season, the soybean rust sentinel plot monitoring program was coordinated by Dr. Allen Wrather, University of Missouri Delta Research Center, Portageville, MO. Due to the elimination of funds for sentinel plot monitoring there were no designated sentinel plots in Missouri for the 2013 season. Dr. Wrather sent the following message to all Missouri regional extension specialists concerning the 2013 program, "There will be no organized soybean rust survey in Missouri during 2013 because funds were not available. If rust develops on soybean in states near Missouri during 2013, I will examine some leaves from local fields to determine if and when it develops in Missouri. Please call me if you have questions about the soybean rust survey system in 2013. I am most accessible by calling my mobile phone, 573-379-0259."

Dr. Wrather sent messages to the regional extension specialists after most of the SBR teleconference calls updating them on the status of SBR in the United States. He also recommended that they track development of rust in the U. S. at the USDA rust web site, <http://sbr.ipmpipe.org/cgi-bin/sbr/public.cgi>.

2013 Soybean Rust Detections and Recommendations: Soybean rust was not found in production fields in Missouri during the 2013 season. With the delayed planting in all of the state, risk for SBR in Missouri was higher than it has been in several years. However dry conditions late in the season and the lack of any tropical storms or strong storms to move inoculum from the south minimized the risk of rust development. With the low risk status late in the season no alerts were issued and no recommendations for pesticide applications specifically for the management of SBR were made.

Future of Soybean Rust Monitoring in Missouri: Dr. Allen Wrather has coordinated the Missouri efforts for the last several years. Since southeast Missouri has been the area of the state which has had the most positive reports and the earliest reports in years in which soybean rust was reported in Missouri this has been a logical project for Dr. Wrather as the plant pathologist located at the Delta Research Center in southeast Missouri. Dr. Allen retired as of December 31, 2013. The future of his position is not clear. This will limit any activities related to field scouting for soybean rust and could delay diagnosis of the disease if samples have to be mailed or transported to the main campus in Columbia, MO.

Nebraska (Loren Geisler):

There was no rust in Nebraska, and that there will be no monitoring for rust or other diseases in 2014.

North Carolina: (Steve Koenning):

Soybean rust was detected in 12 North Carolina Counties in 2013 (Catawba, Cleveland, Columbus, Cumberland Gates Greene, Johnston, Robeson, Rowan, Scotland, Union, and Wayne). Only a few fields in the southern piedmont likely suffered any yield suppression due to a late season dry spell. Losses for the entire state were minimal since rust arrived so late in the season. Lack of detection of soybean rust in sentinel plots results in increased grower confidence in their ability to produce a crop economically. Prevention of unnecessary fungicide applications to soybean through monitoring efforts of diseases can lower variable costs for soybean production by \$20.00-\$40.00 per acre on 1.5 million acres of soybean. Assuming \$10.00 per acre for one application of fungicide, growers saved at least \$17,000,000.

North Dakota (Samuel Markel):

In 2013, soybean rust maps were monitored and no action was taken since soybean rust did not get to Nebraska to trigger any response.

Ontario (Albert Tenuta):

Soybean production in Canada totals about 2.7 million acres. There was no rust in Ontario in 2013. Funding for soybean rust is no longer available from the farmers, but they will have a couple of plots for other diseases and spore trapping locations.

South Carolina: (John Mueller):

The levels of soybean rust observed in South Carolina in 2013 were probably the most extensive ever seen in this state. Rust was detected in early August in the Savannah River Valley and continued a steady spread across the state until it was detected in 29 counties across the state.

Cool, very wet weather throughout much of the growing season definitely favored the development of soybean rust. Soybean rust was found in every county with significant soybean acreage. Counties where soybean rust was found included: Aiken, Allendale, Anderson, Bamberg, Barnwell, Berkeley, Calhoun, Clarendon, Colleton, Darlington, Dorchester, Edgefield, Florence, Greeneville, Hampton, Horry, Kershaw, Lee, Lexington, Marion, Marlboro, Newberry, Orangeburg, Pickens, Richland, Saluda, Sumter, Williamsburg and York Counties. Although rust was commonly seen across the state yield losses were minimal. Growers were very conscientious about spraying at R-3 and where wet weather was predicted again at R-5. Rust did develop in nonsprayed fields and yield losses of 10 to 25% could be documented. Although common on leaves rust was not observed on stems or pods. In conclusion, soybean rust incidence and severity in 2013 were the highest ever seen in South Carolina. However, timely fungicide applications in most fields prevented significant yield losses.

Tennessee (Heather Young):

In 2014 there were 15 sentinel plots established and monitored weekly or bi-weekly for soybean rust as well as other soybean diseases and insects. Most parts of Tennessee received adequate amount of moisture for disease in 2013, but the cooler temperatures might have suppressed frogeye leaf spot development. Although environmental conditions were close to ideal for SBR, spores were not deposited in the state until September. SBR was first confirmed in Giles county the second week in September 2013, approximately 2 weeks earlier than in 2012 and a total of 9 counties were confirmed by end of October. It was estimated SBR caused 0.5% yield loss in Tennessee in 2013, mainly in middle Tennessee where the disease was present during reproductive growth stages.

