EVALUATION MATERIALS FOR REAPPOINTMENT CONSIDERATION FOR:

Milton E. Tignor, Jr., Ph.D.
Assistant Professor
Plant and Soil Science Department
University of Vermont
Burlington, VT 05405-0082
12/21/2001
1). Teaching

Courses:

**PSS 011 Principles of Plant Science** (3 credits): F’00 = 46 undergraduates and F’01 = 58 undergraduates.

**PSS 124 Vegetable “Fruit” Crops** (2 credits): S’01 = 38 undergraduates.

**PSS 126 Vegetable “Root” Crops** (2 credits): F’01 = 18 undergraduates.

**PSS 127 Greenhouse Operations and Management** (2 credits): S’01 = 49 undergraduates.

**PSS 196 Postharvest Horticulture** (2 credits): S’02 = 9 undergraduates.

**PSS 301 Plant Science Colloquium** (1 credit): F’01 = 4 graduate students.

*PSS 197 Principles of Plant Science Laboratory* (1 credit): F’00 = 8 undergraduates.

*PSS 196 Greenhouse Design and Construction* (3 credits): S’02 = 5 undergraduates.

(*Onetime special course offerings)

Student Advising:

- Plant and Soil Science Undergraduate Majors: (13 students)
- Plant and Soil Science Undergraduate Minors: (2 students)
- Urban Forestry and Landscape Horticulture Majors: (3 students)
- Sustainable Landscape Horticulture Majors: (1 student)
- Graduate Students: (3 students, major advisor for 1, comm. member for 2)

**TOTAL advisees: 22 students**

I have 70% teaching appointment and I am solely responsible for seven courses (6 undergraduate and 1 graduate level) and will be co-teaching one more (Nursery Production and Management with Mark Starrett (first offering Spring 2004)) which total 18 credit hours of offerings. Some courses are alternate year courses, but I average approximately 5 credit hours of teaching per semester. This is a challenging assignment that requires me to teach courses in a variety of different horticultural disciplines from greenhouse operations and management to postharvest physiology. However, my diverse background and training make me uniquely suited to meet the rigors of this challenge.

Teaching has been my primary professional responsibility since leaving my postdoctoral research work to become an Assistant Professor first at the University of Florida (2 years) and now at the University of Vermont. I enjoy teaching a great deal, but I also am attempting to manage my career in such a way to allow me to stay active in the research arena. I feel
strongly that to stay on top of my field I need to have an active research program, especially for upper-division undergraduate courses.

Teaching highlights for the period from March 2000, through December 31st, 2001 include:

Two teaching presentations at National Meetings:


Three teaching presentations to educators at UVM:


One acceptance of an article to a peer reviewed journal: (from work at UF):

Submission of 3 grant proposals related to teaching:


Course summaries and teaching highlights for the period from March 2000, through December 31st, 2001 include: All of the courses have been offered with a WebCT Internet Supplement to visit these sites point your browser to [http://webct.uvm.edu](http://webct.uvm.edu) then use ‘mtignor1’ as the username and ‘reviewer’ as the password. These supplements serve primarily as a repository for lecture materials, central location for student communication, and an efficient mechanism to quiz and survey students.

**PSS 011 Principles of Plant Science:** The study of plant science is a challenging pursuit covering many exciting topics which I have categorized under the four broad topics of plants, soils, the environment, and people. The course has been designed to introduce students to concepts that will be essential to their successful completion of upper-division courses in the Plant and Science major. The course should also be interesting and useful to those in allied majors such as Environmental Studies, Botany, and others. However, it should be noted that this course is designed for the major and not for a general audience. Those students who may want a more general introduction for non-majors are encouraged to enroll in PSS 10 Home and Garden Horticulture.

*Highlights:* I redesigned PSS 011 from scratch in order to meet the needs of PSS majors. The students utilize a textbook only for background information and the lectures cover new material that builds on that general background. Topics cover everything from basic fertilizer calculations to photosynthesis. I also highlight a controversial topic in agriculture each year and engage the students in debate concerning the topic. In F’00 the topic was genetically modified organisms. In order to enhance the debate, I had two guest speakers present the pro’s (John Davis, Associate Professor of Forest Biotechnology, UF) and con’s (David Zuckerman, Organic Vegetable Farmer and VT State Representative Chittenden 7-3). In F’01 the controversial topic chosen was agricultural labor. I presented students with the facts on agricultural labor in the United States and Mike Ballard (Sustainable Economic Development Consultant) discussed his first-hand experiences working and assisting migrant workers in a Missouri farm community. Students then debated potential ways the farm worker situation in the U.S. might be improved.

