

# Abbreviated Curriculum Vitae

2016 to Present

Revised 26 February, 2019

## David B. Hannaway

Professor of Crop Science  
Department of Crop & Soil Science  
Oregon State University  
Corvallis, OR 97331-3002

Phone: 541-737-5863 (office); 541-231-2555 (mobile)

E-Mail: david.hannaway@oregonstate.edu

Professional Web Page: <http://cropandsoil.oregonstate.edu/content/david-hannaway>

### Educational Background

- **Ph.D.** Plant Physiology, University of Kentucky, 1979
- **M.S.** Plant & Soil Science, University of Tennessee, 1975
- **B.S.** Plant Science, University of Delaware, 1973

### Academic/Professional Work Experience (Oregon State University)

- **2016-Present:** Professor, Forage Crops; 40% Research, 25% Extension, 15% Teaching, 15% Administration, 5% Service; Department of Crop & Soil Science
- **1995-2016:** Professor, Department of Crop & Soil Science
- **1985-1995:** Associate Professor, Department of Crop & Soil Science
- **1979-1985:** Assistant Professor/Extension Forage Specialist; Department of Crop Science

## RESEARCH ACTIVITIES

### Research Accomplishments

#### *Publications (last 3 years)*

##### *Journal Manuscripts*

- 2019: 1 journal publication to date, 8 in preparation
- 2018: 2 journal publications
- 2017: 5 journal publications

##### *Abstracts and Presentations*

- 2019: None to date
- 2018: 8 International, 2 US
- 2017: 3 International, 3 US

### Current Research Projects

#### 1. AES Hatch Collaborative Research Project (2017-2021)

“Developing seasonal production profiles of key Oregon forage species using crop modeling and field validation for sustainable forage-livestock systems.” Approved, December 2015: Project ORE0217; Partially funded (\$30,000) January, 2017. Remainder of funding provided subsequently provided for 2017. 2018-2021, \$50,000 per year.

Collaborators include G. Wang, S. Ates, M. Bohle, S. Filley, and T. Downing.

## **2. *Optimal Forage Species Selection Using GIS-based Mapping***

Agroecology-based project integrating digital elevation, climate, soil, and species suitability information to improve forage species selection. Efforts include participation by multiple departments and colleges within Oregon State University and other universities, agencies, and organizations in the USA, PRC, Taiwan, Thailand, Vietnam, Indonesia, Australia and New Zealand.

Continuing discussions with agricultural economists to incorporate concepts of spatial economic modeling. Forage species include perennial, cool- and warm-season grasses, alfalfa, and clovers.

Collaborators include Chris Daly, Mike Halbleib, Chris Ringo, Len Coop, Guojie Wang, Serkan Ates, and international colleagues.

## **3. *Modeling Potential Seasonal and Annual Yield***

Project is using crop simulation modeling to estimate forage production potential across the landscape. Work is a collaborative effort involving faculty and students from Lincoln University (NZ), China Agricultural University (PRC), Jiangsu Academy of Agricultural Sciences (PRC), and Oregon State University (OSU).

The NZ focus is alfalfa within grazing systems. US focus and scope is Oregon alfalfa and grass hay production and mixed clover-grass pastures. Seasonal and total annual yield will be predicted using crop simulation models, with assistance from AgMIP program organizers from the University of Florida.

Collaborators include Derrick Moot (Lincoln University), FENG Liping (China Agricultural University), CAO Hongxin (Jiangsu Academy of Agricultural Sciences), and Chris Daly, Mike Halbleib, Len Coop, Guojie Wang, and Serkan Ates (OSU).

## **4. *Developing a Maturity Index for Cool-season Grass Species and Cultivars***

Phenological development is an important management indicator for forage species since quality and quantity are closely related to plant maturity at harvest. Climate-based maturity stage timing estimates for all species and cultivars in all global locations would be useful for selecting planting mixtures and formulating recommendations for cutting management, forecasting forage quality, and estimating forage production potential. This project will develop a universal maturity index for cool-season forages grasses by creating a function that includes photoperiod and temperature-mediated development parameterized for each species, ecotype, and cultivar of key cool-season forage grasses.

Collaborators include Roeland Kapsenberg, Steve Reid, and Jerome Magnuson (DLF); Serkan Ates, Len Coop, Guojie Wang, Mylen Bohle, and Shelby Filley (OSU); Liping Feng (China Agricultural University); Feng He and Xianglin Li (Chinese Academy of Agricultural Sciences); Derrick Moot and Xiumei Yang (Lincoln University, NZ); Peter Ballerstedt (Barenbrug USA); Jerry Hall (Grassland Oregon).