Texas (Tom Isakeit):

The 2013 season was very quiet for soybean rust. The disease came in very late (November) on commercial soybeans in extreme south Texas; too late for any impact on yield. Further north in the state, it came after the harvest of the commercial crops and was only detected in the fall on kudzu from just south of Houston, to scattered occurrences in counties close to the Louisiana border.

Soybean acreage was pretty low last year. I didn't notice a lot of fields compared with other crops. The USDA statistics indicated 95,000 acres harvested in Texas. No other disease problems observed.

Wisconsin (Damon Smith):

There were no soybean rust sentinel plots in Wisconsin. We pay attention to rust in the south and will take appropriate measures if necessary.

Business Meeting:

Motion to approve the minutes from 2013:

Dr. John Rupe moved for minutes approval, Dr. Doug Jardine seconded it. The motion passed with majority vote.

Administrative Update:

The 2013 year was a tough year for NIFA and the experiment station directors. The turn of the calendar and the passing of the Farm Bill should bring some anticipated stability to the roller coaster in DC. There should be money for soybean diseases in new AFRI proposals, including the CARE program. Really the only program that received a reduced budget is the new Crop Protection Program (CPP) that is a conglomeration of several IPM-related programs merged into one.

Dr. Steve Slack was able to share with several NIFA representatives the story of the NCERA 208 committee, including how we stabilized the response to the first soybean rust find. Ten years later, Dr. Slack anticipates that we can now consider soybean rust much like other soybean diseases. He shared the Soybean Rust Impact videos (see details below) with representatives in DC and they were really well received.

Plant Disease Feature Article:

Thanks to the efforts of Drs. Kiersten Wise, Ed Sikora and Tom Allen, the NCERA 208 committee once again pulled together a multi-state publication. This one was a feature article in Plant Disease titled "A coordinated effort to manage soybean rust in North America: a success story in soybean disease monitoring." This article was accepted in February 2014. Dr. Wise was acknowledged with an award for her efforts to pull off such an article.

A thanks to Dr. Don Hershman:

Dr. Hershman has shown great leadership, collaboration, and foresight over his career. The group unanimously thanks Don for his contributions over the past years and wish him well in the next chapter of his life after his December retirement.

Discussion on ending NCERA-208 (merging with NCERA-137 (formerly 212)):

There are pros and cons with ending this committee. Some feel the timing is right, some disagree. Some of the arguments that favored merging with the NCERA-137 committee included:

- Impact statements are already written from the 2013 award.
- Soybean rust will be treated like other diseases and by merging with 137, it will continue to be part of discussions with the national soybean working groups.
- The paperwork (according the Dr. Slack) for merging the two groups is not too bad.

Arguments for continuing as a separate committee included

- We should wait until the life of latest NCERA-208 committee 5-year plan is expired and re-evaluate then.
- Significant paperwork has been completed to renew the NCERA-208 committee and get the 2013 award.
- Travel money will go away for committee that disbands
- Someone will have to file a report to terminate 208.

At the end, it was decided, with the encouragement of Dr. Slack, to merge with NCERA-137. Daren Mueller made a motion for NCERA-208 to merge with NCERA-137, if NCERA-137 was willing. Ray Schneider seconded the motion. And the motion passed.

[INSERT COMMENTS FROM NCERA-137]

Once the NCERA-208 committee decided to merge with NCERA-137, the NCERA-137 committee voted to either accept this merger or not. Dr. Ed Sikora made the motion to merge the NCERA-208 committee with the NCERA-137 committee on September 30, 2014, [amendment] contingent on NCERA-137 being renewed (Dr. Carl Bradley made this amendment)]. Dr. John Rupe seconded the motion.

Dr. Slack then reminded the group that the NCERA-137 committee will need to rewrite NCERA-137 objectives to have a national flavor.

Secretary nominations:

The floor was open for nominations for secretary of the NCERA-137 committee (no new secretary was appointed for the NCERA-208 committee). Dr. Nathan Kleczewski was nominated. Dr. Anne Dorrance made a motion to appoint Dr. Kleczewski as the incoming secretary. Dr. Don Hershman seconded and closed the nominations. Dr. Kleczewski was unanimously elected by the group.

Meeting Locations:

It was discussed by the group that the next meeting occur in Washington DC to accommodate travel restrictions for Dr. Martin Draper and increase our visibility in DC. Dr. Carl Bradley suggested meeting before or after the 2015 Commodity Classic in Phoenix to raise our visibility with commodity groups. Dr. Heather Young made a motion to meet in the DC area and Dr. Doug Jardine seconded it. The vote passed. The group discussed keeping the same approximate time (March) as well.

Dr. Dufault moved to close the meeting and the entire group unanimously seconded it.