**APPENDIX D**

**SAES-422**

**Format for Multistate Research Activity**

**Accomplishments Report**

***Note:*** *This report is submitted each year of an activity’s duration and is due 60 calendar days following the annual meeting. The SAES-422 is submitted electronically by AAs into NIMSS. Annual Reports for MRF projects are available to NIFA through NIMSS.*

**Project/Activity Number:** NCCC167

**Project/Activity Title:** Corn Breeding Research

**Period Covered:** 10/01/16 - 09/30/2017

**Date of This Report:** January 30, 2019

**Annual Meeting Date(s):** 03/08/17-03/09/17

**Participants:***Provide information with a focus on the decisions made. As an alternative, list the URL for the meeting minutes, if that report contains the list of those who were present. And, if available, add the address for the list server as well. (Max characters = 4,000. Suggested Format: "Last name, First name (email) - Institution;" The semicolon is used to separate participant information.)*

To fulfill its role as a communication committee, the NCCC167 annually sponsors the Corn Breeding Research Meeting (CBRM), which has in recent years become a national-level meeting focused on advances and opportunities in corn breeding. The meeting occurs alternately in conjunction with either the Maize Genetics Conference (MGC) or the American Seed Trade Association Meeting (ASTA). The 2017 CBRM was held at Union Station Hotel in St. Louis, MO and was attended by more than 70 breeders and/or researchers (advanced registrants listed below), representing 15 universities, five companies, USDA-ARS, USDA-NIFA, NSF and the Iowa Corn Growers Association. The meeting consisted of 17 invited talks, including nine oral presentations by graduate students(\*) and eight by non-students(@), who spoke in either the Early Career Session or the Genomes to Fields (G2F) Session. An additional 14 graduate students were in attendance (#).

List of advanced registrants, ordered first of institution:

# Akaogu, Ijeoma, Cornell University

\* Diepenbrock, Christine, Cornell University

Romay, Cinta, Cornell University

Gibson, Ryan, Dow Agrosciences

Zheng, Peizhong (John), Dow Agrosciences

Larsson, Sara, Dupont Pioneer

Schaefer, Christopher, Dupont Pioneer

Ertl, David, Iowa Corn Growers Association

# Kabahuma, Mercy, Iowa State University

# Mcfarland, Bridget, Iowa State University

\* Posekany, Tes, Iowa State University

@ Yandeau-Nelson, Marna, Iowa State University

Alkhalifah, Naser, Iowa State University

Campbell, Darwin, Iowa State University

Lamkey, Kendall, Iowa State University

Lawrence-Dill, Carolyn, Iowa State University

Yu, Jianming, Iowa State University

@ Liu, Sanzhen, Kansas State University

Mezmouk, Sofiane, KWS SAAT SE

Hughes, Teresa, Monsanto Corporation

Pfaffe, Haley, Monsanto Corporation

Okamuro, Diane, National Science Foundation

# Bastos Martins, Lais, North Carolina State University

\* Marino, Thiago, North Carolina State University

Yang, Qin, North Carolina State University

Thompson, Addie, Purdue University

\* Vavra, Cody, Texas A&M Agrilife Research

Xu, Wenwei, Texas A&M Agrilife Research

\* Manching, Heather, University of Delaware

@ Wisser, Randall, University of Delaware

# Craig, Valerie, University Of Guelph

Lee, Elizabeth, University Of Guelph

Muszysnki, Michael, University of Hawaii-Manoa

@ Jamann, Tiffany, University of Illinois

Bohn, Martin, University of Illinois

Studer, Anthony, University of Illinois

# Han, Mengqiao, University of Iowa

# Ames, Nicholas, University of Minnesota

\* Brandariz Zerboni, Sofia, University of Minnesota

\* Kadam, Dnyaneshwar, University of Minnesota

@ Hirsch, Candy, University of Minnesota

# Vatsa, Avimanyou, University of Missouri

Gardiner, Jack, University of Missouri

Kazic, Toni, University of Missouri

@ Jarquin, Juan Diego, University of Nebraska–Lincoln

Schnable, James, University of Nebraska–Lincoln

Okamuro, Jack, USDA, ARS

Andorf, Carson, USDA-ARS, Ames IA

Gardner, Candice, USDA-ARS, Ames IA

Lauter, Nick, USDA-ARS, Ames IA

Lopez, Miriam, USDA-ARS, Ames IA

Moran-Lauter, Adrienne, USDA-ARS, Ames IA

Peters, David, USDA-ARS, Ames IA

Scott, Paul, USDA-ARS, Ames IA

Beissinger, Timothy, USDA-ARS, Columbia MO

Kaleikau, Ed, USDA-NIFA

# Burdo, Brett, UW-Madison

# Gage, Joseph, UW-Madison

# Michel, Kathryn, UW-Madison

# Miller, Kathleen, UW-Madison

# Rodriguez, Jonas, UW-Madison

# Shuler, Stacie, UW-Madison

\* Ibrahim, Abdalla, UW-Madison

\* White, Mike, UW-Madison

@ De Leon, Natalia, UW-Madison

@ Falcon, Celeste, UW-Madison

Kaeppler, Shawn, UW-Madison

Mazaheri, Mona, UW-Madison

Rothfusz, Emily, UW-Madison

Tracy, William, UW-Madison

**Brief summary of minutes of annual meeting**: *Provide information with a focus on the decisions made (Max characters = 12,000. Single line breaks are not preserved, use double line breaks instead or use a <p> tag to separate paragraphs.). As an alternative, list the URL for your meeting minutes.*

Program for the 2017 Corn Breeding Research Meeting

(Note: The minutes of the NCCC167 Business Meeting are provided at the end of this program)

Wednesday, March 8, 2017

12:30-1:00 Registration

Opening Remarks 1:00-1:10 Nick Lauter, USDA-ARS, Ames, IA

Larry Darrah Student Presentation Session Part I

1:10-1:30 Thiago Marino, North Carolina State University

Genomewide recurrent selection for Fusarium ear rot and fumonisin resistance in maize

1:30-1:50 Abdalla Zanouny, University of Wisconsin

GWAS over 20 days reveals dynamic maize genome controlling biomass-related traits at seedling and juvenile stages

1:50-2:10 Tes Posekany, Iowa State University

The surface hydrocarbon metabolome on maize silks is affected by genotype and duration of exposure to the environment

2:10-2:30 Christine Diepenbrock, Cornell University

Provitamin A and vitamin E in maize: genomics to market

2:30-3:00 Break

Larry Darrah Student Presentation Session Part II

3:00-3:20 Cody Vavra, Texas Tech University

High-Throughput Method to Characterize the Cob Structure and Chemical Composition of Corn Hybrids

3:20-3:40 Mike White, University of Wisconsin

Ear Flex Variability in Hybrids Derived from Expired Plant Variety Protection Lines

3:40-4:00 Sofía Brandariz, University of Minnesota

Selecting poor lines to maintain the accuracy of genomewide selection in maize

4:00-4:20 Heather Manching, University of Delaware

Investigating the genetics of selection response for flowering time in a multi-environment parallel selection experiment

4:20-4:40 Dnyaneshwar Kadam, University of Wisconsin

Genomic Prediction of Single Crosses in the Early Stages of a Maize Hybrid Breeding Pipeline

Community Discussion

4:40-5:00 Multi Institutional Training Opportunities

NCCC-167 Business meeting

5:00-5:30 NCCC-167 Business Meeting

Poster Set up (Colorado Eagle Room)

5:00-5:30 Multi Institutional Training Opportunities

Poster Session (Colorado Eagle Room)

5:30-6:30 NCCC-167 Business Meeting

Thursday, March 9, 2017

7:00-8:00 Breakfast

Genomes2Fields Research Session

8:00-8:15 Natalia de Leon, University of Wisconsin

The Genomes to Fields Maize G X E Project: 2017 Season Update

8:15-8:40 Diego Jarquin, University of Nebraska-Lincoln

Incorporation of Environmental Information to Improve Genomic Prediction in The Maize G2F GXE Hybrid Project