## **5. *Modeling and Mapping Suitability Zones for Alfalfa Cultivar Types***

This project is modeling and mapping the 11 fall dormancy (FD) and 6 winter survival index (WSI) types of alfalfa by defining their quantitative tolerances. Functional relationships will be developed covering the entire range of values for climate and soil conditions. Each FD and WSI value will be characterized and mapped to display the areas best suited for cultivar classification. Validation work with crop simulation models will utilize existing field trial information from all alfalfa-growing regions in the US and China.

Collaborators include Feng He and Xianglin Li (Chinese Academy of Agricultural Sciences); Liping Feng (China Agricultural University); Derrick Moot and Xiumei Yang (Lincoln University, NZ); Len Coop, Guojie Wang, Mylen Bohle (OSU).

## 6. Evaluation of Warm-season Grasses for Use in Oregon

Seasonal distribution of forage growth of cool-season species leaves a summer production gap that could be filled by warm season annuals and perhaps some cold-tolerant perennials. Project is consistent with AES Hatch funds collaborative project proposal and Guojie Wang's initial research plan. Field plantings were established at the Union Experiment Station in 2016. First data was taken in 2017.

Collaborators include Guojie Wang, Serkan Ates, Mylen Bohle (OSU).

## Publications (last 3 years, 2017-2019)

### *Journal Manuscripts*

#### In Progress

- Shuai, Y., H. Guana, W.C. Keb, D.B. Hannaway, X.L. Lia, X.M. Lia, Q. Pua, Q.F. Rane, Y.H. Yana, X.Q. Zhanga. 201X. Submitted. Effects of single and multiple inoculants on Napier grass silage with two dry matter levels. **Animal Feed Science & Technology J.** [Role: Research project discussions during China "Foreign Expert" teaching at NWAUFU; review, revision, rewrite of entire journal manuscript.]
- Lui, Bo, David B. Hannaway, and Shuhao Tan. 201X. Submitted. Can Social Capital Help Younger Herders Rent Grassland Areas? **Land Use Policy J.** [Role: Review and rewriting of entire manuscript with grassland scientist perspective.]
- Li, Xiaodong, Xiaoli Wang, Jiahai Wu, Erru Yu, David B. Hannaway, Lu Cai, and Yiming Cai. 201X. In Revision. Transcriptional analyses provide insights into molecular mechanisms of response to nitrogen stress in tall fescue. **American J. Bot.** [Role: Review and rewriting of entire manuscript.]
- Chen, Zhao, Tian Zhao, Wennan Zhou, Xv Liu, Wenbo Jiang, Jian Cui, David B. Hannaway, Quanzhen Wang, and Quan Zhang. 201X. In Revision. Seed yield can be explained by altered yield component contributions in field-grown western wheatgrass (*Pascopyrum smithii* Rydb.) **Journal TBD.** [Role: Review and rewriting of entire manuscript following research group discussions.]
- Yang,\* Yungui, Yanyan Lin, Lu Zhao, Xuemei Yang, Ting Guo, and David B. Hannaway. 201X. In Revision. Effects of cultivars and additives on the quality and nutritional value of oat silage. **Journal TBD.** [Role: Organization, analysis, review, and revising entire manuscript.]
- Shuhao Tan and David B. Hannaway. 201X. In Preparation. Reciprocal use, production factor allocation and environmental efficiency of grassland management. **Ecological Economics J.** [Role: Review and rewriting of entire manuscript with grassland scientist perspective.]
- Lui, Bo, 201X. In Preparation. Social capital, lease period and grassland rental prices: data of 156 herders from Inner Mongolia, P.R. China. **Journal TBD.** [Role: Review and rewriting of entire manuscript with grassland scientist perspective.]
- Cui, Xin, Xinbao Liu, David B. Hannaway, Jian Sun, and Zhihua Li. 201X. In Preparation. Effect of formic acid concentration level on fermentation characteristics of alfalfa silage. **Journal TBD.** [Role: Research project advisor during China Fulbright at Nanjing Agricultural University; Review, revision, rewrite of entire journal manuscript.]

Completed

**2019: 1;** Impact Factor: Sum=1.79, Ave=1.79

Smith, R.W., M. Webb, D. Kidd and D.B. Hannaway. 2019. Mapping pasture species suitability using fine scale soils and climate data. **Crop & Pasture Science**. Impact Factor 1.79. Manuscript CP18573. [Role: Concept discussion, previous work section, and revisions to entire manuscript.]

**2018: 3;** Impact Factor: Sum=6.131, Ave=2.0437

Daly, C., Halbleib, M., Hannaway, D.B., Eaton, L.M. 2018. Environmental Limitation Mapping of Potential Biomass Resources across the Conterminous United States. **Global Change Biology: Bioenergy** (1-18). DOI: 10.1111/gcbb.12496. Impact Factor: 4.655. [Role: Organization, writing, and revisions to crop section of manuscript.]

