

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY NORTH BEND WIND
PROJECT, LLC FOR A PERMIT TO CONSTRUCT AND OPERATE THE
NORTH BEND WIND PROJECT IN HYDE COUNTY AND HUGHES
COUNTY, SOUTH DAKOTA

SD PUC DOCKET EL21-018

PRE-FILED TESTIMONY OF DR. ADAM VARENHORST

Q. State your name.

A. My name is Dr. Adam Varenhorst.

Q. State your employer.

A. South Dakota State University.

Q. State your specific job at South Dakota State University.

A. I am an assistant professor and Field Crop Entomology Extension Specialist in the Agronomy, Horticulture and Plant Science Department.

Q. Explain the range of duties you perform.

A. I oversee research related to the management of insects in South Dakota's major agricultural crops. See CV attached as Exhibit A.

Q. What are your extension specialist duties?

A. As the SDSU Extension Field Crop Entomologist I serve South Dakota stakeholders by addressing insect pest issues in field crops. I conduct applied research that focuses on corn, soybean, wheat and sunflower. I also assist the other extension entomologists to address questions pertaining to insect questions for the home and garden, urban insect pests and general entomology questions. Tasks that I am responsible for include: Development of insect related identification guides, fact sheets and timely electronic articles. Identification of insects related to field crops. Provide insect and insecticide safety content for the commercial applicator trainings held throughout South Dakota.

Q. How were you contacted by the Bollweg family.

A. I was previously contacted by the Bollweps in my role as a Field Crop Entomologist with SDSU Extension. At the Bollweps' request, I provided them with information and recommendations concerning red sunflower seed weevils and how farmers should manage

them.

Q. What information did you provide about red sunflower seed weevils?


A. The information I provided is as follows. The red sunflower seed weevil is a native pest of sunflower in South Dakota. When left unmanaged, the red sunflower seed weevil is capable of infesting approximately 80% of the developing seeds in a sunflower head. Since 2016, populations of red sunflower seed weevils have been observed in South Dakota that are 10-100x over the economic threshold of 4-6 weevils per sunflower head. In addition, SDSU Extension entomologists have received reports of insecticide application failures for red sunflower seed weevils since 2017. These reports were for the pyrethroid class active ingredient lambda-cyhalothrin. Since 2017, research from South Dakota State University has concluded that there are populations of red sunflower seed weevils with reduced susceptibility to pyrethroid class insecticides. On-going research is aimed at determining the level of reduced susceptibility and compare the populations tested in South Dakota to those from neighboring states. Our observations of red sunflower seed weevils in several counties in South Dakota during 2021 indicate that very large populations are present within fields. We are continuing to test populations using laboratory assays.

Q. What information did you provide about how farmers should combat the red sunflower seed weevil?

A. At this time, we recommend that all sunflower fields be scouted, and insecticides be applied when the threshold for red sunflower seed weevils is exceeded. Due to the numerous field failures, we are recommending that lambda-cyhalothrin not be used for management of the red sunflower seed weevil. We also are recommending that fields are scouted 24-48 hours after insecticide application to determine if the treatment successfully reduced the red

sunflower seed weevil populations. To prevent additional issues with labeled insecticide products we recommend tank mixing two insecticides with different modes of action (not including lambda-cyhalothrin) or using a product that is not from the pyrethroid insecticide class. A letter I wrote is attached hereto as Exhibit B.

Dated this 31 of January, 2022.

A handwritten signature in black ink, appearing to read "Adam Varenhorst", written over a horizontal line.

DR. ADAM VARENHORST

Adam J. Varenhorst

Curriculum Vitae

Assistant Professor, Extension Field Crop Entomologist, IPM Director
(75% Extension: 25% Research)
Agronomy, Horticulture and Plant Science Department
South Dakota State University
Brookings, SD 57007
Office Phone (605) 688-6854
Cell Phone (712) 540-7173
Adam.Varenhorst@sdstate.edu

Education:

Ph.D. 2015. Entomology, Iowa State University, Ames, IA
M.S. 2011. Entomology, Iowa State University, Ames, IA
B.S. 2009. Biology, Briar Cliff University, Sioux City, IA

Professional Experience:

- 2/16 to present** Assistant Professor and Extension Field Crop Entomologist, Agronomy, Horticulture and Plant Science Department, South Dakota State University.
Department Head: Dr. David Wright
- 8/15 to 2/16** Extension Entomology Specialist II, Agronomy, Horticulture and Plant Science Department, South Dakota State University.
Department Head: Dr. David Wright.
- 4/15 to 8/15** Postdoctoral Research Associate, Iowa State University.
Supervisor: Dr. Erin Hodgson,
 - Skills developed:
 - Creating research-based extension handouts
 - Author and co-author extension articles
 - Public speaking to diverse audiences
- 5/11 to 4/15** Graduate Research Assistant. Soybean Entomology, Iowa State University. Dr. Matthew O'Neal, Advisor. Ph.D. Dissertation, entitled, "Beyond biotypes: *Aphis glycines* (Hemiptera: Aphididae) biology and the durability of aphid-resistant soybean".
 - Skills developed:
 - Aphid species identification
 - Aphid rearing
 - Supervising, training and managing a total of eleven hourly employees

- Designing and implementing field and laboratory experiments

6/09 to 5/11

Graduate Research Assistant. Soybean Entomology, Iowa State University. Dr. Matthew O’Neal, Advisor. M.S. Thesis: “Selective insecticides: the potential for improved control of the soybean aphid as a result of a bioresidual”.

- Skills developed:
 - Insect identification
 - Designing and implement small-plot field crop experiments
 - Supervising, training and managing hourly employees
 - Iowa Insecticide applicators license; endorsements to apply herbicides, insecticides, and fungicides; endorsements for demo and research pest control
 - Statistical analysis, interpretation of data

8/08 to 5/09

Collection Curator. Briar Cliff University and Dorothy Pecaut Nature Center, Sioux City, IA. Dr. Ted. Wilson, Advisor.

- Skills developed:
 - Insect identification with dichotomous keys
 - Insect specimen collection, curation, and management

3/08 to 12/08

Research Assistant. Briar Cliff University Sioux City, IA. Dr. Ted Wilson, Advisor. Research Project: Survey of the insects in the Sioux City Prairie, Woodbury County.

- Skills developed:
 - Understanding of the scientific method
 - Insect collection and curating

12/00 to 8/15

Farm Consultant. Jerry Varenhorst Farms, LeMars, IA. Jerry Varenhorst, Owner.

- Skills obtained:
 - Maintenance and repair of machinery
 - Operation of farm machinery
 - Marketing of commodities
 - Interpersonal communication

Grants:

Funded (total = \$3,096,962):

2018: (\$110,524)

Research Grant 2018, South Dakota Soybean Research and Promotion Council Grant.

“Evaluating foliar insecticide efficacies for the soybean aphid and the impact of tillage and cover crops on seed treatment efficacies and insect populations”.

Amount awarded: \$97,080

PI: **Adam J. Varenhorst**

Co-PI: B. Fuller (South Dakota State University), J. Kleinjan (South Dakota State University), P. J. Johnson (South Dakota State University)

Research Grant 2018, South Dakota Oilseeds Council. "Evaluating the susceptibility of red sunflower seed weevil to pyrethroid insecticides in South Dakota".

Amount requested: \$13,444

PI: **Adam J. Varenhorst**

Co-PI: A. Bachmann (South Dakota State University), P. Wagner (South Dakota State University)

2017: (\$958,772)

Extension Implementation Program Grant 2017, United States Department of Agriculture, National Institute of Food and Agriculture. "SDSU Integrated Pest Management: Agronomic Crops, Specialty Crops, Pollinator Health, Pesticide Applicators, Public Health, and Diagnostic Clinics."

Amount awarded: \$358,000

PI: **Adam J. Varenhorst**

Co-PI: A. Bachmann, P. O. Johnson, E. Byamukama

Research Grant 2017, United Soybean Board. "Evaluation of precision zone management in soybean fields to increase profit and reduce product inputs."

Amount awarded: \$99,745

PI: D. Mueller (Iowa State University)

Co-PI: **A. Varenhorst**, S. Conley (University of Wisconsin)

Research Grant 2017, South Dakota Soybean Research and Promotion Council Grant.

"Evaluating foliar insecticide efficacies for the soybean aphid and the impact of tillage and cover crops on seed treatment efficacies and insect populations".

Amount awarded: \$79,272

PI: **Adam J. Varenhorst**

Co-PI: B. Fuller (South Dakota State University), J. Kleinjan (South Dakota State University), P. J. Johnson (South Dakota State University)

Research Grant 2017, South Dakota Soybean Research and Promotion Council Grant.

"Developing management recommendations for the use of fungicide and insecticide seed treatments for soybeans in South Dakota".

Amount awarded: \$50,000

PI: **Adam J. Varenhorst**

Co-PI: F. Mathew (South Dakota State University), J. Kleinjan (South Dakota State University)

Research Grant 2017, South Dakota Soybean Research and Promotion Council Grant.

"Association of soybean cyst nematode with biotic stress factors (Fusarium and soybean aphid) and management".

Amount awarded: \$90,000

PI: Febina Mathew (South Dakota State University)

Co-PI: **A. Varenhorst**, M. Nepal (South Dakota State University), J. Kleinjan (South Dakota State University), E. Byamukama (South Dakota State University)

Research Grant 2017, National Sunflower Association. "Efficacy and economics of insecticide seed treatments for management of wireworms and seed corn maggots in sunflowers".