8:40-9:05 Celeste Falcon, University of Wisconsin

Genotype by Environment Interaction in the 2014 and 2015 Inbred Study

9:05-9:30 Randy Wisser, University of Delaware

Use of an Ex-PVP hybrid context to interrogate 84 tropically-sourced introgressions encompassing a temperate-adaptive locus in maize

10:00-10:20 Break

Early Career Session

10:00-10:30 Tiffany M Jamann, University of Illinois

A comparative study of host resistance in maize and sorghum

10:30-11:00 Marna Yandeau-Nelson, Iowa State University

Genotype-Metabolite-Phenotype: A Systems approach to dissecting the genetic and metabolic networks for cuticular lipids on maize silks

11:00-11:30 Sanzhen Liu, Kansas State University

Genetic Dissection of Disease Resistance via Analysis of Extreme Phenotype Copy Number Variation

11:30-12:00 Candy Hirsch, University of Minnesota

Genotype-by-Environment Interactions Affecting Heterosis in Maize

12:00-1:30 Lunch, Awards, and General Session Adjournment

Poster Session (Colorado Eagle Room)/Open Session (Texas Special Room)

1:30-4:00 Poster and Open Sessions

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2017 NCCC167 Corn Breeding Research Business Meeting Minutes

March 8th, 2017

Union Station Hotel and Conference Center, St. Louis, MO

The FY17 meeting took place immediately following Session I of the Corn Breeding Research Meeting. The order of items presented herein is consistent with presentation at the meeting and does not necessarily correspond with the order of proposed agenda items.

Participants:

Paul Scott, Tony Studer, Shawn Kaeppler, Bill Tracy, Liz Lee, Tim Beissinger, Martin Bohn, Wenwei Xu, Randy Wisser, David Ertl, Nick Lauter, Cory Vavra, Tiffany Jamann, Natalia de Leon, Jack Okamuro (USDA-ARS National Program Leader), David Ertl (Iowa Corn Growers Association), Kendall Lamkey (NCC167 Administrator), Ed Kaleikau (USDA-NIFA National Program Leader).

Introductory remarks. The meeting was called to order at 5:10 PM by Nick Lauter. Natalia de Leon agreed to help with notetaking since Lauter had dual roles as Chair and Secretary. Individuals voiced a short list of agenda items to be addressed. These included a review of previous year's meeting minutes, discussion of next meeting sites and times, review of the Treasurer’s report, electing new meeting organizers, a report on progress on archiving NCCC167 historical materials, and a discussion of amounts and numbers of Larry Darrah Awards to be given out.

Approval of 2016 meeting minutes. Nick Lauter, secretary for the group submitted a draft copy of the meeting minutes for the 2016 meeting. They were reviewed and no alterations were requested. Then, a motion to accept the minutes was made by Bill Tracy, seconded by Natalia de Leon, and approved by a unanimous vote of the group.

Approval of FY2016 budget report. Natalia de Leon, treasurer for the group, submitted a copy of the 2016 budget report. The NCCC167-CBR account had a balance of $12,277 as of 3/01/17. The 2017 meeting revenues were projected at $9,600 for registrations and $2500 for industry contributions. 2017 meeting costs were estimated at $10,925 but were not yet finalized. The Treasurer’s report was briefly reviewed, and a motion to accept the report without alteration was made by Sherry Flint-Garcia, seconded by Liz Lee and approved by a unanimous vote of the group.

Time and location of the 2018 Meeting. After minimal discussion, a motion to have 2018 meeting together with the ISCDA group at ASTA in December 2017 was made by Liz Lee, seconded by Tony Studer, and approved by a unanimous vote of the group. As was reviewed as the 2016 minutes were approved, Tony Studer remained on deck to act as 2018 chair, with Bill Tracy acting as co-chair in particular to facilitate planning with ISCDA organizers.