Wang, Musen, Zhu Yu, Zhe Wu, and David Hannaway. 2018. Effect of *Lactobacillus plantarum* KR107070 and a propionic acid based preservative on the fermentation characteristics, nutritive value and aerobic stability of alfalfa-corn mixture silage ensiled with four ratios. **Grassland Science** 64(1): 51-60. doi: 10.1111/grs.12178. Impact Factor: 0.734. [Role: Fulbright Program Instructor during Wang's M.S. program at Sichuan Agricultural University; subsequently research program co-advisor during his PhD program at China Agricultural University; manuscript design and revisions.]

Nguyen, Thanh, Nga Thi, Thanh Le, Jouni Havukainen, and David B. Hannaway. 2018. Pesticide use in vegetable production: A survey of Vietnamese farmers' knowledge. **Plant Prot. Sci.** 54: 203–214. <https://doi.org/10.17221/69/2017-PPS>. Impact Factor: 0.742 (2016). [Role: Organization, writing, and revisions of entire manuscript.]

**2017: 4;** Impact Factor: Sum=10.36, Ave=2.59

Wang, Mingya, Longyu Hou, Yanqiao Zhu, Qiang Zhang, Hui Wang, Fangshan Xia, Lingling Chen, Peisheng Mao, and David B. Hannaway. 2017. Siberian wildrye seed yield limited by assimilate source. **Field Crops Res.** Impact Factor: 3.048. [Role: Organization and rewriting entire manuscript.]

He, Feng, Kun Wang, Xianglin Li, and David B. Hannaway. 2017. Effects of precipitation and clipping intensity on net primary productivity and composition of *Leymus chinensis* in temperate grasslands. **PLoS ONE** PONE-D-17-14028R3. Impact Factor: 2.806. [Role: Organization, analysis, review, and rewriting entire manuscript.]

Wang M., L. Hou, Q. Zhang, X. Yu, L. Zhao, J. Lu, P. Mao, D. B. Hannaway. 2017. Influence of row spacing and P and N applications on seed yield components and seed yield of Siberian wildrye (*Elymus sibiricus* L.). **Crop Science** 57(4): 2205-2212. doi:10.2135/cropsci2016.08.0713. Impact Factor: 1.7 (2015-2017). [Role: Organization, writing, and revisions of entire manuscript.]

Gu, Dongxiang, Fengxian Zhen, David Hannaway, Yan Zhu, Leilei Liu, Weixing Cao, and Liang Tang. 2017. Quantitative Classification of Rice (*Oryza sativa* L.) Root Length and Diameter Using Image Analysis. **PLoS ONE** 12(1): e0169968. doi:10.1371 / journal.pone.0169968. Impact Factor: 2.806. [Role: Organization, data analysis, writing, and revisions.]

Manuscripts Reviewed and Revised for Colleagues

Zhou, Jiqiong, Gail W.T. Wilson, Adam B. Cobb, Gaowen Yang, Yingjun Zhang. 2019. Improving alfalfa establishment with phosphorus amendments and mowing to facilitate restoration of degraded grasslands. *Land Degradation & Development* (volume and pagination not yet assigned) <https://doi.org/10.1002/ldr.3251> [Senior author is Sichuan Agricultural University colleague, last author is China Agricultural University colleague. Role: Revision of entire manuscript for organization and native speaker English.]

Books, Chapters, and Other Peer-Reviewed Publications

Ates, S.\*, H. Cicek, W.B Lindsay, C.N. Hayley, D.E. Mayberry, S. Kassam, D.B. Hannaway, and M. Louhaichi. 2017. Sustainable Development of Smallholder Crop-Livestock Farming in Developing Countries. In: Proc. 4th International Conference on Sustainable Agriculture and Environment. 10-12 August 2017, Solo, Indonesia. IOP Conf. Series: **Earth and Environmental Science** **142**. doi :10.1088/1755-1315/142/1/012076.

Hannaway, David B., Linda Brewer, Steve Fransen, Glenn Shewmaker, Shannon Williams, and Sarah Baker. 2017. Planning and Sowing Grasslands. Chapter 7 In: **Improving Grassland and Pasture Management in Temperate Agriculture**. Athole Marshall and Rosemary Collins, Eds. ISBN-13: 9781786762009.

Abstracts and Presentations

Hannaway, David B. 2018. Improving Alfalfa Cultivar Selection by GIS Mapping of Fall Dormancy Classes and Modeling Yield. Invited Paper. 1st International Conference on Agricultural Models and Their Application in Modern Sustainable Agriculture & 5th Symposium on the Development and Application of Agricultural System Models. Nov. 11-14, 2018, Nanjing, China.

Hannaway, D., He, F., Moot, D., Yang, X., Mills, A., Smith, R., Teixeira, E., Shewmaker, G., Islam, A., Wang, G. 2018. Improving Alfalfa (*Medicago sativa* L.) Cultivar Selection by GIS Mapping of Fall Dormancy and Winter Survival Index Classes and Modeling Seasonal and Annual Yield. Abstract. 2nd World Alfalfa Congress, Cordoba, Argentina. Nov. 11-14.