Amount awarded: \$40,000

PI: **Adam J. Varenhorst**

Co-PI: Janet Knodel (North Dakota State University), J. P. Michaud (Kansas State University)

Research Grant 2017, National Sunflower Association. "Benefits of insect pollination to confection sunflowers".

Amount awarded: \$16,500

PI: Jarrad Prasifka (USDA-ARS)

Co-PI: Rachel E. Mallinger (USDA-ARS), **A. Varenhorst**, J. Bradshaw (University of Nebraska-Lincoln)

Research Grant 2017, South Dakota Wheat Commission (7/1/17-6/30/18). "Determining the importance of insecticide seed treatments for managing aphids and *Barley yellow dwarf virus* in winter wheat".

Amount awarded: \$25,000

PI: **Adam J. Varenhorst**.

Co-PI: Emmanuel Byamukama (South Dakota State University)

Research Grant 2017, United States Department of Agriculture, National Institute of Food and Agriculture (3/15/2017-3/14/2020). "Improving disease management in sunflower."

Amount Awarded: \$300,000

PI. Febina Mathew (South Dakota State University)

Co-PI: S. Markell (North Dakota State University), B. Harveson (University of Nebraska-Lincoln), **A. Varenhorst**, A. Severin (Iowa State University), A. Seetharam (Iowa State University).

2016: (\$525,533)

Research Grant 2016, South Dakota Department of Agriculture Specialty Crop Block Grant. "Determining the importance of pollinators to confection sunflower production in South Dakota".

Amount requested: \$48,351.

PI: **Adam J. Varenhorst**

Co-PI: M. Dunbar (South Dakota State University), A. Bachmann (South Dakota State University), R. Beck (South Dakota State University), F. Mathew (South Dakota State University)

Research Grant 2016, South Dakota Oilseeds Council. "Determining the pollinator diversity present in South Dakota sunflowers and their impact on yield".

Amount requested: \$10,640 (50%)

PI: **Adam J. Varenhorst**

Co-PI: A. Bachmann (South Dakota State University)

Research Grant 2016, Sun Grant Program North Central Region (USDA-NIFA funded).
“Development of best management practices for the production of *Brassica carinata* (L.) in the Dakotas.”

Amount requested: \$150,000

PI: Thandiwe Nleya

Co-PI: F. Mathew (South Dakota State University), **A. Varenhorst**, B. Johnson (North Dakota State University)

Research Grant 2016, South Dakota Soybean Research and Promotion Council Grant.
“Association of soybean cyst nematode with biotic stress factors (Fusarium and soybean aphid) and management”.

Amount requested: \$90,000

PI: Febina Mathew (South Dakota State University)

Co-PI: **A. Varenhorst**, M. Nepal (South Dakota State University), J. Kleinjan (South Dakota State University), E. Byamukama (South Dakota State University)

Research Grant 2016, South Dakota Soybean Research and Promotion Council Grant.
“Developing management recommendations for the use of fungicide and insecticide seed treatments for soybeans in South Dakota”.

Amount requested: \$50,000

PI: **Adam J. Varenhorst**

Co-PI: F. Mathew (South Dakota State University), J. Kleinjan (South Dakota State University)

Research Grant 2016, South Dakota Soybean Research and Promotion Council Grant. “Effect of fungicide seed treatments on soybean disease caused by *Fusarium* species”.

Amount requested: \$20,505

PI: Febina Mathew (South Dakota State University)

Co-PI: **A. Varenhorst**, J. Kleinjan (South Dakota State University)

Research Grant 2016, National Science Foundation (2013-9/2016). “Broad implementation of the lost ladybug project”.

Amount awarded: \$99,624

PI: John Losey (Cornell University).

Co-PI: **A. J. Varenhorst**, Louis Hesler (USDA-ARS).

Research Grant 2016, South Dakota Pulse Council. “Monitoring dry pea for diseases and insect pests in South Dakota”.

Amount requested: \$4,000

PI: Febina Mathew

Co-PI: **A. J. Varenhorst**, C. Graham, R. Beck

Research Grant 2016, National Sunflower Association. “Efficacy and economics of insecticide seed treatments for management of wireworms and seed corn maggots in sunflowers”.

Amount requested: \$35,913

PI: **Adam J. Varenhorst**

Co-PI: Janet Knodel (North Dakota State University), J. P. Michaud (Kansas State University)

Research Grant 2016, National Sunflower Association. “Benefits of insect pollination to confection sunflowers”.

Amount requested: \$16,500

PI: Jarrad Prasifka (USDA-ARS)

Co-PI: Rachel E. Mallinger (USDA-ARS), **A. Varenhorst**, J. Bradshaw (University of Nebraska-Lincoln)

2015: (\$1,502,133)

Extension Grant 2015, South Dakota SARE Professional Development Program State Level Mini-Grant. “Pollinator Identification and Conservation Workshop”. Amount awarded: \$5,500.

PI: **Adam J. Varenhorst**

Co-PI: Amanda Bachmann.

Extension Grant 2015, South Dakota SARE Professional Development Program State Level Mini-Grant. “Providing integrated pest management training opportunities for crop managers”

Amount awarded: \$5,500.

PI: Emmanuel Byamukama

Co-PI: **Adam J. Varenhorst**, Amanda Bachmann, and Paul Johnson

Research Grant 2015, South Dakota Wheat Commission (7/1/16-6/30/17). “Cost and benefit analysis of the use of seed treatments and timing of planting against aphids in winter wheat and tactics for sustainable management of wheat stem sawfly in South Dakota”. Amount awarded: \$20,000

PI: **Adam J. Varenhorst**.

Co-PI: Karl Glover (South Dakota State University)

Research Grant 2015, North Central Soybean Research Program (10/1/15-9/30/18). “Soybean entomology in the north central region: management and outreach for new and existing pests”.

Amount awarded: \$1,471,133 (5.5%)

PI: Kelley J. Tilmon (Ohio State University).

Co-PI: B. Diers (University of Illinois), G. Hartman (University of Illinois), C. Krupke (Purdue University), P. Nachappa (Indiana University-Purdue University Fort Wayne), M. O’Neal (Iowa State University), E. Hodgson (Iowa State University), B. McCornack (Kansas State University), D. Finke (University of Missouri), G. Heimpel (University of Minnesota), B. Potter (University of Minnesota), R. Koch (University of Minnesota), T. Hunt (University of Nebraska-Lincoln), R. Wright (University of Nebraska-Lincoln), D. Prischmann (North Dakota State University), J. Knodel (North Dakota State University), A. Michel (Ohio State University), **A. Varenhorst**.

Proposed (total = \$1,203,262):

2017: (\$120,000)

Research Grant 2017, North Central Region Sustainable Agriculture Research and Education. “Evaluating the impact of insecticide and fungicide applications on pollinators in confection and oilseed sunflowers.”

Amount requested: \$120,000

PI: **Adam J. Varenhorst**

Co-PI: P. Wagner, (South Dakota State University) and A. Bachmann (South Dakota State University)

2016: (\$285,266)

Research Grant 2016, North Central Soybean Research Program Grant. “Determining when seed treatments in soybean really pay off”.

Amount requested: \$225,000

PI: **Adam J. Varenhorst**

Co-PI: D. Mueller (Iowa State University), S. Conley (University of Wisconsin), F. Mathew (South Dakota State University), J. Kleinjan (South Dakota State University), M. Dunbar (South Dakota State University)

Research Grant 2016, South Dakota Department of Agriculture Specialty Crop Block Grant. “Developing best management practices for dry pea production in South Dakota”.

PI: Febina Mathew (South Dakota State University)

Co-PI: **A. J. Varenhorst**, C. Graham (South Dakota State University), R. Beck (South Dakota State University), A. Bachmann (South Dakota State University)

Amount requested: \$37,856

Research Grant 2016, South Dakota Oilseeds Council. “Developing management recommendations for the use of seed treatments in sunflower in South Dakota”.

Amount requested: \$12,410

PI: **Adam J. Varenhorst**

Co-PI: F. Mathew (South Dakota State University)

Research Grant 2016, South Dakota Oilseeds Council Grant. “Managing Phomopsis stem canker of sunflower using genetic resistance”.

Amount requested: \$10,000

PI: Febina Mathew (South Dakota State University)

Co-PI: **A. Varenhorst**

2015: (\$797,996)

Research Grant 2015, USDA Multi-State Specialty Crop Block Grant. “Genetic improvement of sustainable pea production in the United States”.

Amount requested: \$797,906

PI: Dipak Santra (University of Nebraska-Lincoln)

Co-PI: R. Harveson (University of Nebraska-Lincoln), J. Bradshaw (University of Nebraska-Lincoln), C. Coyne (Washington State University), F. Mathew (South Dakota State University), **A. Varenhorst**, K. McPhee (North Dakota State University), J. Pasche (North Dakota State University)

Publications and Book Chapters

Peer reviewed

Google Scholar: <https://scholar.google.com/citations?hl=en&user=7wU4mecAAAAJ>

ORCID ID: <http://orcid.org/0000-0001-6239-9860>

2018

Dunbar, M. W., A. Bachmann, and **A. J. Varenhorst**. 2018. Reduced insecticide susceptibility in *Aedes vexans* (Diptera: Culicidae) where agricultural pest management overlaps with mosquito abatement. *Journal of Medical Entomology*.

O'Neal, M. E., **A. J. Varenhorst**, M. C. Kaiser. 2018. Rapid evolution to host plant resistance by an invasive herbivore: soybean aphid (*Aphis glycines*) virulence in North America to aphid resistant cultivars. *Current Opinion in Insect Science* 26: 1-7.

