Dirk Victor Charlson

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Resume Summary:

Crop Physiologist and Soybean Breeder with 12+ years professional experience

- conducting public and commercial research in the agriculture industry
- demonstrating competency in several disciplines ranging from molecular biology to applied field research
- contributing to scientific understanding of crop response to drought, nutrient availability, and diseases
- 14 peer-reviewed manuscripts, 3 research grants, and 5+ by-invitation research presentations
- experience teaching college biology and genetics courses
- leading and managing a commercial soybean breeding program
- entrepreneur and precision agriculture specialist

Education:

2003	Ph.D.	Plant Physiology	Iowa State University, Ames, IA
2000	M.S.	Plant Pathology	Iowa State University, Ames, IA
1997	B.S.	Biology	Iowa State University, Ames, IA
1995	A.A. & A.A.S	Biology	North Iowa Area Community College, Mason City, IA

Professional Experiences:

2015 - Present — **Precision Agriculture Advisor (*Owner*)**, Nor'Star Precision Agriculture Solutions, Forest City, IA
- Building relationships between growers and precision agriculture services
- Unmanned-aerial vehicle education and operations

2011 – 2015 — **Research Scientist (*Soybean Breeder and Manager*)**, Soybean Product Development, DuPont Pioneer, South Dakota Research Center, Volga, SD
- Evaluated and developed soybean MG I and MG II products for South Dakota and Western Minnesota
- Lead soybean breeding research team and program

2010 – 2011 — **Research Scientist (*Maize Molecular Breeding Support*)**, Research Information Management, DuPont Pioneer, South Dakota Research Center, Volga, SD
- Facilitated and supported deployment of molecular breeding technologies to maize breeders in South Dakota, North Dakota, Minnesota, and Manitoba-Canada

Teaching Experiences:

2008 – 2009 — **Biology Instructor**, Science Department, Northwest Arkansas Community College, Bentonville, AR. Teaching undergraduate Principles of Biology course with laboratory.

2007 — **Instructor**, Knowledge Is Power Program (KIPP), College Residential Institute, University of Arkansas-Fayetteville. Teaching 9th and 10th grade high school students about plant sciences and scientific method.

2006 — **Biology Instructor**, Science Department, Columbia College, Columbia, MO. Teaching undergraduate, senior-level genetics course with laboratory.

2006 — **Biology Instructor**, Biology Department, Moberly Area Community College, Columbia Campus, Columbia, MO. Teaching non-major undergraduate biology with laboratory.

2004 – 2005 — **Instructor**, EXPRESS Program, University of Missouri-Columbia. National Institutes of Health (NIH) funded program that provides opportunities for freshman and sophomores with minority status to work in research laboratories.

Graduate and Post-Graduate Research Experiences:

2006 – 2009 **Post-Doctoral Research Associate (*Soybean Physiology*)**, Department of Crop, Soil, and Environmental Science, University of Arkansas, Fayetteville, AR

- Conducted genetic and physiological research on drought tolerance and nitrogen metabolism in soybean
- Mentor: Dr. Larry Purcell

2004 – 2006 **Life Sciences Post-Doctoral Fellow (*Plant Molecular Biology*)**, Biochemistry Department, University of Missouri, Columbia, MO

- Two-year fellowship to conduct physiological and genetic research on iron homeostasis in Arabidopsis
- Mentor: Dr. Elizabeth Rogers

2000 – 2003 **Graduate Research Assistant (*Soybean Genetics and Physiology*)**, Agronomy Department, Iowa State University, Ames, IA

- Ph.D. Dissertation: "Investigation of iron deficiency chlorosis in soybean"
- Conducted breeding, and genetic and physiological research on soybean iron-deficiency chlorosis.
- Advisor: Dr. Randy Shoemaker

1997 – 1999 **Graduate Research Assistant (*Soybean Plant Pathology*)**, Department of Plant Pathology, Iowa State University, Ames, IA

- M.S. Thesis: "Investigation of hatch stimulation in *Heterodera glycines* Ichinohe"
- Conducted physiological research on soybean cyst nematode
- Advisor: Dr. Gregory Tylka

Selected Refereed Publications (by topic):

Iron Deficiency Chlorosis

Rourke, J. A., **D. V. Charlson**, D. O. Gonzalez, L. O. Vodkin, M. A. Graham, S. R. Cianzio, M. A. Grusak, and R. C. Shoemaker. **2008**. Microarray analysis of iron-deficiency chlorosis in near-isogenic soybean lines. BMC Genomics 8:476-489.