Time and location of the 2019 Meeting. Bill Tracy moved to have the 2019 CBR meeting in conjunction with MGC in March 2019. Shawn Kaeppler seconded the motion, and it was approved by a unanimous vote of the group.

Election of Officers. Past Chair: Nick Lauter will serve as Past Chair for the 2018 CBR Meeting. 2018 Chair: As planned in the 2016 NCCC-167 Business Meeting, Tony Studer will serve as chair in 2018. 2019 Chair: Nick Lauter moved that Wenwei Xu serve as 2019 chair. The nominee agreed to serve. The motion was seconded by Bill Tracy and was approved by a unanimous vote of the group. Natalia de Leon and Nick Lauter agreed to continue respectively as Treasurer and Secretary for the group.

Discussion on record maintenance for NCCC-167/CBRM. Nick Lauter reported that the effort to archive historical materials at the ISU library system remains underway and will continue. He also reported that efforts to enlist MaizeGDB to host the meeting announcement and registration pages had not gone forward and presented the view that maintaining a registration page is part of the service fee charged by UW Conference Services, thus, there is little need to make a change. Finally, there was a discussion of whose responsibility it is to submit the meeting report each year. After weighing several options, the group decided it made the most sense to have the chair each year submit the report, which is due to NIFA within 60 days following the meeting. Bill Tracy moved that we formalize this policy. The motion was seconded by Liz Lee and approved by a unanimous vote of the group.

Discussion of Larry Darrah Student presentation awards. We considered whether or not we should standardize the set of criteria for evaluation, the number of awards, the award amount, and who votes. It was acknowledged that the system is formed each year in part based on precedent and in part based on the chair’s discretion. The outcome of the discussion was that no changes were recommended at this point. Thus for 2017, one award of $300 would be given based on votes cast by all registered meeting participants.

Adjournment. Seeing no further business items, the meeting was adjourned at 5:44 PM by Nick Lauter.

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The 2017 winner of the Larry Darrah Student Oral Presentation Competition was Christine Diepenbrock of Cornell University for her work on “Provitamin A and vitamin E in maize: genomics to market”. Congratulations to Christine and to Dr. Mike Gore, her faculty advisor.

**Accomplishments:** *This section focuses on intended activities, outputs, and short-term outcomes. Committees should build information built around the activity's milestones, as identified in the original proposal. Please indicate significant evidence of linkages both internal*

*to the project/committee and to external peer groups, stakeholders, clientele, and other multistate activities. The report should also reflect on the items that stakeholders want to know, or want to see. The committee should describe plans for the coming year in no more than one or two short paragraphs. If the committee is filing an annual report, the accomplishments will cover only the current year of the project; for termination reports, list accomplishments from the entire span of the project.*

***Short-term Outcomes:*** *Quantitative, measurable benefits of the research outputs as experienced by those who receive them. Examples include the adoption of a technology, the creation of jobs, reduced cost to the consumer, less pesticide exposure to farmers, or access to more nutritious food.*

***Outputs:*** *Defined products (tangible or intangible) that are delivered by a research project. Examples of outputs are reports, data, information, observations, publications, and patents.*

***Activities:*** *Organized and specific functions or duties carried out by individuals or teams using scientific methods to reveal new knowledge and develop new understanding.*

***Milestones:*** *Key intermediate targets necessary for achieving and/or delivering the outputs of a project, within an agreed timeframe. Milestones are useful for managing complex projects. For example, a milestone for a biotechnology project might be "To reduce our genetic transformation procedures to practice by December 2004."*

Accomplishment: The NCCC167-sponsored 2017 Corn Breeding Research Meeting was successfully held in fulfilment of the mandate to facilitate communication among breeders and researchers that advances our collective understanding of problems and potential solutions for American corn breeding. The scientific program was strong, including 17 oral and 12 poster presentations of research results, a community session led by our National Program Leaders and Committee Administrator, and a session on facilitating outreach and education related to plant breeding. The meeting was well-attended and represented an inclusive spectrum across occupations, a feature that is critical for generating cross-talk between private and public sector experts within our multi-state committee. Representation across career stages was also inclusive, and reflects an emphasis of NCC167 on high quality and relevant public sector training of graduate students, a vast majority of whom will go on to become our future industry leaders.

