

**David G. Hopkins; Annual Report
Calendar year 2002**

A. Dissemination-Instruction and Student Success

1. Teaching Initiatives:

- a. Two more general and much less expensive texts were used in Soils 210 in 2002. An increased emphasis was placed on the “home soil” assignments in the laboratory sessions this year. A laboratory assignment to help students understand sand mineralogy and nutrient reserves was developed, and for the first time, traditional soil fertility tests were run on each students home soil. Student feedback was quite positive; I was frequently able to incorporate “home soil” results in lectures, which helped students gain a sense of ownership in the topic.
- b. Many of the lectures have been improved by incorporating photographs of actual soil profiles in the word documents used with the ELMO system. The students seem to really appreciate the inclusion of real life examples in the formal lecture.
- c. In 2002 I taught Soils 784. I developed curricula materials for the seven students, including one field trip to observe Fargo profiles and the deep Sherack Fm. at the MeritCare building site. I arranged a guest lecture, the “pedology/archaeology fusion”, by Dr. Michael Timpson concerning his work in Greece and Crete. My ability to teach this course more effectively in the future was enhanced by the materials I compiled. Several lectures were presented in PowerPoint using a significant number of soil profile photographs and associated laboratory data. Students participated in two detailed pedon description sessions in the laboratory. I know that this was an important part of the course instruction. This course was challenging as students were from diverse backgrounds with limited earth sciences understanding; two undergraduates from Moorhead State (MSUM) also attended. Students developed a seminar lecture and paper on topics gleaned from a survey of student goals taken in the 5th week of the semester.
- d. As a member of the Faculty Institute for Excellence in Learning (FIEL) I attended at least two working sessions on problem based learning during the spring semester, 2002, and also attended the Plant Sciences Teaching Circle as my schedule permitted.

2. Incorporation of Technology in Teaching:

Significant improvements were made in North Dakota Soil Photographic Library project and were incorporated into the lectures. My word documents which had been the basis of my lecture templates have now been enhanced with numerous photographs from the North Dakota Soil Photographic Library. The slides look pretty stunning on the ELMO system, and I hope this type of effort will strengthen students interest in the course.

Laboratory data from the North Dakota Soil Characterization database was compiled for a lecture on sodium affected soils for the Soils 794 course. Most students had not been exposed to data that is this detailed. Many students used data from these sources for their term project presentations.

3. Advising efforts:

Undergraduate students:

Mr. Verne Wolf (co-advised with Dr. Griegel)

I trained Ms. Lori Alleckson in soil profile description and hired her to help me in my trace metal work on the Langdon REC.

Graduate students:

Extensively reviewed Mr. Wayne Cymbaluk's Master's thesis in late winter and spring of 2002; I was on Mr. Cymbaluk's Supervisory Committee, which met for his defense on June 7th, 2002.

Mr. Marcus Bingham: M.S. degree in Natural Resources Management (NRM)

Mr. Todd Braun, M.S. degree in Natural Resources Management (NRM)

Supervisory Committee meetings for both Mr. Bingham and Mr. Braun were held in September, 2002.

Mr. Timothy Amundson began his MS degree in January 2003 and will be working on the Glacial Ridge soil organic carbon inventory.

6. Activities in Student Recruitment/Retention/Other Student Activities:

I serve on the College of Agriculture Recruitment Committee, and continue to discuss recruitment strategies with the Department chair. I generated a poster for the soil science major with Dr. Casey for use in COAFSNR outreach activities.

A former student, Mr. Mike Tischler, requested my advice about a PhD in soil science in April, 2002. He was concerned about benefits of the advanced degree versus financial gains he could realize as a consultant. I contacted several of colleagues who are gainfully employed in environmental consulting and made the connections so that Mr. Tischler could merit from their advice. He is now a staff scientist at the NASA Goddard Space Flight Center in Maryland.

I participated in the Geology 495 Spring Break Field trip to Hawaii and wrote a guidebook chapter entitled "Soils of Hawaii: the "sexy"-oxides." This field trip was unique in that we joined students and faculty from the UND Department of Geology and Geological Engineering.

Visited with Mr. Carson Rittle, NDSU Geosciences student on April 20th, 2002 to help him understand physical and chemical properties of paleosols for a summer internship with the NDGS, as per the request of Dr. Alan Ashworth.