2017

Clay, S. A. and **A. Varenhorst**. 2017. Estimating weed and insect development, in-season yield losses, and economic thresholds. *In* Clay, D. E., S. A. Clay, and S. A. Bruggeman (eds). American Society of Agronomy.

Varenhorst, A. J., S. R. Pritchard, E. W. Hodgson, M. E. O'Neal, and A. Singh. 2017. Determining the effectiveness of three-gene pyramids against *Aphis glycines* (Hemiptera: Aphididae) biotypes. *J. Econ. Entomol.*

Dunbar, M., A. Adhikari, B. Kontz, **A. Varenhorst**, T. Nleya, E. Byamukama, and F. Mathew. 2017. First report of Alternaria Black Spot caused by *Alternaria alternata* on Brassicae carinata in South Dakota. *Plant Disease*. DOI: 10.1094/PDIS-02-17-0222-PDN

Koch, R., B. Potter, P. Glogoza, E. Hodgson, C. Krupke, J. Tooker, C. DiFonzo, A. Michel, K. Tilton, T. Prochaska, J. Knodel, R. Wright, T. Hunt, B. Jensen, **A. Varenhorst**, B. McCornack, K. Estes, and J. Spencer. In review. Biology and economics of recommendations for insecticide-based management of soybean aphid. *Plant Health Progress*.

2015

Varenhorst, A. J., and M. E. O'Neal. 2015. The effect of an interspersed refuge on *Aphis glycines* (Hemiptera: Aphididae) and natural enemy populations. *J. Econ. Entomol.* DOI: 10.1093/jee/tov302

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2015. Reduced fitness of virulent *Aphis glycines* (Hemiptera: Aphididae) biotypes may influence the longevity of resistance genes in soybean. *PLoS One*. DOI: 10.1371/journal.pone.0138252.

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2015. Determining the duration of *Aphis glycines* (Hemiptera: Aphididae) induced susceptibility effects in soybean. *Arthropod-Plant Inter.* 9: 457-464. DOI: 10.1007/s11829-015-9395-7.

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2015. An induced susceptibility response in soybean promotes avirulent *Aphis glycines* (Hemiptera: Aphididae) populations on resistant soybean. *Environ. Entomol.* 44: 658-667. DOI: 10.1093/ee/nvv051.

2012

Varenhorst, A. J., and M. E. O'Neal. 2012. The response of natural enemies to selective insecticides applied to soybean. *Environ. Entomol.* 41: 1565-1574.

In preparation

Varenhorst, A. J., M. T. McCarville, J. A. Wenger, M. E. O'Neal, and A. P. Michel. How does virulence spread within a field? Soybean aphids, host-plant resistance, and interspersed refuges. *J. Econ. Entomol.*

Pritchard, S. R., M. E. O'Neal, A. Singh, A. K. Singh, and **A. J. Varenhorst**. Effect of soybean trichome density on *Aphis glycines* Matsumura (Hemiptera: Aphididae).

Extension Fact Sheets

Dunbar, M., B. Fuller, B. McManus, and **A. J. Varenhorst**. 2017. Corn rootworm in South Dakota. iGrow, South Dakota State University Extension. Publication:

Fiedler, D., F. Mathew, R. Beck, and **A. Varenhorst**. 2016. Phoma black stem of sunflower. iGrow, South Dakota State University Extension. Publication: 03-2004-2016.

Fiedler, D., F. Mathew, R. Beck, and **A. Varenhorst**. 2016. Phomopsis stem canker of sunflower. iGrow, South Dakota State University Extension. Publication 03-2005-2016.

Fiedler, D., F. Mathew. R. Beck, and **A. Varenhorst**. 2016. Stem weevils of sunflowers in South Dakota. iGrow, South Dakota State University Extension. Publication: 03-2006-2016.

Welch, K. D., K. J. Tilmon, and **A. J. Varenhorst**. 2016. Bean leaf beetle in South Dakota. iGrow, South Dakota State University Extension. Publication: 03-2002-2016.

Welch, K. D., K. J. Tilmon, and **A. J. Varenhorst**. 2016. Green cloverworm and other caterpillars in South Dakota soybeans. iGrow, South Dakota State University Extension. Publication: 03-2001-2016.

Welch, K. D., K. J. Tilmon, and **A. J. Varenhorst**. 2016. Japanese beetles in South Dakota. iGrow, South Dakota State University Extension. Publication: 03-2000-2016.

Extension Articles

2017: 83

Byamukama, E., C. Tande, M. Langham, C. Strunk, and **A. Varenhorst**. 2017. Soybean vein necrosis virus detected in South Dakota soybeans. iGrow, South Dakota State University Extension. 9/21/2017.

<http://igrow.org/agronomy/soybeans/soybean-vein-necrosis-virus-detected-in-south-dakota-soybeans/>

Varenhorst, A., P. Wagner, and A. Bachmann. 2017. What should I do about the spider mites that I'm finding in corn? iGrow, South Dakota State University Extension. 9/20/2017.
<http://igrow.org/agronomy/corn/what-should-i-do-about-the-spider-mites-that-im-finding-in-corn/>

Wagner, P., A. Bachmann, and **A. Varenhorst.** 2017. Managing cucumber beetles. iGrow, South Dakota State University Extension. 9/20/2017.
<http://igrow.org/gardens/home-and-garden-pests/managing-cucumber-beetles/>

Varenhorst, A., P. Wagner, and A. Bachmann. 2017. Aphid populations being observed in South Dakota corn. iGrow, South Dakota State University Extension. 9/13/2017.
<http://igrow.org/agronomy/corn/aphid-populations-being-observed-in-south-dakota-corn/>

Wagner, P., A. Bachmann, and **A. Varenhorst.** 2017. Protecting your garden from squash bugs. iGrow, South Dakota State University Extension. 9/7/2017.
<http://igrow.org/gardens/home-and-garden-pests/protecting-your-garden-from-squash-bugs/>

Varenhorst, A., P. Wagner, and A. Bachmann. 2017. What were SDSU Extension entomologists doing at Dakotafest? iGrow, South Dakota State University Extension. 8/31/2017.
<http://igrow.org/agronomy/soybeans/what-were-sdsu-extension-entomologists-doing-at-dakotafest/>

Varenhorst, A., P. Wagner, A. Bachmann, C. Dierks, B. Hauswedell, and P. Rozeboom. 2017. Pyrethroid resistant soybean aphids detected in South Dakota. iGrow, South Dakota State University Extension. 8/31/2017.
<http://igrow.org/agronomy/soybeans/pyrethroid-resistant-soybean-aphids-detected-in-south-dakota/>

Byamukama, E., C. Strunk, and **A. Varenhorst.** 2017. Soybean field day planned for September 12. iGrow, South Dakota State University Extension. 8/31/2017.
<http://igrow.org/agronomy/soybeans/soybean-field-day-planned-for-september-12/>

Varenhorst, A., P. Wagner, A. Bachmann, and R. Beck. 2017. Red and gray beetles on sunflower heads: What are they? iGrow, South Dakota State University Extension. 8/31/2017.
<http://igrow.org/agronomy/other-crops/red-gray-beetles-on-sunflower-heads-what-are-they/>

Varenhorst, A., P. Wagner, and A. Bachmann. 2017. Thistle caterpillars chewing up soybeans: Round 2! iGrow, South Dakota State University Extension. 8/28/2017.
<http://igrow.org/agronomy/soybeans/thistle-caterpillars-chewing-up-soybeans-round-2/>

Varenhorst, A., P. Wagner, A. Bachmann, and C. Strunk. 2017. Small red maggots under your soybean plants' epidermis? We have answers. iGrow, South Dakota State University Extension. 8/24/2017.

<http://igrow.org/agronomy/soybeans/small-red-maggots-under-your-soybean-plants-epidermis-we-have-answers/>

Varenhorst, A., P. Wagner, A. Bachmann, C. Dierks, B. Hauswedell, and P. Rozeboom. 2017. Grasshoppers chewing up soybean in Southeast South Dakota. iGrow, South Dakota State University Extension. 8/24/2017.
<http://igrow.org/agronomy/soybeans/grasshoppers-chewing-up-soybean-in-southeast-south-dakota/>

Varenhorst, A., P. Wagner, A. Bachmann, and P. O. Johnson. 2017. What's eating the Canada thistle? iGrow, South Dakota State University Extension. 8/24/2017.
<http://igrow.org/agronomy/soybeans/whats-eating-the-canada-thistle/>

Varenhorst, A., P. Wagner, and A. Bachmann. 2017. Soybean aphid populations reaching and exceeding thresholds. iGrow, South Dakota State University Extension. 8/18/2017.
<http://igrow.org/agronomy/soybeans/soybean-aphid-populations-reaching-and-exceeding-thresholds/>

Varenhorst, A., P. Wagner, A. Bachmann, and R. Beck. 2017. Red sunflower seed weevils exceeding thresholds and then some. iGrow, South Dakota State University Extension. 8/16/2017.
<http://igrow.org/agronomy/other-crops/red-sunflower-seed-weevils-exceeding-thresholds-and-then-some/>

Varenhorst, A., P. Wagner, A. Bachmann, R. Beck, and L. Edwards. 2017. Dectes stem borer in South Dakota sunflowers. iGrow, South Dakota State University Extension. 8/10/2017.
<http://igrow.org/agronomy/other-crops/decetes-stem-borer-in-south-dakota-sunflowers/>

Varenhorst, A., P. Wagner, A. Bachmann, and R. Beck. 2017. Monitoring sunflower fields for sunflower moth. iGrow, South Dakota State University Extension. 8/10/2017.
<http://igrow.org/agronomy/other-crops/monitoring-sunflower-fields-for-sunflower-moth/>

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Varenhorst, A. J. and P. M. Wagner. **2018.** Foliar insecticides in wheat. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Wheat: A guide to managing weeds, insects, and diseases.