Yang, X., Moot, D., Brown, H., Teixeira, E., Hung, T., Hannaway, D. 2018. Modelling Alfalfa (*Medicago sativa* L.) Phenological Development. Abstract. 2nd World Alfalfa Congress, Cordoba, Argentina. Nov. 11-14.

Fan, Q., Blair, S., Hannaway, D. and Wang, G. 2018. Spring-seeded annual forages differ in response to partial-season irrigation. ASA and CSSA Meeting, Nov. 4-7, Baltimore, MD

Fan, Q., Blair, S., Hannaway, D. and Wang, G. 2018. Summer-seeded annual forages differ in response to partial-season irrigation. ASA and CSSA Meeting, Nov. 4-7, Baltimore, MD

Hannaway, David B. 2018. Forage Production & Management Lectures. Sichuan Agricultural University. "Foreign Expert" Program. Oct 7–30. Chengdu, Sichuan Province, China.

Hannaway, David B. 2018. Forage Production & Management Lectures. Northwest Agriculture & Forestry University. "Foreign Expert" Program. Aug. 28–Sep. 6 and Nov. 4-9. Yangling, Shaanxi Province, China.

Hannaway, D.B.\*, L.J. Brewer, S. Ates, N.P. Anderson, G. Wang, S. Filley, C. Daly, M.D. Halbleib, C. Ringo, S. Monk, D.J. Moot, X. Yang, D.F. Chapman, and P. Sohn. 2018. Abstract 27647. In: Proceedings of European Grassland Federation, Cork, Ireland. 17-21 June.

- Hannaway, D.B. 2018. MatchClover: Web-based Tool for Matching Clovers to Climates, Soils, and Intended Uses. Invited Presentation. Tasmanian Institute of Agriculture, Mt. Pleasant Research Center, 09 May.
- Hannaway, D.B. 2018. MatchClover: Web-based Tool for Matching Clovers to Climates, Soils, and Intended Uses. Plenary Paper. Dairy Systems Workshop, Christchurch, New Zealand. 28 Feb.
- Hannaway, D.B. 2017. Oregon Station Report. WERA 1014 – Intensive Pasture Management for Sustainable Livestock Production in the Western US. Ann. Mtg. 30 Nov. – 01 Dec., Reno, NV.
- Shirley, Lindsey and David B. Hannaway. 2017. What can OSU offer Alliance Partners? 俄勒冈州立大学可以为联盟成员提供什么? China-US Extension Alliance Annual Mtg., Yangling, China. 11-13 Sep.
- Hannaway, David B., David Mouat, and Linda J. Brewer. 2017. Greening the Desert: Strategies and Tools for Sustainability. Proc. Kubuqi International Desert Forum. Kubuqi, Inner Mongolia. July 28-30.
- Hannaway, David B. 2017. Oregon State University Forage Projects: Research, Teaching, Extension, and International. Northwest Ag & Forestry Univ. Grassland Sciences Program. 18 July.
- Hannaway, David B. 2017. Oregon State Report to NCCC31- Ecophysiological Aspects of Forage Management Ann. Mtg., Lincoln, NE. 19-21 July.
- Hannaway, David B. 2017. Strategic Plan Discussions. Oregon Forage-Livestock Systems Working Group. La Grande, OR. 28-29 March.
- Hannaway, David B. 2017. A Proposal Presented to Guizhou Governor SUN: “Restoring Desertified Rocky Karst Landscapes and Strengthening Guizhou’s Forage-Livestock Sector.” Guiyang, Guizhou Province, PRC. March 21.
- Hannaway, David B. 2017. Using GIS and Spatial Analysis Techniques for Species Suitability Modeling & Mapping. Lincoln University, Christchurch, NZ. March 8.
- Hannaway, David. 2017. MatchClover – Web Based Tools for Matching Clovers to Climates, Soils and Intended Uses. Oregon Clover Growers’ Annual Meeting. February 8. Wilsonville, Oregon.
- Hannaway, David B. 2016. Improving Alfalfa Cultivar Selection by GIS Mapping of Fall Dormancy and Winter Survival Index Zones and Modeling Seasonal and Annual Yield. Jiangsu Academy of Agricultural Sciences. August 18.
- Hannaway, David B. 2016. Oregon Forages. NCCC-031 Annual Meeting. Corvallis, OR. Jun. 16.
- Hannaway, D.B. 2016. Forages: the seeds of sustainability. American Society of Seed Analysts Annual Meeting. June 6. Portland, Oregon and Seed Technology. 37(2):198. Abstract.
- Hannaway, David B., Patti Sohn, and Ken Cuffe. 2016. MatchClover – a Progress Report. Oregon Clover Commission. West Salem, Oregon. May 11.
- Hannaway, D.B. 2016. Improving Alfalfa Cultivar Selection by GIS Mapping of Fall Dormancy and Winter Survival Index Zones and Modeling Seasonal and Annual Yield. Northwest Agriculture & Forestry University. March 2.
- Shewmaker, G.E., D.B. Hannaway, and S.C. Fransen. 2016. Forages and Grasslands in the Pacific Northwest. Abstract for American Forage and Grassland Council Annual Meeting 10-13 Jan., Baton Rouge, LA.