Wrote a detailed letter on doctoral research options in our department to Ms. Laura Harstad, College Station, TX; October 29th, 2002.

Hosted Ms. Rebecca Weinlaeder from Rochester, MN in November, 2002 for a departmental visit and discussed her potential major in soil science; Ms. Weinlaeder has just formalized her association with our department in Spring, 2003.

11. Extension Service Teaching:

Outreach and extensions presentations in 2002 included:

Presentation of a progress report on the “wield beet study” to the ND and MN Sugarbeet Growers Meetings on January 8th, 2002. Dr. Franzen contributed data from the Shellack site in Minnesota and I added soil chemistry data from Richland County sites and updates on magnesium deficiency symptoms; this was the largest audience I ever spoke to.

After the sugarbeet reporting session, I explained “the sand syndrome” at a Crystal Sugar Grower Education Forum held on January 22nd, 2002. Mr. John Prigge, Crystal Sugar contact, told me that I “was the draw” for the growers forum; that was certainly a new compliment for my outreach program.

Dr. Franzen asked me to prepare a presentation for the Soil and Water Training Session on January 16th, 2002 on the topic of development and importance of soil aggregation. Responses from the audience were outstanding.

I gave an invited presentation on “Soil properties and their impacts on irrigation” at the Manitoba Horticultural Production Days in Brandon on January 31st, 2002. This was a familiar topic from my research investigations during the 1980s, but I utilized Canadian soil series and laboratory data to make my points for the audience.

Another invited presentation was given on February 6th, 2002 to the North Dakota Urban and Community Forestry Association annual Tree Care Workshop on “Chemical and physical limitations of Urban Soils.” Dr. Ron Smith sent an email requesting me to address a conference he is organizing for 2004 after my presentation.

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I was a field guide for the Midwest Groundwater Conference tour held in Fargo in early October. I wrote up a short introduction to my research site in the Sandhills and added several graphics that were included in the Tour Guide.

B. Research/Scholarship:

1. Highlights of research and scholarly activity:

Departmental Initiatives

Project: “Evaluation of hydraulic properties for topsoils and argillic horizons”

Cooperating researchers: Dr. Frank Casey and Mr. Nate Derby

Funding: from an earlier two year EPSCoR IIP Seed Grant, and Dr. Casey’s appropriated funds

Mr. Wolf and Ms. Alleckson worked together with Mr. Derby to generate retention characteristics for soils at the Valley City precision farming site. In the autumn, I compiled this data and presented a poster paper at the SSSA national meetings.

Individual Research Highlights

Two grant proposals were submitted in 2002 and I was awarded a significant subcontract for research. Two collaborative research papers with departmental and external colleagues were published in 2002 and I authored a third paper that is in press with the Soil Science Soc. Am. J.

Project: “Characterization of the “alkali problem” and identification of tolerant corn in salt-affected soils of the Red River Valley”

Cooperating researcher: Dr. Marcelo Carena, Dept. of Plant Sciences; Funding: from SBARE corn-granting committee for three years.

I spent two weeks using the VERIS plow and salinity sensor in LaMars township in early May, mapping 9 fields for site selection. In autumn, I worked with Mr. Peter Cossette (work-study student) to generate GIS-based graphics of these sites. This first success in geo-referencing field data to digital orthophotographs significantly enhances my ability to present field research. Research results were presented to the Corn Granting Committee of SBARE December 6th, 2002, to obtain funds for the coming field season. Our research plans for 2003 were accepted by the board and the budget finalized in 2003.

On August 1-2nd, 2002 Mr. Mike Ulmer, Mr. Jim Doolittle and I tested GPR at the Valley City precision farming site and in the Sandhills. Objectives were to assess if GPR could discriminate 1) argillic horizons in stratified drift and 2) water table depth in dune landscapes. Results at the Valley City site were inconclusive but in the Sandhills, GPR worked very well. Mr. Doolittle contends that our results are novel as we mapped the water table in two dimensions.

Publications:

Wu, J. W. A. Norvell, D. G. Hopkins, and R. M. Welch. 2002. Spatial variability of grain cadmium and soil characteristics in a durum wheat field. Soil Science Society of America Journal 66:268-275.