Charlson, D. V. and R. C. Shoemaker. **2006**. Evolution of iron acquisition in higher plants. Journal of Plant Nutrition 29:1-17.

Cianzio, S. R., R. C. Shoemaker, and **D. V. Charlson**. **2006**. Genomic Resources of agronomic crops, *In* L.L. Barton and J. Abadía (eds.), Iron Nutrition in Plants and Rizhospheric Microorganisms, Springer, pp. 449-466.

Charlson, D. V., T. B. Bailey, S. R. Cianzio, and R. C. Shoemaker. **2005**. Molecular marker Satt481 is associated with iron-chlorosis resistance in a soybean breeding population. Crop Science 45:2394-2399.

Charlson, D. V., T. B. Bailey, S. R. Cianzio, and R. C. Shoemaker. **2004**. Breeding soybean for resistance to iron-deficiency chlorosis and soybean cyst nematode. Soil Science and Plant Nutrition 50:1055-1062.

Charlson, D. V., S. R. Cianzio, and R. C. Shoemaker. **2003**. Associating SSR markers with soybean iron chlorosis. Journal of Plant Nutrition 26:2267-2276.

Soybean Cyst Nematode

Charlson, D. V., K. R. Harkins, and G. L. Tylka. **2008.** Relationship between juvenile hatching and acridine orange fluorescence of *Heterodera glycines* eggs. Nematology 8:603-610.

Charlson, D. V. and G. L. Tylka. **2003**. *Heterodera glycines* cyst components and surface disinfestants affect *H. glycines* hatching. Journal of Nematology 35:458-464.

Selected Refereed Publications (by topic): continued

Drought and Nitrogen Fixation

Fritschi, F. B., J. D. Ray, L. C. Purcell, C. A. King, J. R. Smith, and **D. V. Charlson**. **2013.** Diversity and implications of soybean stem nitrogen concentration. Journal of Plant Nutrition 36:2111-2131.

Charlson, D. V., S. Bhatnagar, C. A. King, L. C. Purcell, J. D. Ray, C. H. Sneller, and T. E. Carter Jr. **2009**. Polygenic inheritance of canopy wilting in soybean [*Glycine max* (L.) Merr.]. Theoretical and Applied Genetics 119:587-594.

Charlson, D. V., K. L. Korth, and L. C. Purcell. **2009.** Allantoate amidohydrolase transcript expression is independent of drought tolerance in soybean. Journal of Experimental Botany 60: 847-851.

National Scientific Meeting and Invited Presentations:

"Convergent evolution of ureide-catabolizing enzymes in plants and animals." October 6, **2008**. ASA-CSSA-SSSA International Annual Meeting, Houston, TX.

"Update on molecular markers for soybean resistance to iron chlorosis." February 23, **2005**. Soybean Breeders Workshop, St. Louis, MO.

"Functional analysis of soybean genes for iron-deficiency chlorosis." February 21, **2002**. North Central Soybean Research Program, Nashville, TN.

"Molecular markers for breeding iron deficiency chlorosis." January 10, **2001**. Iowa Soybean Promotion Board, Ames, IA.

"Surface disinfestation of *Heterodera glycines* eggs affects hatch behavior." July 8, **1999**. Joint Meeting of The American Society of Parasitologists and The Society of Nematologists, Monterey, CA.

Selected Academic Presentations:

"Investigations in soybean iron chlorosis, soybean cyst nematode, and iron acquisition in plants." September 27, **2004**. Interdisciplinary Plant Group Fall Seminar Series, University of Missouri.