## Proposals Prepared (Last 3 years, since 2016)

- **Oregon Beef Council (2018)**

“Management of self-regenerating annual clovers in rainfed (hay/silage) and irrigated (dairy grazing) production systems in western Oregon.” Collaborator with Serkan Ates (PI), Troy Downing, Carlos Ochoa, Shelby Filley, Seth Spencer, Larissa McGuire. Status: \$24,500 funded for 2019-2021.
- **Oregon Agricultural Research Foundation (2018)**

“Can novel legume species be successfully used as nurse crops to alleviate problems with the slow establishment of birdsfoot trefoil?” Collaborator with Serkan Ates (PI). Status: \$12,500 requested for 2019-2021. Not funded.
- **Oregon Extension Service Professional Development (2018)**

Participating in annual meeting of China-US University-based Extension Alliance, Anhui Agricultural University. Status: \$1,000 requested, \$500 provided.
- **Oregon State University Sabbatical Leave Application (2017)**

Six-month sabbatical leave (January – June, 2018) to work with Lincoln University and Dairy NZ colleagues. Status: Proposal approved at 80% salary.
- **Oregon Extension Service (2017)**

“Convening a Conversation about the Diabetes Epidemic.” Status: Following a conversation with CAS and CPHHS with Vice Provost Scott Reed, Roberta Riportella (Associate Dean for Outreach and Engagement; Program Leader, Extension Family and Community Health), Sam Angima (Ag Program Leader), and Peter Ballerstedt (Barenbrug USA Forage Products Manager). Status: CPHHS declined to be involved.
- **Guizhou Province, PRC Land Restoration Proposal (2016-17)**

“Restoring Desertified Rocky Karst Landscapes and Strengthening Guizhou’s Forage-Livestock Sector.” Proposal requested by Provincial Governor. Status: Not funded, Vice Governor declared the problem was solved.
- **OSU Learning Innovations Scaled Grant (2016)**

“Grasslands of the World: Virtual Reality-Assisted Educational Modules.” Status: \$99,843 requested for 2 years. Not funded.
- **OSU Global Opportunities Faculty-Led Student Study Program (2016)**

“New Zealand Grazing Systems Course.” Status: Approved; insufficient student numbers to be financially viable.
- **NRCS Conservation Innovations Grant (2016)**

“Developing an Educational Module for Improving Grazing Management.” Status: Not funded.
- **Oregon Agricultural Research Foundation (2016)**

“Evaluation of seasonal yield, forage quality, and persistence of cool-season grass and legume species for sheep production systems in non-irrigated western Oregon pastures.” Co-PI with Serkan Ates, Department of Animal and Rangeland Sciences (A&RS); with: Mary Smallman, Claudia Ingham (A&RS); Shelby Filley: Regional Livestock & Forage Extension Agent, Roseburg; Gene Pirelli: Ag/Livestock/Swine/Forage Extension Polk County; Jerry Hall: Grassland Oregon. Status: Funded for \$12,500.

- **Oregon Beef Council (2016)**  
“Persistence and productivity of winter- and summer-active species pasture mixtures under rainfed, full or deficit irrigation conditions.” Co-PI with Serkan Ates. Status: Funded for \$12,500.
- **FFAR (2016)**  
“A systems approach for enhancement of soil health, farm productivity, and ecosystem services through diversification of forage species and modified grazing practices.” Co-PI with Serkan Ates. Status: Not funded.

### **Grants and Project Support Generated**

- 2019 – 2021; collaborator on Oregon Beef Council grant (Serkan Ates is PI) (\$24,500)
- 2017-2021; PI for NIFA Hatch Project (5 years @\$50,000/year)
- 2016-17; Co-PI with Serkan Ates on Agricultural Research Foundation project (\$12,500)
- 2015-2017; PI for Oregon Clover Commission (\$10,000 for two year project)