Byamukama, E., D. Yabwalo, P. M. Wagner, and **A. J. Varenhorst.** **2018.** Seed treatments in corn. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Corn: A guide to managing weeds, insects, and diseases.

Byamukama, E., D. Yabwalo, P. M. Wagner, and **A. J. Varenhorst.** **2018.** Seed treatments in soybean. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Soybean: A guide to managing weeds, insects, and diseases.

Byamukama, E., D. Yabwalo, P. M. Wagner, and **A. J. Varenhorst.** **2018.** Seed treatments in wheat. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Alfalfa and Oilseeds: A guide to managing weeds, insects, and diseases.

Byamukama, E., D. Yabwalo, P. M. Wagner, and **A. J. Varenhorst.** **2018.** Seed treatments in sunflower. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Wheat: A guide to managing weeds, insects, and diseases.

2017:

Varenhorst, A. J., M. W. Dunbar, and P. M. Wagner. **2017.** Soil and foliar insecticides in corn. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Corn: A guide to managing weeds, insects, and diseases.

Varenhorst, A. J., M. W. Dunbar, and P. M. Wagner. **2017.** Foliar insecticides in alfalfa. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Alfalfa and Oilseeds: A guide to managing weeds, insects, and diseases.

Varenhorst, A. J., M. W. Dunbar, and P. M. Wagner. 2017. Foliar insecticides in oilseeds. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Sunflower & Oilseeds/Alfalfa & Range: A guide to managing weeds, insects, and diseases.

Varenhorst, A. J., M. W. Dunbar, and P. M. Wagner. 2017. Foliar insecticides in soybean. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Soybean: A guide to managing weeds, insects, and diseases.

Varenhorst, A. J., M. W. Dunbar, and P. M. Wagner. 2017. Foliar insecticides in wheat. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Wheat: A guide to managing weeds, insects, and diseases.

Byamukama, E., D. Yabwalo, M. W. Dunbar, P. M. Wagner, and **A. J. Varenhorst. 2017.** Seed treatments in corn. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Corn: A guide to managing weeds, insects, and diseases.

Byamukama, E., D. Yabwalo, M. W. Dunbar, P. M. Wagner, and **A. J. Varenhorst. 2017.** Seed treatments in soybean. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Soybean: A guide to managing weeds, insects, and diseases.

Byamukama, E., D. Yabwalo, M. W. Dunbar, P. M. Wagner, and **A. J. Varenhorst. 2017.** Seed treatments in wheat. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Alfalfa and Oilseeds: A guide to managing weeds, insects, and diseases.

Byamukama, E., D. Yabwalo, M. W. Dunbar, P. M. Wagner, and **A. J. Varenhorst. 2017.** Seed treatments in sunflower. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Wheat: A guide to managing weeds, insects, and diseases.

2016:

Beck, D., R. Beck, A. Chirumamilla, **A. Varenhorst. 2016.** Production and utilization of field peas in South Dakota. iGrow.

Varenhorst, A. J. 2016. Soil and foliar insecticides in corn. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Corn: A guide to managing weeds, insects, and diseases.

Varenhorst, A. J. 2016. Foliar insecticides in alfalfa. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Alfalfa and Oilseeds: A guide to managing weeds, insects, and diseases.

Varenhorst, A. J. 2016. Foliar insecticides in oilseeds. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Alfalfa and Oilseeds: A guide to managing weeds, insects, and diseases.

Varenhorst, A. J. 2016. Foliar insecticides in soybean. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Soybean: A guide to managing weeds, insects, and diseases.

Varenhorst, A. J. 2016. Foliar insecticides in wheat. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Wheat: A guide to managing weeds, insects, and diseases.

Byamukama, E., and **A. J. Varenhorst. 2016.** Seed treatments in corn. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Corn: A guide to managing weeds, insects, and diseases.

Byamukama, E., and **A. J. Varenhorst. 2016.** Seed treatments in soybean. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Soybean: A guide to managing weeds, insects, and diseases.

Byamukama, E., and **A. J. Varenhorst. 2016.** Seed treatments in wheat. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Alfalfa and Oilseeds: A guide to managing weeds, insects, and diseases.

Byamukama, E., and **A. J. Varenhorst. 2016.** Seed treatments in sunflower. *In* Bachmann, A. (ed). South Dakota Pest Management Guide, Wheat: A guide to managing weeds, insects, and diseases.

Refereed:

Wright, R. and **A. J. Varenhorst. 2016.** Sorghum insect pests.

Varenhorst, A. J., B. W. Fuller, and B. W. French. 2016. Corn insect pests. *In* Clay, D.E., C.G. Carlson, S.A. Clay, and E. Byamukama (eds). iGrow Corn: Best Management Practices. South Dakota State University.

Varenhorst, A. J., and B. W. Fuller. 2016. Stored grain pests of corn. *In* Clay, D.E., C.G. Carlson, S.A. Clay, and E. Byamukama (eds). iGrow Corn: Best Management Practices. South Dakota State University.

Invited Presentations

2018:

Varenhorst, A., and B. Hauswedell. 2018. Planting populations and seed treatments. Soy100: Growing 100-Bushel Soybeans. 14 March 2018. Brookings, SD.

Varenhorst, A., J. Knodel, E. Bynum, and J. P. Michaud. 2018. 2018 Sunflower special topics: Insects of the sunflower root and stalk. 40th Annual NSA Research Forum. 10 January 2018. Fargo, ND.

2017:

Varenhorst, A. J., B. Hauswedell, J. P. Michaud, and J. Knodel. 2017. Evaluating early season belowground pest management in sunflowers. 65th Annual Meeting of the Entomological Society of America. 8 November 2017. Denver, CO.

Varenhorst, A. J. 2017. Integrated pest management: Insects. American Society of Agronomy Cultivating Sustainability: A Training Curriculum for Agronomy Professionals: Concepts in Integrated Pest Management: Insects and Plant Pathology Webinar Series.

Varenhorst, A., B. Hauswedell, P. Rozeboom, P. Wagner, and A. Bachmann. 2017. Managing pests in South Dakota's Major Crops. 72nd Annual Meeting of the North Central Branch of the Entomological Society of America. 6/4/2017.

Varenhorst, A. and M. O'Neal. 2017. Interspersed refuges: How do they impact soybean aphid natural enemies? 72nd Annual Meeting of the North Central Branch of the Entomological Society of America. 6/7/2017.

Varenhorst, A. J. 2017. Insect issues facing farmers in South Dakota. PS 390 Junior Seminar. Instructor Dr. Thandiwe Nleya. 28 February 2017. Brookings, South Dakota. Presented to 40 students.

Varenhorst, A. J., B. Hauswedell, M. Mattern and P. Rozeboom. 2017. Insect pests and pollinators of sunflower in South Dakota. NuSeed, Legend Seeds Sunflower Training. Alison Stone. Pierre, SD. Presented to 122 stakeholders.

Varenhorst, A. J. 2017. Belligerent bugs –How resistance affects insect management. American Society of Agronomy Resistance Management Webinar Series.

Varenhorst, A., M. Mattern, B. Hauswedell, and P. Rozeboom. 2017. 2017 Insect Pest and Research Update. Brown County Crops Clinic. Aberdeen, SD. 1/6/2017.

2016:

Varenhorst, A. J. 2016. From a B.S. in biology to a Ph.D. in entomology: How did I get here? Briar Cliff University STEM Seminar. Briar Cliff University, Sioux City, IA. 11 November 2016.

Varenhorst, A. J. and M. E. O'Neal. 2016. The effect of an interspersed refuge on soybean aphid management. Symposium: Research Update from the North Central Soybean Research Program (NCSRP). 71st Annual North Central Branch of the Entomological Society of America. 5 June 2016.

Varenhorst, A. J. 2016. Insect pollinators. Hinton Community Elementary School, Hinton, IA. 23 May 2016. Presented to a total of 60 first grade students.

Varenhorst, A. J. 2016. Seed treatments: do they provide economic benefits to South Dakota farmers? PS 333. Instructor Dr. Febina Mathew. 4 April 2016. Brookings, SD. Presented to 58 students.

Varenhorst, A. J. 2016. Insecticide seed treatments in soybeans. Soy100. Stephanie Bruggeman. 11 March 2016. Brookings, SD. Presented to 80 stakeholders.

Varenhorst, A. J. 2016. Insect pests of sunflower in South Dakota. NuSeed, Legend Seeds Sunflower Training. Alison Stone. 23 February 2016. Chamberlain, SD. Presented to 55 stakeholders.

Varenhorst, A. J. 2016. Major insect issues in South Dakota. PS 380 Junior Seminar. Instructor Dr. Thandiwe Nleya. 16 February 2016. Brookings, SD. Presented to 20 students.

Varenhorst, A. J. 2016. Review of 2015 insect pests and what to watch for in 2016. Faulkton Crop Improvement Meeting. 29 January 2016. Faulkton, SD. Presented to nine stakeholders.

Varenhorst, A. J. 2016. 2015 insect pest summary and current research update. 8 January 2016. Aberdeen, SD. Presented to 19 stakeholders.

2015:

Varenhorst, A. J. 2015. Climate and insect pests: How are they related? Climate & Agriculture Workshop. 15 December 2015. Mitchell, SD. Presented to seven stakeholders.