**PSS 124 Vegetable ‘Fruit’ Crops:** The current version of this course emphasizes the amalgamation of Horticulture, Plant Physiology, Economics, and farming system concepts that comprise the basis of professional vegetable production. The class was designed to be a two-hour modular course that introduces students to a large number of concepts, from the disciplines mentioned above and apply them to vegetable crop production. Vegetable production is a complex discipline that requires years of study and practice before mastery is achieved. This course provides students a foundation of knowledge, which can be used to begin the journey. *Learning facts* and *Learning how to learn* are parceled out in roughly equal doses. The WebCT supplement for this course may be reviewed (see Appendix 1).

*Highlights:* I designed this course from scratch. Agricultural Practices were emphasized in my lectures. Students were assigned presentations on minor vegetable crops to present to the class. A majority of the student presentations are available on-line (see Appendix 1). I was impressed with the quality of many of the student talks. Vern Grubinger also gave a guest lecture on organic soil fertility management and organic weed control. Many of our students
are extremely interested in sustainable farm management practices and additionally; Dr. Grubinger is the author of the required text for this course.

**PSS 126 Vegetable ‘Root’ Crops:** The study of vegetable root crop production was presented to students as a multidisciplinary science covering several major vegetable root crops and a few minor ones as well. The course has been designed to introduce students to concepts that will be essential to understanding the complexities involved with vegetable root crop production. This course was designed for upper division PSS majors and covered cultural practices for the production of potatoes, allium crops, carrots, parsnips, beets, and tropical ‘root’ crops.

*Highlights:* I designed this course from scratch. Agricultural Practices were emphasized in my lectures and groups of students were assigned presentations on some aspect of potato production. A majority of the group presentations are available on-line (see Appendix 1). I was impressed with the quality of many of the student talks. One student group designed a sustainable organic potato production manual for the Slade Hall residents. Students were also invited to attend a Northeastern Organic Farmers Association (Vermont) tour of my research at the Horticultural Research Center. Approximately one-third of the students also participated in grading potatoes for my research project as a ‘hands-on’ extra-credit assignment.

**PSS 127 Greenhouse Operations and Management:** No doubt, most students have a concept of what a greenhouse is. Depending on their personal experiences, the level of detail and amount of information incorporated into that concept will vary. A mechanic looks at an automobile quite differently from someone who has never peered beneath the hood of a car. The overall learning objectives of this course were to enhance the student vision of the greenhouse concept, expand their basic skill set and knowledge of greenhouse operations and management, and to help them understand the diverse nature of disciplines involved in mastering greenhouse operations and management science and art.

*Highlights:* I designed this course from scratch. Greenhouse construction, heating, cooling, lighting, temperature control were emphasized through math intensive problem sets. The horticultural aspects of greenhouse management were also introduced spanning the topics of rooting media, irrigation, and growth regulators. After completing the problem sets students were assigned a final project that required applications of the concepts they had learned to the design of a greenhouse of their choosing. Designs ranged from small personal greenhouses to large (several acre) gutter-connected production houses. Many students were surprised at what they were capable of following their mastery of the calculations.

**PSS 196 Postharvest Horticulture:** *This course will be offered for the first time S’02.* Materials covered in this course are critical for our undergraduates to have. It will be a modular course designed for upper-division undergraduates covering postharvest physiology and cultural practices for vegetable, fruit, and ornamental horticulture crops. The course will require students to synthesize information they have learned from a variety of courses including the Principles of Plant Science, Plant Physiology, and other production courses such as Vegetable ‘Root’ Crops and Tree Fruits.
Anticipated Highlights: Lots of visual materials from a range of operations from small organic farms to large conventional farms in excess of 3,000 acres.