### **Extramural Support**

- 2018: Difficult to estimate financial contribution
  - *Lincoln University*: office, computer account, professional photographer, growth chambers, data; faculty, staff, and student support
  - *Dairy NZ*: professional staff support; workshop registration and meals
  - *Foundation for Arable Research*: professional staff support
  - *Tasmanian Institute of Agriculture*; professional staff support, invitation, logistics
  - *Sichuan Agricultural University*; faculty, graduate student, and staff support
  - *Northwest Ag & Forestry University*; faculty, graduate student, and staff support
- 2017: \$5,300
  - *Northwest Ag & Forestry University*
    - *July*: \$800 for airport transfers, field trips transportation, and per diem
    - *October/November*: \$2,500 for international airfare, lodging, per diem
  - *Kubuqi International Desert Forum*
    - \$2,000: Airfare, lodging, and per diem for participation in forum
- 2016: \$5,000 Guizhou Province Government
  - Travel and per diem for proposal development discussions
- 2015-2016: \$50,000 People’s Republic of China Visiting Scholars
  - HE Feng: 1 year alfalfa modeling and mapping project

### **Regional, National, and International Collaborations**

- Oregon AES Hatch Fund Collaborative Research Project PI
- Western Region Research Project (Oregon WERA 1014 representative)
- North Central Regional Research Project (Oregon NCCC31 representative)
- Northwest Forage Conference Charter/Continuing Chairman
- Chinese Agency (CAAS-IAS) Collaborative Research
- Chinese University (CAU, NAU, SiCAU, NWA&FU) Collaborative Research, Teaching, and Extension Projects



## Research Products

### ➤ **Forage Species Suitability Maps**

Originator and lead scientist for 'Optimal Forage Species Selection and GIS-based Mapping' research projects in the US, PRC, and Taiwan that has resulted in suitability maps for Oregon-grown forage and turf grasses and recommendations for multi-national seed company marketing efforts. Project developed a new approach for matching crops with "agroecozones" involving the integration of digital elevation, climate, soil, and species suitability information.

Participation has included multiple departments and colleges within Oregon State University and other universities, agencies, and organizations in the US, PRC, Taiwan, Southeast Asia, Canada, northern Africa, and the European Union.

Grants to the forage program supporting this effort now approach \$1.75 million over the past 15 years, including significant funding from the USDA Foreign Agricultural Service Emerging Markets Program, and Market Access Program, USDA International Cooperation Division Scientific Cooperation & Research Program, the State of Oregon Economic & Community Development Department, the Oregon Seed Council, and Oregon Tall Fescue and Orchardgrass Commissions. Cost sharing to support this program has been provided by other OSU departments and Chinese Universities.

Continuing modeling and mapping activities include forage, food, and biofuels crops.

### ➤ **Dynamic Internet Map Server**

Co-developer and continuing cooperator for the "Dynamic Internet Map Server" which allows for the development of user-created, web-delivered, computer-drawn maps using quantitative species tolerance levels for climate and soil factors. Chris Daly, Matt Doggett, and Mike Halbleib (PRISM Climate Group) are the lead developers. Continuing development involves the use of functions rather than tabular maximum and minimum values for quantitative tolerances and developing a portal for this work linked to the Forage Information System (<http://forages.oregonstate.edu/>).

## EXTENSION ACTIVITIES

### Peer-Reviewed Extension Publications (Last 3 years, since 2017)

#### Under Development

David B. Hannaway and Forage-Livestock Systems Working Group. 201X. Oregon Forages. Web segment within Forage Information System. <https://forages.oregonstate.edu/oregon>

McGregor, Ian, David B. Hannaway, Leticia Henderson, Cassie Bouska, Linda Brewer, Scott Duggan, Amy Derby, Pete Schreder, and Mylen Bohle. Forage ID Guidebook. 201X. Forage-Livestock Systems Working Group Project publication. Oregon State Extension.

Bohle, Mylen, David Hannaway, Bill Buhrig. 201X. Irrigating Alfalfa. Beef Cattle Library. Oregon State University. [Role: shared concept development and writing]

#### Completed

Fery, Melissa, David B. Hannaway, and Maud Powell. 2019. Introduction to Pasture and Grazing Management. Professional and Continuing Education (PACE) Course. Oregon State Univ. Exten. Ser.

Fery, Melissa, Linda J. Brewer, David B. Hannaway. 2019. Small-Acreage Horse Farms Management for Green Pastures, Clean Water, and Healthy Horses. Oregon State Univ. Exten. Ser. EC 1558 (Rev.).

### Reviewed and Revised for Colleagues

- Moore, Amber, et al. 2019. Nutrient Management for Pastures: Western Oregon and Washington. EM 9224. Oregon Extension Service.
- Roseberg, Richard J., Steven Norberg, and Brian Charlton. 2018. Teff Grass for Forage: Nitrogen and irrigation requirements. PNW 709.
- Fransen, Steve, Gene J. Pirelli, Marty Chaney, Larry Brewer, Scott Robbins. 2017. The Western Oregon and Washington Pasture Calendar. PNW 699.