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2015. Induced susceptibility affects *Aphis glycines* virulence on resistant soybean: Implications for managing this pest in the future. 63rd Annual Meeting of the Entomological Society of America. 15 November 2015. Minneapolis, MN.

Varenhorst, A. J. 2015. Insect issues facing farmers in South Dakota. PS 390 Junior Seminar. Instructor Dr. Thandiwe Nleya. 22 October 2015. Brookings, South Dakota. Presented to 30 students.

Research Presentations

2018:

Koch, R., J. Menger, I. MacRae, J. Knodel, B. Potter, P. Glogoza, E. Hodgson, **A. Varenhorst**, A. Chirumamilla, and J. Gavloski. 2018. Insecticide resistance in soybean aphid: An emerging

challenge in soybean production. 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 20 March 2018. Madison, WI.

Pezzini, D., P. Mittapelly, C. DiFonzo, D. Finke, T. hunt, J. Knodel, C. Krupke, B. McCornack, A. Michel, C. R. Philips, **A. Varenhorst**, R. Wright, and R. Koch. 2018. Emerging stink bugs on soybean – Where are they and what do they like to eat? 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 20 March 2018. Madison, WI.

Hauswedell, B., C. Dierks, P. Rozeboom, F. Mathew, J. Kleinjan, and **A. Varenhorst**. 2018. Does planting date, location and seeding rate affect the efficacy of seed treatments in soybean? 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 20 March 2018. Madison, WI.

Dunbar, M., A. Bachmann, and **A. Varenhorst**. 2018. Reduced insecticide susceptibility in *Aedes vexans* (Diptera: Culicidae) where agricultural pest management overlaps with mosquito abatement. 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 20 March 2018. Madison, WI.

Hohenstein, J., M. Kaiser, K. Tilmon, **A. Varenhorst**, E. Hodgson, and M. O'Neal. 2018. “Refuge-in-a-bag” approach for sustainable management of virulent soybean aphids (*Aphis glycines*, Hemiptera: Aphididae) in the field. 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 19 March 2018. Madison, WI.

Conzemius, S., L. Hesler, **A. Varenhorst**, and K. Tilmon. 2018. Eat, drink and be varied: Soybean aphid intrabiotypic variants on soybean ascensions. 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 19 March 2018. Madison, WI.

Dierks, C., B. Hauswedell, P. Rozeboom, and **A. Varenhorst**. 2018. Do cover crops and tillage affect the efficacy of soybean insecticide seed treatments? 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 19 March 2018. Madison, WI.

Varenhorst, A. and B. Hauswedell. 2018. Determining the efficacy of insecticide seed treatments and in-furrow insecticides for wireworm management. 40th Annual NSA Research Forum. 10 January 2018. Fargo, ND.

Prasifka, J., R. Mallinger, **A. Varenhorst**, and J. Bradshaw. 2018. Benefits of insect pollination to confection sunflowers in the Northern and Central Plains. 40th Annual NSA Research Forum. 10 January 2018. Fargo, ND.

2017:

Dierks, C., P. Rozeboom, B. Hauswedell, and **A. Varenhorst**. 2017. Evaluating the efficacy of foliar insecticides for soybean aphids in South Dakota. 65th Annual Meeting of the Entomological Society of America. 7 November 2017. Denver, CO.

Conzemius, S., L. Hesler, **A. Varenhorst**, and K. Tilmon. 2017. Mind your elders: Wild soybean's contribution to soybean aphid resistance. 65th Annual Meeting of the Entomological Society of America. 6 November 2017. Denver, CO.

Pezzini, D., D. Finke, T. Hunt, J. Knodel, C. Krupke, B. McCornack, A. Michel, C. R. Philips, **A. Varenhorst**, R. Wright, and R. Koch. 2017. Influence of field and landscape factors on stink bug (Hemiptera: Pentatomidae) community in North Central soybean. 65th Annual Meeting of the Entomological Society of America. 5 November 2017. Denver, CO.

Hauswedell, B., P. Rozeboom, J. P. Michaud, J. Knodel, and **A. Varenhorst**. 2017. Evaluation of seed and in-furrow treatments for sunflower in South Dakota. 65th Annual Meeting of the Entomological Society of America. 5 November 2017. Denver, CO.

Mallinger, R., J. Prasifka, J. Bradshaw, and **A. Varenhorst**. 2017. How do pollination services to sunflowers vary across plant genotypes, environments, and pollinator taxa? 65th Annual Meeting of the Entomological Society of America. 5 November 2017. Denver, CO.

Varenhorst, A., M. W. Dunbar, and A. Bachmann. 2017. Agricultural pest management in South Dakota: Does it affect mosquito insecticide resistance? 72nd Annual Meeting of the North Central Branch of the Entomological Society of America. 6/6/2017

Hauswedell, B., M. W. Dunbar, F. Mathew, J. Kleinjan, and **A. Varenhorst**. 2017. Developing management recommendations for soybean seed treatments in South Dakota. 72nd Annual Meeting of the North Central Branch of the Entomological Society of America. 6/5/2017

Pezzini, D., D. Finke, T. Hunt, J. Knodel, C. Krupke, B. McCornack, A. Michel, C. R. Philips, **A. Varenhorst**, R. Wright, and R. Koch. 2017. Influence of field and landscape factors on stink bug (Hemiptera: Pentatomidae) community in North Central soybean. North Central Branch of the Entomological Society of America. Indianapolis, IN. 6/5/2017.

Varenhorst, A., B. Hauswedell, J. Knodel, and J. P. Michaud. 2017. Determining the impact of seed treatments on sunflower yield. National Sunflower Association Forum. Fargo, ND. 1/10/2017.

Dunbar, M. W., A. Bachmann, F. Mathew, and **A. Varenhorst**. 2017. Mosquito insecticide resistance affected by agricultural pest management. Adult Control I, American Mosquito Control Association, Annual Meeting, San Diego, CA.

2016:

Varenhorst, A., B. Hauswedell, M. Mattern, and F. Mathew. 2016. Sunflower Update: Insects and diseases. Ag Horizons. Pierre, SD. 11/30/2016.

Okello, P., A. Adhikari, **A. Varenhorst**, S. Osborne, E. Byamukama, and F. Mathew. 2016. Interaction between Fusarium and soybean cyst nematode on soybean. American Phytopathology Society Annual Meeting. 31 July 2016. Tampa FL.

Posch, J. P., **A. J. Varenhorst**, F. M. Mathew. 2016. Exploring interactions of soybean cyst nematode with stem canker pathogens on soybean. American Phytopathological Society North Central Meeting. 8 June 2016. Minneapolis, MN.

Pritchard, S., M. O'Neal, A. Singh, A. Singh, **A. Varenhorst**. 2016. Effect of soybean trichome density on biotype-1 soybean aphid (*Aphis glycines*) and its natural enemies. 71st Annual North Central Branch of the Entomological Society of America. 6 June 2016. 3rd place in PIE student competition.

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2015. Exploring factors that may promote the longevity of *Rag* genes. 70th Annual North Central Branch of the Entomological Society of America. 1 June 2015. Manhattan, Kansas.

Nutter, F., M. T. McCarville, and **A. J. Varenhorst**. 2014. Defoliation.Pro: A new training tool for improving the accuracy and precision of defoliation ratings. 62nd Annual Meeting of the Entomological Society of America. 19 November 2014. Portland, Oregon.

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2014. Does induced susceptibility occur between virulent and avirulent soybean aphids on resistant soybean? 62nd Annual Meeting of the Entomological Society of America. 17 November 2014. Portland, Oregon. (Received 1st place in PIE student competition)

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2014. Do biotype-1 soybean aphids benefit from the presence of biotype-2 on resistant soybean. 1st Annual ISU Graduate and Professional Student Research Conference. 5 April 2014. Ames, Iowa (Received Best in Session).

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2014. Do biotype-1 soybean aphids benefit from the presence of biotype-2 on resistant soybean? 69th Annual North Central Branch of the Entomological Society of America. 10 March 2014. Des Moines, Iowa. (Received 2nd place in the Ph.D. PIE student competition)

Wagner, P., M. E. O'Neal, and **A. J. Varenhorst**. 2014. Varying the timing of insecticide application limits non-target impacts in soybean. 69th Annual North Central Branch of the Entomological Society of America. 10 March 2014. Des Moines, Iowa.

Varenhorst, A. J., and M. E. O'Neal. 2013. Induced susceptibility: a density dependent response that explains *Aphis glycines* populations on resistant soybean in field research plots. 68th Annual North Central Branch of the Entomological Society of America. 17 June 2013. Rapid City, South Dakota. (Received 2nd place in the Ph.D. PIE student competition)

Varenhorst, A. J., and M. E. O'Neal. 2013. Density-dependent induced susceptibility: a non-genetic explanation of soybean aphid biotypes on aphid resistant soybean. 4th Biennial ISU Hemipteran Research Symposium. 26 March 2013. Ames, Iowa.

Varenhorst, A. J., and M. E. O'Neal. 2012. Which aphids are important vectors of *Soybean mosaic virus*? 60th Annual Meeting of the Entomological Society of America. 12 November 2012. Knoxville, Tennessee.

Varenhorst, A. J., and M. E. O'Neal. 2012. What role do alate soybean aphids (*Aphis glycines*) play in the spread of Soybean mosaic virus? 67th Annual North Central Branch of the Entomological Society of America. 4 June 2012. Lincoln, Nebraska. (Received 2nd in the Ph.D. PIE student competition)

Varenhorst, A. J., and M. E. O'Neal. 2011. Managing soybean aphids with selective insecticides results in a bioresidual. 59th Annual Meeting of the Entomological Society of America. 14 November 2011. Reno, Nevada.