Accomplishment: The NCC167 continues to improve the demographics of the annual Corn Breeding Research meeting. Not that long ago, corn breeding meetings typically had very low numbers of women scientists, and even in recent years, our group hasn’t always reflected the demographics of the discipline. In 2017, for the first time, a majority (9 out of 17) of the invited talks at our meeting were presented by women scientists, a necessary accomplishment in view of our recent attendance being split nearly equally among women and men. Notably, this result was achieved organically, rather than by a particular mechanism by our group. Among our nine female invited speakers, three spoke in the Early-Career Session, two presented in the Genomes-to-Fields Session, and four communicated their graduate research results in the Larry Darrah Session; it is encouraging that we are achieving this balance across our career stages and as a reflection of the progress our scientific discipline has made more broadly. Our group also continues to be both racially and ethnically diverse, especially among the graduate students, who represented seven US states and nine countries.

Output: The NCCC167 continues to provide a focused and high-intensity venue for important research communication. Among other things, this meeting aids in the coordination of large-scale efforts such as the Genomes-to-Fields Initiative, serves as a critical opportunity for graduate students and early-career scientists to showcase their research, and serves to “record” the trends in methods, outcomes and impacts of breeding approaches. While difficult to quantify this output, strong attendance and ever-increasing representation are good measures to show that these activities are valued across the sectors of corn breeding and corn breeding research.

**Impacts:** *This section focuses on actual or intended potential long-term outcomes and impacts. Committees should build information around the activity's milestones, as identified in the original proposal. The report should also reflect on the items that stakeholders want to know, or want to see. List any grants, contracts, and/or other resources obtained by one or more project members as a result of the project's activities. Include the recipients, funding source, amount*

*awarded and term if applicable. If the committee is filing an annual report, the impacts will cover only the current year of the project; for termination reports, list impacts from the entire span of the project.*

***Activities:*** *Organized and specific functions or duties carried out by individuals or teams using scientific methods to reveal new knowledge and develop new understanding.*

***Milestones:*** *Key intermediate targets necessary for achieving and/or delivering the outputs of a project, within an agreed timeframe. Milestones are useful for managing complex projects. For example, a milestone for a biotechnology project might be "To reduce our genetic transformation procedures to practice by December 2004."*

***Indicators:*** *Qualitative surrogate observations or indirect measures of quantitative performance measures which permit monitoring the achievement of outcomes when direct measurement of performance is difficult, too costly, or not possible. An indicator of cultivar adoption might be seed certification records, rather than actual land area planted to that cultivar.*

By hosting the 2017 Corn Breeding Research Meeting, the NCCC167 provided an open and well-organized exchange of cutting edge ideas among scientists across occupations and career stages, with special emphasis on informing how public sector research programs can continue to train future industry leaders. The sheer volume of positive, substantive interactions among research groups, companies, and funding agency and stakeholder group representatives is a significant impact of this multistate committee’s efforts.

**Publications:** For SAES-422 reports list the publications for **current** year only (with the authors, title, journal series, etc.). If the list exceeds the maximum character limit below, an attachment file may be used. (Max characters = 50,000. Single line breaks are not preserved, use double line breaks instead or use a <p> tag to separate paragraphs.)

No proceedings papers are published as part of this meeting. Instead, the individual experts publish the works in peer-reviewed journals. The NCCC167 has not been tracking the publications of its members and affiliates.

**Authorization**: Submission by an AES or CES director or administrative advisor through

NIMSS constitutes signature authority for this information.

\*Limited to three pages or less exclusive of publications, details may be appended.