"Breeding for soybean iron chlorosis resistance." September 13, **2002**. Center for Plant Responses to Environmental Stress Fall Seminar Series, The Plant Sciences Institute, Iowa State University.

"Linking the physiology with the genetics of iron-deficiency chlorosis in soybean." October 9, **2001**. Crop Production and Physiology Fall Seminar Series, Agronomy Department, Iowa State University.

"The biology, management, and genetics of iron-deficiency chlorosis in soybean." February 6, **2001**. Department of Plant Pathology Spring Seminar Series, Iowa State University.

Certifications and Diploma:

North Iowa Area Community College, Mason City, IA

(2017)	Diploma	Agriculture Technology
(2017)	Certificate	PappaJohn Entrepreneurial Program

North Iowa Air Service, Mason City, IA

(2017) Private Pilot Certificate

Iowa Commercial Pesticide Applicator License

- Category 1A (Agricultural Weed Control)
- Category 1B (Agricultural Insect Control)
- Category 1C (Agricultural Crop Disease Control)
- Category 4 (Seed Treatment)
- Category 9 (Regulatory Pest Control)
- Category 10 (Demonstration and Research Pest Control)

Continuing Education Units (2014 - Present):

Remote Sensing: The Present and The Promise. (1.0 CM) (March 9, 2016). Precision Ag Updates Webinar Series

UAVs in Crop Agriculture: Practical Applications and Lessons from Manned Aviation. (1.0 CM) February 10, 2016. Precision Ag Updates Webinar Series

On-farm Trial Replicated Strip Trials: From Data Collection, Analyses to Decisions. (1.0 CM) January 13, 2016. Precision Ag Updates Webinar Series

Soil Fertility Management with Tight Crop Production Margins. (1.0 NM) January 15, 2016. Crop Advantage-Iowa State University Extension and Outreach, Mason City, IA

Genetic Selection and Seeding Rate Considerations for Tight Margins. (1.0 CM) January 15, 2016. Crop Advantage-Iowa State University Extension and Outreach, Mason City, IA

Best Practices for Alfalfa Establishment: Soil Fertility, Variety Selection and Planting. (1.0 CM) January 15, 2016. Crop Advantage-Iowa State University Extension and Outreach, Mason City, IA

The Most Expensive Herbicide Program is One that Doesn't Control Weeds. (1.0 PM) January 15, 2016. Crop Advantage-Iowa State University Extension and Outreach, Mason City, IA

Application of UAV-Based Remote Sensing for Assessing Crop Stress. (2.5 CM) November 17, 2015. ASA, CSSA, and SSSA International Annual Meetings, Minneapolis, MN

Novel Approaches on Site-Specific Integrated Pest Management. (2.0 IPM) November 17, 2015. ASA, CSSA, and SSSA International Annual Meetings, Minneapolis, MN

Beyond the Penman-Monteith: Instruments and Approaches for Precision Water Stress. (4.0 SW) November 17, 2015. ASA, CSSA, and SSSA International Annual Meetings, Minneapolis, MN

Saline and Sodic Soil Management. (2.5 SW) August 12, 2014. South Dakota State University Extension, White Lake, SD

Continuing Education Meetings and Workshops (2016):

Ag PhD Soil Clinic. February 23, 2016. Ag PhD, Osage, IA

Optimizing Your Equipment-John Deere. January 18-19, 2016. Precision Agriculture: 5th Annual Action Summit. North Dakota Farmers Union, Jamestown, ND

Managing Data and Imagery: Satellite, UAS, and Remote Sensing. January 18-19, 2016. Precision Agriculture: 5th Annual Action Summit. North Dakota Farmers Union, Jamestown, ND

Precision Ag 101: Where do I Start? January 18-19, 2016. Precision Agriculture: 5th Annual Action Summit. North Dakota Farmers Union, Jamestown, ND

Precision Ag 201: Maximizing Yield Data. January 18-19, 2016. Precision Agriculture: 5th Annual Action Summit. North Dakota Farmers Union, Jamestown, ND

Professional Affiliations:

American Society of Agronomy
Crop Science Society of America
International Society of Precision Agriculture
UAV Systems Association