Varenhorst, A. J., and M. E. O'Neal. 2011. The natural enemy community of the soybean aphid, and the effects that selective insecticides have on its populations. 66th Annual North Central Branch of the Entomological Society of America. 14 March 2011. Minneapolis, Minnesota. (Received 3rd place in the M.S. PIE student competition)

Varenhorst, A. J., and M. E. O'Neal. 2010. Can selective insecticides control soybean aphid populations without harming natural enemies? 58th Annual Meeting of the Entomological Society of America. 13 December 2010. San Diego, California.

Varenhorst, A. J., and M. E. O'Neal. 2010. Can selective insecticides control soybean aphid populations without harming natural enemies? Midwest Ecology & Evolution Conference 2010. 27 March 2010. Ames, Iowa.

Varenhorst, A. and T. Wilson. 2008. Survey of the insects in the Sioux City Prairie, Woodbury County. 18th Annual Prairie Invertebrate Conference. 25 October 2008. Newburg, Wisconsin.

Extension Presentations

2017

Varenhorst, A., A. Bachmann and M. Dunbar. 2017. Insecticide resistance in South Dakota mosquitos. Mosquito Control and West Nile Conference. Aberdeen, SD.

Varenhorst, A. 2017. Forage insect pests: what to watch for. Forage Fiesta. Beresford, SD.

Varenhorst, A., P. Wagner and A. Bachmann. 2017. Corn, Soybean, and Alfalfa insect pest management. East River IPM Field School. Beresford, SD.

Varenhorst, A. J. 2017. Current and potential insect pests. Northeast Research Farm Field Day.

Varenhorst, A. J. 2017. Current and potential insect pests. Southeast Research Farm Field Day.

Varenhorst, A. J. 2017. Current and potential insect pests. Volga Farm Field Day.

Varenhorst, A. J. and P. Wagner. 2017. 2017 insect pests in field peas. Field Pea Tours.

Varenhorst, A. J. and P. Wagner. 2017. Alfalfa and Range insect pest management. West River Field School. Rapid City, SD.

Varenhorst, A., J. 2017. Current and potential wheat insect pests. Pierre and Wall Wheat Walks.

Varenhorst, A., J. 2017. Current and potential wheat insect pests. Watertown Wheat Walks.

Varenhorst, A. J. and P. M. Wagner. 2017. Commercial Agriculture Recertification: Category 1B. Presented at 10 locations to 1,826 stakeholders.

Varenhorst, A. J. and P. M. Wagner. 2017. Private Agriculture Recertification. Presented at 13 locations.

2016

Varenhorst, A., P. Wagner, A. Bachmann. 2016. Extension Entomology Booth. South Dakota State Fair, Huron, SD. Attended 9/1/16 – 9/5/16. Contacted approximately 5,000 stakeholders.

Varenhorst, A. 2016. Scouting for late season insect pests. DakotaFest, Mitchell, SD. 8/16/16. Presented to approximately 12 stakeholders.

Varenhorst, A., and A. Bachmann. Extension Entomology Booth. DakotaFest. DakotaFest, Mitchell, SD. Attended 8/16/16 - 8/18/16. Contacted approximately 1,000 stakeholders.

Varenhorst, A. 2016. Corn and soybean insect pests. Volga Research Farm Field Day. Volga, SD. 7/27/16. Presented to 8 stakeholders.

Varenhorst, A. 2016. Insects in South Dakota Crops. IPM Field School. Volga, SD. Attended 7/20/16 - 7/21/16. 66 attendees.

Varenhorst, A. 2016. Insecticides and pollinators. Pollinator Workshop. Pierre, SD. 7/15/16. Presented to 11 attendees.

Varenhorst, A. 2016. Soybean insect pests. Southeast Research Farm Field Day. Beresford, SD. 7/12/16. Presented to approximately 40 stakeholders.

Varenhorst, A. 2016. Soybean insect pests. Northeast Research Farm Field Day. 7/6/16. Presented to approximately 40 stakeholders.

Varenhorst, A. 2016. South Dakota insect pests. West River IPM Field School. Pierre, SD. 6/28/16. Presented to 40 attendees.

Posch, J. P., P. Alberti, T. Olson, P. Okello, **A. Varenhorst**, A. Bachmann, E. Byamukama, and F. Mathew. 2016. Common garden diseases and pests. SDSU Extension Day. 6/22/16. Rosebud Indian Reservation.

Varenhorst, A. 2016. Insect pests of field peas in South Dakota. Field Pea Tours. 6/21/16-6/22/16. Presented at two locations to a total of 15 stakeholders.

Varenhorst, A. 2016. Insect pests of wheat in South Dakota. Wheat Walks. 25 May 2016. Presented at three locations to a total of 20 stakeholders.

Varenhorst, A. 2016. Insect pests in South Dakota. South Dakota Independent Crop Consultants Workshop. 1 April 2016. Presented to a total of 45 stakeholders.

Varenhorst, A. and A. Bachmann. 2016. Integrated pest management of insects and pesticide safety. South Dakota State University Winter IPM School. 15 March 2016. Presented to a total of 14 stakeholders.

Varenhorst, A. J. 2016. Insect updates on major crops in South Dakota. Commercial Agriculture Recertification: Category 1B. Presented at ten locations to a total of 1,924 stakeholders.

Varenhorst, A. J. 2016. Insect pest issues in South Dakota. South Dakota Private Applicator Training. Presented at nine locations to a total of 503 stakeholders.

Posters

2018

Dierks, C., B. Hauswedell, P. Rozeboom and **A. Varenhorst**. 2018. Developing an efficacy study for foliar insecticidal management of soybean aphids in South Dakota. 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 20 March 2018. Madison, WI.

Rozeboom, P., B. Hauswedell, C. Dierks, and **A. Varenhorst**. 2018. Evaluating the efficacy of seed treatments and planting dates against aphid pests in South Dakota winter wheat. 73rd Annual

Meeting of the North Central Branch of the Entomological Society of America. 20 March 2018. Madison, WI.

Wagner, P. and **A. Varenhorst**. 2018. Do dung beetles provide services in grazed cover crops. 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 20 March 2018. Madison, WI.

Hauswedell, B., P. Rozeboom, J. P. Michaud, J. Knodel and **A. Varenhorst**. 2018. Efficacy of seed and in-furrow treatments in sunflower for early season insect pests. 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 19 March 2018. Madison, WI.

Anderson, E., B. Fuller, P. Wagner, and **A. Varenhorst**. 2018. Grasshoppers of Eastern South Dakota: A species diversity survey. 73rd Annual Meeting of the North Central Branch of the Entomological Society of America. 19 March 2018. Madison, WI.

Wagner, P., A. Bachmann, R. Beck, B. Hauswedell, E. Byamukama, and **A. Varenhorst**. 2018. South Dakota State University Extension Efforts in Sunflower. 40th Annual NSA Research Forum. 10 January 2018. Fargo, ND.

2017

Wagner, P., E. Anderson, A. Bachmann, and **A. Varenhorst**. 2017. Grasshoppers of western South Dakota: A species diversity survey. 65th Annual Meeting of the Entomological Society of America. 7 November 2017. Denver, CO.

Hauswedell, B., P. Rozeboom, F. Mathew, J. Kleinjan, and **A. Varenhorst**. 2017. Developing soybean seed treatment recommendations in South Dakota. 65th Annual Meeting of the Entomological Society of America. 7 November 2017. Denver, CO.

Dierks, C. P. Rozeboom, and **A. Varenhorst**. 2017. Evaluating the impacts of seed treatment and cover crop on soybean. 65th Annual Meeting of the Entomological Society of America. 7 November 2017. 7 November 2017. Denver, CO.

Rozeboom, P. and **A. Varenhorst**. 2017. Evaluating the efficacy of seed treatments in South Dakota winter wheat. 65th Annual Meeting of the Entomological Society of America. 7 November 2017. Denver, CO.

Mattern, M., P. Rozeboom, A. Bachmann, and **A. Varenhorst**. 2017. Determining the species of pollinators visiting South Dakota sunflower. 65th Annual Meeting of the Entomological Society of America. 6 November 2017. Denver, CO.

Conzemius, S., L. Hesler, **A. Varenhorst**, and K. Tilmon. 2017. No-Choice but to find plant resistance to soybean aphid biotype 4. 72nd Annual Meeting of the North Central Branch of the Entomological Society of America. 6/5/2017

Hauswedell, B., P. Rozeboom, and **A. Varenhorst**. 2017. Efficacy of insecticide seed treatments for sunflowers in South Dakota. 72nd Annual Meeting of the North Central Branch of the Entomological Society of America. 6/6/2017

Dunbar, M. W., A. Bachmann, F. Mathew, and **A. J. Varenhorst**. 2016. Mosquito insecticide resistance affected by agricultural pest management. American Society of Tropical Medicine and Hygiene, Annual Meeting, Atlanta, GA.

Hauswedell, B., M. W. Dunbar, F. M. Mathew, J. Kleinjan, and **A. J. Varenhorst**. 2016. Developing management recommendations for the use of seed treatments for soybean in South Dakota. AgOutlook. Sioux Falls, SD.

Posch, J. P., **A. J. Varenhorst**, P. A. Rozeboom, and F. M. Mathew. 2016. Determining the impact of co-infestations of *Diaporthe longicolla* and soybean aphid on soybean. AgOutlook. Sioux Falls, SD.

Neupane, S., Q. Ma, F. Mathew, **A. Varenhorst**, E. J. Andersen, and M. P. Nepal. 2016. Characterization of induced susceptibility effects on soybean-soybean aphid and soybean-soybean aphid-soybean cyst nematode interactions. AgOutlook. Sioux Falls, SD.