### **Current Extension Projects**

1. Converting and updating the Forage Information System (FIS)
2. Developing the Oregon Forages web segment with grant funding from OSU Forage-Livestock Working Group
3. Providing key leadership in Forage ID OSU Forage-Livestock Working Group Project
4. Further developing the "MatchClover" Web Application
5. Updating Strategic Plan for Oregon Forage & Livestock Systems
4. Writing Extension Publications Supporting Forage Production and Utilization
5. Assisting Oregon Forage Organizations
6. Planning and Participating in the NW Forage Workers' Conference (NFWFC)
7. Providing Extension Agent and Farmer/Rancher Support
8. Assisting Extension Director and Vice Provost of Outreach with China-US University-based Extension Alliance

### **Recent Extension Accomplishments**

- **Publications:** Listed Above
- **Educational Programs**
  - Workshop Instructor for the SARE-funded series conducted in the northwest (Glenn Shewmaker, PI)
  - Co-instructor with Shelby Filley for CROP 599 Pasture & Grazing Management evening class for students, staff, faculty, and farmers.
- **Extramural Support**
  - Research and commodity commission support has assisted with Extension educational programming
  - Visiting scholars have contributed their time to all phases of the forage program planning and implementation
  - Choosing online educational approaches for organizing and delivering information has optimized limited funds for increased impact
- **Regional, National, and International Collaboration**
  - Extensive connections with US and international forage, livestock, and grassland extension, research, and teaching faculty. Working relationships with grass and clover seed industry representatives in Oregon and China.
  - Assisting Vice Provost of Outreach in OSU's participation in the China-US University-based Extension Alliance involving 29 Chinese Agricultural Universities and 9 US Land-grant Universities (<http://www.cuuae.org/english.html>); October 2018 Annual Conference at Anhui Agricultural University, Hefei, China.

## TEACHING ACTIVITIES

### Teaching Projects (Last 3 years, since 2016)

#### 1. *Courses Taught*

- CROP 310/505: Forages (Spring Quarter, E-Campus Equivalent Fall & Winter)
  - 17 students in 2018 (OSU Campus) (Note: Serkan Ates was instructor while Hannaway was on Sabbatical leave)
  - 12 students in 2017 (OSU Campus)
  - 14 students in 2016 (OSU Campus)
- Sichuan Agricultural University (“Foreign Experts” Program)
  - 35 undergraduate, 3 graduate students; Fall, 2018
- Northwest Agriculture & Forestry University (“Foreign Experts” Program)
  - 100 undergraduate, 12 graduate students; Fall, 2018
  - 80 undergraduate, 15 graduate students; Fall, 2017

#### 2. *New Course Development*

- Organic Forages Modules for Organic Production Systems Course

#### 3. *Student Advising*

- Graduate Student Major Professor
  - i. Muhammet Sahin; MS Candidate; Co-Advisor with Serkan Ates (began graduate program Fall, 2017)
  - ii. Elif Sahin; MS Candidate; Co-Advisor with Serkan Ates (began graduate program Fall, 2017)
- Graduate Student International External Reviewer
  - i. Sharifiamina, Shirin. 2018. Agronomic and physiological performance of four perennial grasses under summer dry conditions in New Zealand. PhD Thesis, Lincoln University.

#### 4. *Forage Species Identification Garden*

- Enlisted industry support and assistance from Oregon-based extension colleagues and graduate students in designing, preparing, and planting a Forage Garden to support extension and teaching needs for species observation and identification. Established in 2016 with Serkan Ates (Animal & Rangeland Sciences) and Jerry Hall (Grassland Oregon). Re-established fall of 2018 by Serkan Ates and graduate students.
- Exploring cost and programming requirements for touch surface display like that observed at the Monterey Aquarium and Hatfield Marine Sciences Center.

#### 5. *Forage Species Selection Educational Module*

- Prepared proposal and obtained initial support from the OSU Open Educational Resources unit for developing a multi-language educational module on forage species selection.

#### 6. *Exploring World Agriculture Class*

- 2017: Developed with Serkan Ates a 2-week student study tour of New Zealand and presented lecture to winter term class on beef cattle production systems in Indonesia.
- 2016: Developed 3-week China tour and presented lecture on the value of internationalization and historical and current projects and activities in China.

## Guest Lectures

### *OSU*

- Exploring World Agriculture class (2017, 2016) described above.

### *International*

- Lincoln University, New Zealand; Grassland Sciences (2018)
- Sichuan Agricultural University, China
  - Grassland Sciences Department (2018, 2017)
- Northwest Agriculture and Forestry University, China
  - Grassland Sciences Department (2018, 2017)
  - Institute of Water Saving Agriculture (2016)

## Teaching Accomplishments

- **Student Learning Outcomes and Graduate Learning Outcomes**
  - Established a mentoring relationship with Center for Teaching & Learning faculty to assist with improving undergraduate and graduate student learning opportunities facilitated by developing appropriate SLOs and GLOs and aligning these with instruction and assessment.
- **Open Educational Resources for Forage & Grassland Sciences**
  - Developing a web-based “International Forage & Grasslands Curriculum” freely available within the Forage Information System.
  - Developing PowerPoint presentations for 23 Forage & Grassland Science topics, freely available on the web, linked to Student Study Questions for each topic.
- **Forage Species Identification Tools**
  - Developing improved tools for learning about and identifying forage species (collaboration with Extension agents and Specialists and Teaching faculty, with Extension Working Group funding).
  - Developing clover information sheets as a spin-off from Oregon Clover Commission funding for “MatchClover.”
  - Extracting and updating information from the Forage Identification CD-ROM.
  - Planting forage species in greenhouse and field to support classroom instruction.