Franzen, D. W., D. G. Hopkins, M. D. Sweeney, M. K. Ulmer, and A. D. Halvorson. 2002. Assessment of published soil surveys as a basis for delineating sampling zones for site-specific nutrient application. *Agronomy Journal* 94: 381-389.

Hopkins, D. G., and D. W. Franzen. 2003. Presence of argillic horizons in stratified drift of the Luverne end moraine, eastern North Dakota. *Soil Science Society of America Journal* (in press).

2. Grants/Contracts/Research

In January, 2002, Mr. Steve Adamek (Dakota Technologies Inc.) asked me to co-author an SBIR grant to the National Science Foundation. The topic was field testing of a soil color meter his company developed. The proposal "Field and laboratory evaluation of a real-time, in-situ soil color analyzer" was submitted as an SBIR-Phase 1 grant on January, 16th, 2002. Unfortunately, this proposal was not funded.

In mid-spring Dr. Saini-Eidukat and I submitted a Grant in Aid proposal to the NDSU Research and Consulting Committee entitled, "Feasibility of using XAFS spectroscopy to determine cadmium complexes in soils and bedrock of northeastern North Dakota." The proposal was not successful, but Drs. Eidukat and Norvell and I are committed to improving this proposal for a competitive grant program.

In April, 2002 I was awarded a subcontract from the Red River Basin Institute/Tri-College University for \$46,000.00 to conduct an inventory of soil organic carbon on Nature Conservancy lands in northwestern Minnesota. This research will provide baseline data for future assessment of prairie restoration on soil physical and chemical properties.

4. Selected Presentation before Professional Audiences

Hopkins, D. G, F. X. Casey, and N. E. Derby. 2002. Hydraulic properties of topsoils and argillic horizons on the Luverne end moraine; eastern North Dakota. *Agron. Abstracts*.

Braun, T. A., D. G. Hopkins, J. L. Richardson, S. Ross. 2002. Fire induced repellence in the North Dakota Badlands: Initial year observations. *Agron. Abstracts*.

C. Outreach:

1. Professional Service (Service/Extension) Activities:

Attended Dr. Frank Casey's Soils 410/610 course as a peer review per the request of Dr. Prunty on April 24th, 2002.

Dr. Paul McDaniel asked me to review a manuscript for SSSAJ on loess soils and compaction; completed August 20th, 2002.

In February, 2002 I reviewed a manuscript for Blackwell Publishers, London for the Ashman and Puri "Essential Soil Science" text. Mr. William Maddox, technical editor, said my review was especially comprehensive. I chose the Ashman and Puri text for Soils 210.

Provided Dr. Mickey Ransom geographic information for dominant soils in eastern North Dakota for a NC-94 crop modeling project; this work involved using soil survey interpretations for several counties in the Red River Valley.

In June, I attended the NCR-3 (Soil Survey) meeting in Madison, WI. In 2004, North Dakota will be the host state for the North Central Soil Survey Conference, and I will be responsible for the conference agenda and field trip.

D. Special Initiatives

Assessment

A broad sample of what students retained from Soils 210 resulted from a “favorite trivia” question on the final exam. Responses show an extremely wide appreciation of general soils information. The course is not biased to pedology or earth sciences, as has been suggested. I utilized Dr. Sudhir Mehta’s web-based mid-term evaluation during late October, but only obtained 18 responses. Dr. Mehta gives extra credit for each student response and suggests I adopt his ploy next year for a more conclusive sample. Evaluation comments were helpful in terms of giving me more determination to simplify both course content and tests.

Addressing Institutional Purposes

Teaching

I was assigned to represent my department on the COA Curriculum Committee in September, 2000 and regularly attend meetings. We have had a particularly heavy workload with new programs and course changes in 2002. I serve as secretary for the Committee.

Research

Outreach/Extension

I developed a demonstration of a soil science web project that I am working on with Mr. Travis Post. The demo was presented at the annual meeting of the NDPSCA on October, 18th, 2002. The Association just sent another \$300.00 to support work-study students employed in this Soils Photographic Database project.

I served on a search committee for the Department of Plant Sciences new turfgrass specialist at the request of Dr. Schneider. Seminars, interviews, interactions, and deliberations occurred in early and mid-May, 2002.