2016

Dunbar, M. W., B. Hauswedell, F. M. Mathew, J. Kleinjan, and **A. J. Varenhorst**. 2016. Developing management recommendations for the use of fungicide and insecticide seed treatments for soybeans in South Dakota. International Congress of Entomology. 26 September 2016. Orlando, FL.

Olson, T., F. Mathew, A. Adhikari, B. Kontz, **A. Varenhorst**, and L. Marek. 2016. Development of a quantitative PCR assay to quantify resistance to *Diaporthe helianthi* and *Diaporthe gulyae* in sunflower. American Phytopathological Society Annual Meeting. 30 July 2016.

Adhikari, A., P. Okello, B. Kontz, M. Dunbar, **A. Varenhorst**, and F. Mathew. 2016. Characterizing *Fusarium* species infecting corn roots in South Dakota. American Phytopathological Society Annual Meeting. 30 July 2016.

Olson, T., B. Kontz, K. Kirby, P. Okello, A. Adhikari, J. Kleinjan, **A. Varenhorst**, and F. Mathew. 2016. Efficacy of commercial fungicide seed treatments on soybean. South Dakota State University Northeast Research Farm Field Day. July 6, 2016. Southshore, SD.

Hauswedell, B., M. W. Dunbar, F. M. Mathew, J. Kleinjan, and **A. J. Varenhorst**. 2016. Developing management recommendations for the use of seed treatments for soybeans in South Dakota. South Dakota State University Northeast Farm Field Day. 6 July 2016. Southshore, SD.

Posch, J. P., **A. J. Varenhorst**, F. M. Mathew. 2016. Determining the interaction between the stem canker fungus, *Diaporthe longicolla*, and the soybean aphid, *Aphis glycines*, on soybean. American Phytopathological Society North Central Meeting. 8 June 2016. Minneapolis, MN.

Dunbar, M. W., B. Hauswedell, F. Mathew, J. Kleinjan, and **A. J. Varenhorst**. 2016. Developing management recommendations for the use of seed treatments for soybeans in South Dakota. 71st Annual North Central Branch of the Entomological Society of America. 7 June 2016.

Pritchard, S. R., M. E. O'Neal, A. Singh, A. K. Singh, **A. J. Varenhorst**, and I. Valmorbidia. 2016. Effect of soybean trichome density on *Aphis glycines* and its natural enemies. 3rd Annual Graduate and Professional Student's Research Conference. 12 April 2016. Ames, IA.

Nepal, M., S. Neupane, Q. Ma, F. Mathew, **A. Varenhorst**, and E. J. Andersen, R. N. Reese. 2016. Comparative genomics of disease resistance genes in soybean (*Glycine max*) and common bean (*Phaseolus vulgaris*). 2016 Botany Conference. 30 July through 3 August 2016. Savannah, GA.

Varenhorst, A., K. Grady, R. Beck, C. Graham, T. Nleya, E. Byamukama, A. Bachmann, P. O. Johnson, C. Tande, and F. Mathew. 2016. Sunflowers in South Dakota: A summary of the South Dakota State University extension efforts for 2015. 2016 National Sunflower Association Research Forum. 12 January 2016. Fargo, ND.

Knodel, J., J. P. Michaud, P. Beauzay, and **A. Varenhorst**. 2016. Efficacy of insecticide seed treatments and soil insecticides for management of wireworms in sunflowers. 2016 National Sunflower Association Research Forum. 12 January 2016. Fargo, ND.

Posch, J. P., **A. J. Varenhorst**, and F. M. Mathew. 2015. Interaction between soybean cyst nematode and stem canker pathogens. 11th Annual AgOutlook. 10 December 2015. Sioux Falls, SD.

Dunbar, M. W., **A. J. Varenhorst**, E. W. Hodgson, M. E. O'Neal, A. J. Gassmann. 2015. True armyworm, rye cover, and no-till: An unfortunate combination in 2015. 63rd Annual Meeting of the Entomological Society of America. 17 November 2015. Minneapolis, MN.

Pritchard, S. R., **A. J. Varenhorst**, A. Singh, A. Singh, I. Valmorbidia, M. E. O'Neal. 2015. Effect of soybean trichome density on soybean aphid and its natural enemies. 63rd Annual Meeting of the Entomological Society of America. 16 November 2015. Minneapolis, MN.

Varenhorst, A. J., M. T. McCarville, and M. E. O'Neal. 2015. Fitness costs associated with virulent soybean aphids. 2015 Soybean Breeders Workshop: Entomology and Agronomy. 17 February 2015. St. Louis, Missouri.

Varenhorst, A. J., M. T. McCarville, and M. E. O’Neal. 2014. Fitness costs associated with virulent soybean aphids. Soybean Aphid Field Day. 14 August 2014. Iowa State University Field Extension Education Laboratory Boone, Iowa.

McCarville, M. T., **A. J. Varenhorst,** M. E. O’Neal. 2014. Tougher than we all thought? Re-evaluating the surprisingly durable *Rag* genes. Soybean Aphid Field Day. 14 August 2014. Iowa State University Field Extension Education Laboratory Boone, Iowa.

Varenhorst, A. J. and M. E. O’Neal. 2009. Can reduced-risk insecticides prevent soybean aphid outbreaks? 57th Annual Meeting of the Entomological Society of America. 14 December 2009. Indianapolis, Indiana.

Photo Credits

Environmental Entomology. 2015. Environ. Entomol. 44. Front cover.

United Soybean Board. 2015. Leading experts stress need for cooperation on honey bee health. News from the Checkoff. 16 June 2015.

United Soybean Board. 2015. Checkoff studies soybean-honey bee relationship. News from the Checkoff. 16 June 2015.

Gill, K. 2015. Everyone can play a role in pollinator conservation. Ecological Landscape Alliance.
<http://www.ecolandscaping.org/01/beneficials/everyone-can-play-a-role-in-pollinator-conservation/>

Pearce, R. Researchers abuzz about soybean yields. Country Guide.
<http://www.country-guide.ca/2014/11/07/researchers-abuzz-about-soybean-yields/45085/>

Adamson, N. L., B. Borders, J. Cruz, S. Foltz-Jordan, K. Gill, J. Hopwood, E. Lee-Mäder, A. Minnerath, and M. Vaughn. 2014. Pollinator plants mid-Atlantic region. Cover, picture 15.

Vaughn, M. 2014. USDA NRCS Honey bee monitoring training. USDA NRCS West National Technology Support Center and Pollinator Program. Webinar 29 May 2014 picture C.

Jesse, L., D. Lewis, J. Coats, and M. Shour. 2013. Protecting bees from pesticides. Iowa State University Extension and Outreach. Pub SP 455.

O’Neal, M., and E. Hodgson. 2013. Best practices to promote pollinator habitat. Integrated Crop Management News. 15 August 2013

Heidel-Baker, T., E. Hodgson, and M. O’Neal. Conserving Bees in Iowa Field Crops. Iowa State University Extension and Outreach. Pub 293-13.

Hodgson, E., and T. Heidel-Baker. 2013. Soybean aphid field guide. North Central Soybean Research Program. P. 46. Pub CSI 0060.

O'Neal, M., and E. Hodgson. 2013. Bee health in the news. Iowa State University Extension and Outreach. Integrated Crop Management News. 9 May 2013.

Leopold Center. 2013. Conserving beneficial insects with native plants. Front, Back (pp. 4, 6, 8).

Practical Farmers of Iowa. 2012. The buzz about best pollinator practices.
<http://practicalfarmers.org/blog/2012/the-buzz-about-best-pollinator-practices>.

Hodgson, E., A. Sisson, D. Mueller, L. Jesse, E. Saalau-Rojas, and A. Duster. 2012. Field crop insects. Iowa State University Extension and Outreach. Pg. 37 top. Pub CSI 0014.

McCarville, M., E. Hodgson, and M. O'Neal. 2012. Soybean-aphid resistant soybean varieties for Iowa. Iowa State University Extension and Outreach. Integrated Crop Management News. Pub PM 3023

Teaching Experience

Teaching Assistant

Fundamentals of Entomology and Pest Management (Entomology 376), Iowa State University
Lab Teaching Assistant, Spring 2015, 2014 (two sections), 2013, 2012
Lab Teaching Assistant Coordinator, Spring 2015

Insect Biology (Entomology 370), Iowa State University
Lab Teaching Assistant, Fall 2013, 2012, 2011

Entomology (Entomology 300), Briar Cliff University
Lab Teaching Assistant, Fall 2008

Mentoring Experience

Graduate Student Advisor

Ph.D. Students:

Student: Surendra Neupane
Status: In progress

M.S. Students:

Student: Cole Dierks
Status: In progress

Student: John Posch

Status: Graduated

Student: Brady Hauswedell

Status: In progress

Student: Sophia Conzemius

Status: In progress

Graduate Student Committee

Ph.D. students

Student: Biyi Chen

Status: In progress

Student: Paul Okello

Status: In progress

M.S. students

Student: Taylor Hanson

Status: Graduated

Student: Bret Owen

Status: Graduated

Graduate Student Mentor

Student Mentored: Shelby Pritchard (M.S.)

Status: Graduated

Undergraduate Student Mentor

Student: Mackenzie Mattern

Project title:

Affiliation: South Dakota State University

Duration: 2016-2018

Student: Patrick Wagner

Project title: Examining the effect of insecticide application timing.

Affiliation: Iowa State University

Duration: 2012-2013

George Washington Carver Student Advisor/Mentor

Student Mentored: Danaisa Green

Project title: Determining the presence of fitness costs associated with biotype-4 soybean aphids.