## INTERNATIONAL ACTIVITIES

### Accomplishments

- Overarching benefit of international activities is assisting with internationalizing of OSU and providing recognition of OSU by Universities and research agencies.
  - Enriching class offerings with international examples.
  - Providing seminars to departmental, college, and international student audiences.
  - Obtaining research project support in the form of visiting scholars and students and logistics and per diem support on collaborative project visits.
  - Developing journal manuscript publications resulting from cooperation.
- Assisting Vice Provost and Extension Director Scott Reed with China-US University-based Extension Alliance.
  - Oregon State is one of 11 US universities participating with 29 Chinese universities.
  - Faculty and administrative contacts developed over 30 years have facilitated developing Alliance partnerships.

- Strengthened existing collaborations with China Agricultural University, Chinese Academy of Agricultural Sciences, Nanjing Agricultural University, Jiangsu Academy of Agricultural Sciences, Inner Mongolia Meteorological Institute, and Southwest University.
- Established new contacts with Sichuan Agricultural University, Xinjiang Normal University, Ningxia University, Qinghai University, and Silpakorn University (Thailand).
- Coordinated OSU CAS Administrators and Senior Faculty China Visit involving Beijing and Nanjing universities and research agencies.

### **ADMINISTRATION ACTIVITIES**

#### **Provided leadership for the Crop Science Graduate Program (CSGP) 2015-2018:**

- Served as chairperson for the CSGP Coordinating Committee.
- Served as Graduate School liaison and reported to Central Administration.
- Assisted with development and implementation of graduate program policies and procedures.
- Developed and updated web-based information and routine correspondence templates.
- Served as liaison with the Undergraduate Committee with respect to aligning SLOs, GLOs, and curricula.

### **SERVICE ACTIVITIES**

#### ➤ **Professional & Community Service**

- International
  - International Grasslands Congresses (manuscript reviewer)
  - International Journals (manuscript reviewer for Grass & Forage Science, Agronomy, Crop Science, Tropical Grasslands, etc.)
- National
  - Dossier Reviewer (2017: Virginia Tech; 2016: Univ. of Idaho; previous years)
- Regional
  - Northwest Forage Workers Conference (continuing chairman, 1984-present)
  - WERA 1014 (Oregon representative, 2012 - present)
  - NCCC 31 (Oregon representative, 2016 – present)
- State
  - Oregon Forage and Grassland Council (member and officer/board member assistant; provide educational programs for annual meetings and field days)
  - Oregon Hay Growers' Association (member and officer/board member assistant; provide educational programs as requested)
  - Future Farmers of America (Annual Conference Speaking Contest Judge)
- OSU (CAS and CSS)
  - Assist with in-coming and out-going international delegations
  - Committee service and participating in departmental meetings
- CSS Promotion and Tenure Committee (2016-Current)
- Crop Science Graduate Program Coordinator (2015 to 2018)
- Crop Science Graduate Program 10-year Review (lead faculty member, 2015-2018)

#### ➤ **Professional Affiliations/Memberships**

- American Forage and Grassland Council
- American Society of Agronomy
- Oregon Forage & Grasslands Council
- Oregon Hay & Forage Association

## AWARDS & SPECIAL RECOGNITION

### ➤ **National & International Recognition**

- 2019 Invited Lucerne Modeling Workshop, Lincoln University, New Zealand.
- 2018, 2017, 2016 Invited Speaker: China, Australia, New Zealand, and Ireland.
- 2018 Teaching and Research Invitations in China as a “Foreign Expert” (Sichuan Agricultural University and Northwest Ag & Forestry University).
- Invited speaker at 2018 International Crop Modeling conference (Nanjing, China).
- 2017 and 2016 Hosted Chinese visiting students and scholars (funded by Chinese Central Government and Provincial Governments and Universities).
- 2017 Lead faculty member for planning and leading Exploring World Agriculture student study tour to China.

### ➤ **Editorial Work/Consultancies**

- Forage Technical Consultant for Forage / Livestock System Projects in China, Southeast Asia, Australia, and New Zealand
- Journal manuscript reviewer for Agronomy Journal, Crop Science Journal, Grass and Forage Science (British Grassland Society), and New Zealand Grassland Society
- Lead Editor for Forage Information System
- Co-editor for Tall Fescue Online Monograph and Tri-Society Monograph