Affiliation: Iowa State University

Duration: Summer 2014

Tutoring

Introduction to Microbiology (Biology 239), Briar Cliff University

Tutor, Fall 2008. Three students.

Environmental Science (Environmental Science 110), Briar Cliff University

Tutor, Winter 2008. One student.

Awards and Scholarships:

- | | |
|------|---|
| 2017 | International IPM Award of Excellence: Soybean Entomology for North Central Soybean Research Project |
| 2017 | National Association of County Agricultural Agents Communication Award: Newsletter by a Team Regional Winner |
| 2017 | Curtis Stern Memorial Scholarship from National Sunflower Association, student: Brady Hauswedell |
| 2016 | Griffith Undergraduate Research Award, student: Mackenzie Mattern |
| 2015 | ISU Teaching Excellence Award |
| 2014 | ISU Department of Entomology, Jim Oleson Scholarship in Entomology |
| 2014 | 1 st Place Plant-Insect Ecosystems Session 19. 62 nd Annual ESA National Meeting, Student Ten-Minute Presentation (TMP), Portland, OR |
| 2014 | Best in Section Award. Student Talk Competition at 1 st Graduate and Professional Student Research Conference – ISU, Ames, IA |
| 2014 | 2 nd Place Plant-Insect Ecosystems Session II Ph.D. Competition at 69 th Annual ESA NCB meeting, Student Ten-Minute Presentation (TMP), Des Moines, IA. |
| 2013 | ISU Department of Entomology, Jim Oleson Scholarship in Entomology |
| 2013 | 2 nd Place Plant-Insect Ecosystems Session II Ph.D. Competition at 68 th Annual ESA NCB meeting, Student Ten-Minute Presentation (TMP), Lincoln, NE |
| 2012 | ISU Department of Entomology Alumni Scholarship |

- 2012 2nd Place Plant-Insect Ecosystems Session II Ph.D. Competition at 67th Annual ESA NCB Meeting, Student Ten-Minute Presentation (TMP), Minneapolis, MN
- 2012 North Central Branch of the Entomological Society of America, 2012 Presidential Student Travel Scholarship, Rapid City, SD
- 2011 ISU Department of Entomology, Wayne A. Rowley Scholarship
- 2011 3rd Place Plant-Insect Ecosystems Session II M.S. 66th Annual ESA NCB Meeting, Student Ten-Minute Presentation (TMP), Minneapolis, MN
- 2009-2011 ISU Department of Entomology, Miller Graduate Fellowship
- 2008-2009 Briar Cliff University, BCU Grant
Briar Cliff University, National Smart Grant
- 2008-2009 Briar Cliff University, Academic Scholarship
Briar Cliff University, Leadership Scholarship
- 2007-2008 Briar Cliff University, Academic Award Scholarship
Briar Cliff University, Leadership Scholarship
Briar Cliff University, Academic Competitiveness Grant
- 2006-2007 Briar Cliff University, Academic Award Scholarship
Briar Cliff University, Leadership Scholarship
Briar Cliff University, BCU Grant

Service and Society:

Organizations

Agronomy, Horticulture, and Plant Science Department, South Dakota State University
Department Search Committees
Lecturer Positions

Extension Committees

DakotaFest Planning Committee 2016-present
Roadside Working Group 2015-present
Monarch and Pollinator Planning Summit 2017-present

Department Committees

Greenhouse committee 2016-present
Seminar committee 2016-present

Entomology Graduate Student Organization, Iowa State University

Member, 2009-2015
Student Chair of the Social Committee 2009-2015
Student Chair of the Newsletter Committee 2013-2015
Treasurer, 2010-2011, 2012-2013
President, 2011-2012
Volunteer at:
Annual EGSO Film Festival 2009, 2010, 2011, 2012, 2013, 2014
Edwards Elementary School Science Night 2010, 2011
EGSO participation in VEISHEA 2010, 2011, 2012, 2013

Briar Cliff Science Club, Briar Cliff University
Member 2006-2009
Vice President 2008-2009

Professional Societies

Entomological Society of America
Member, 2008 to present

Roles as a faculty member:

North Central Branch Student Awards Committee Chair 2017 to present
North Central Branch Students Awards Committee 2016 to present
North Central Branch
2016: Ph.D. student presentation competition judge
2017: M.S. student poster competition judge

Roles as a graduate student:

North Central Branch Student Affairs Committee Representative 2012-2014
National Student Affairs Committee Representative 2012-2014
Treasurer of the North Central Branch Student Affairs Committee 2013-2014
North Central Branch Local Arrangements Student Representative 2013-2014
ESA and Foundations Awards Committee Member 2012-2013

National Association of County Agricultural Agents
Member, 2016 to present

Honor Societies

Gamma Sigma Delta: The Honor Society of Agriculture
Member Iowa State University Branch 2011 to 2015
Member South Dakota State University Branch 2015 to present

Community and Other

Pheasants Forever, Member 2008 to present

The National Audubon Society, Member 2008-2012

The Nature Conservancy, Member 2008-2012

The Sierra Club, Member 2008-2012

Reviewer for:

Biological Control
The Journal of Arthropod-Plant Interactions

Technical Skills

Designed and implemented a complete randomized design and also randomized complete block design for field research.

Computer: Microsoft Office (Word, Excel, Power Point, Access), Photoshop, SAS statistical software

Farm machinery operator, equipment repair and maintenance.

Training Programs/Short Courses

Hosted:

Winter IPM Short Course. 2016. Hosted by: Emmanuel Byamukama, Adam Varenhorst,

Pollinator Workshop Short Course. 2016. Hosted by: Adam Varenhorst and Amanda Bachmann. 11 attendees.

Participant:

Bridges: Building a Supportive Community (South Dakota State University). Title IX training. Completed 04/10/17.

SDSU Extension Fall Conference. Mini Workshop: Conflict management. Completed.

SDSU Extension Fall Conference. Mini Workshop: Working with public figures. Completed.

Faculty Inquiry Group (FIG). 2015-2016. What the best college teacher's do. Presented by South Dakota State University Center for the Enhancement of Teaching and Learning. Completed.

Active Shooter Training Class. Presented by Division of Technology and Security. 10/29/15.

Building Research Teams. Presented by Dianne Nagy. South Dakota State University. Completed 10/27/15.

Bridges: Building a Supportive Community (South Dakota State University). Title IX training. Completed 10/6/15.

Federal Required Training: Responsible Conduct of Research. Presented by Norm Braaten. South Dakota State University. Completed 9/24/15.

Prospecting for Funding Opportunities. Presented by Dianne Nagy. South Dakota State University. Completed 9/24/15.

Graduate Assistants: Employee vs. Student. Presented by Tracy Greene, Kinchel Doerner, and David Hanson. South Dakota State University. Completed 9/15/15.

Federal Requirements for Data Management Plans & Public Access. Presented by Jim Doolittle and Kristi Tornquist. South Dakota State University. Completed 9/15/15.

Research at SDSU Workshop for New Faculty. Presented by Kevin Kephart, Jim Doolittle, Dianne Nagy, Kay Scheibe, Michelle Mucciante, and Will Aylor.

Preventing Discrimination and Sexual Violence: Title IX, VAWA and Clery Act for Faculty and Staff. Iowa State University. Completed 8/5/15.

Unlawful Harassment Prevention for Higher Education Staff. Iowa State University. Completed 2/14/14.

Title IX Awareness and Violence Prevention for Higher Education Students. Iowa State University. Completed 2/14/14

Aphid Identification Program

Attended a five-day mentoring program presented by Dr. David Voegtlin from the University of Illinois at the University of Illinois.



28 September 2021

Michael Bollweg
Bollweg Farms
Tumbleweed Lodge
20210 322nd Ave.
Harrold, SD 57536

RE: RED SUNFLOWER SEED WEEVILS

Dear Michael Bollweg,

The red sunflower seed weevil is a native pest of sunflower in South Dakota. When left unmanaged, the red sunflower seed weevil is capable of infesting approximately 80% of the developing seeds in a sunflower head. Since 2016, populations of red sunflower seed weevils have been observed in South Dakota that are 10-100x over the economic threshold of 4-6 weevils per sunflower head. In addition, SDSU Extension entomologists have received reports of insecticide application failures for red sunflower seed weevils since 2017. These reports were for the pyrethroid class active ingredient lambda-cyhalothrin. Since 2017, research from South Dakota State University has concluded that there are populations of red sunflower seed weevils with reduced susceptibility to pyrethroid class insecticides. On-going research is aimed at determining the level of reduced susceptibility and compare the populations tested in South Dakota to those from neighboring states. Our observations of red sunflower seed weevils in several counties in South Dakota during 2021 indicate that very large populations are present within fields. We are continuing to test populations using laboratory assays.

At this time, we recommend that all sunflower fields be scouted, and insecticides be applied when the threshold for red sunflower seed weevils is exceeded. Due to the numerous field failures, we are recommending that lambda-cyhalothrin not be used for management of the red sunflower seed weevil. We also are recommending that fields are scouted 24-48 hours after insecticide application to determine if the treatment successfully reduced the red sunflower seed weevil populations. To prevent additional issues with labeled insecticide products we recommend tank mixing two insecticides with different modes of action (not including lambda-cyhalothrin) or using a product that is not from the pyrethroid insecticide class.

Sincerely,

A handwritten signature in black ink, appearing to read 'Adam Varenhorst'.

Dr. Adam Varenhorst

Assistant Professor and Extension Field Crop Entomologist

South Dakota State University