PSS 301 Plant Science Colloquium: In this course graduate students discuss current topics in plant science research. In fall ‘01 students selected the topic of plant-to-plant interaction. The course was conducted in a journal discussion format. Each student selected two refereed journal articles (which had to have been published in 2000 or 2001) and presented them to the other students. Student presentations ranged from 30-45 minutes and then a discussion among students concerning the paper followed. Introduction, material and methods, statistical analysis, hypotheses, and conclusions were all discussed.

Highlights: Although the number of students participating in the course (4) was small, I was impressed by the presentations that the students made (available on-line). Students also engaged in-depth discussions concerning key aspects of the papers often teaching each other scientific principles in the process.

PSS 197 Principles of Plant Science Laboratory: In fall ‘00 it was suggested that PSS majors might benefit from a laboratory course that would expand and reinforce topics presented in PSS 011 Principles of Plant Science. Eight students enrolled in the lab, and received additional lectures related to topics covered in the course. Topics included, human resources management, phytochrome responses, and organic farming. Hands-on experience was provided through an ongoing laboratory exercise involving poinsettia production. Students also watched and discussed several videos produced by various New England extension agencies. This course was useful to the students. However, due to limited graduate student help it could not be offered in fall ‘01.

PSS 196 Greenhouse Design and Construction: This course will be offered the first and only time S’02. The Dean’s office has dedicated funds to construct two greenhouses for student use at the Horticultural Research Center in South Burlington. The frame was procured from an auction sale locally. Five students have been selected that will develop three different designs based on economics for a 4-season and overwintering house. Four of the five students have completed PSS 127 Greenhouses Operations and Management and the fifth has constructed a greenhouse for personal use. Students will design the greenhouses based on interviews with clientele (students involved with the Horticulture and Common Ground Clubs), calculate heating and cooling requirements based on different glazing materials, and spec equipment to be purchased for the greenhouses. The greenhouses will be constructed based on student designs summer of ‘02.

Student Extracurricular Activity Advising

Common Ground Student Run Educational Farm (faculty co-advisor): Serve as resource for approximately 15 students that are heavily involved in the organic production of vegetables on a student-managed farm at the Horticultural Research Center in South Burlington. For many students this is their first and only hands-on agricultural production experience during their undergraduate careers. Students operate the farm as a CSA (Community Supported Agriculture) and donate all remaining food (not going to farm
shareholders) to either the Salvation Army Food Shelf or the Chittenden County Emergency Food Shelf (approx. 6000 lbs in 2000, and over 14,000 lbs in 2001). Gave tours of the student run farm to distinguished visitors including Ross A. Virginia, Ph.D. (Professor, Dartmouth) Ron Sonoda, Ph.D. (Professor Emeritus, UF), Tulio Goncalves de Melo (Agronomist, EMBRAPA, Brazil), and Duangpom Suwanagul, Ph.D. (Assistant Professor, Kasetsart University; Bangkok, Thailand).

Other Educational Projects:
Assisted the in the development of a design exercise utilized in PSS 131 in fall ’01. I met with the Jericho Underhill Park District Board of Directors and the group decided that they could use the help of the students in the Landscape Design Course to assist them in redesigning the entrance at Mills Riverside Park. Students worked on designs the best of which will be presented to the JUPD BOD in January ’02 for consideration and possible implementation.

Developed a relationship with Brown’s River Middle School 5th grade instructor Rita Clark. Working with my graduate student Nate Sands students are receiving four lectures on pumpkin and potato history and cultural practices. We are also planning to have a summer garden for the students at a nearby park if resources can be found.
2.) Research and Scholarship

I have a 30% research appointment based on a 9-month contract. I am in the process of developing a new expertise in vegetable horticulture. Formerly, I worked on tropical tree fruit physiology and pathogen defense mechanisms of forest trees. My research is taking form in the three major areas of vegetable crop production, sustainable vegetable production practices, and plant-microbe interactions in crop plants and phytoremediation systems. It will take time to make the transition. However, there has already been some success in my research program.

*Highlights for the period from March 2000, through December 31st, 2001 include:*

**Seven research presentations (total) at local, state, national, and international meetings:**


**Submission of 8 grants related to research:**

Foss, D., N.J. Hayden, W.C. Hession, and M. Tignor. 2001. Constructed wetlands center for research, education, and outreach at the University of Vermont. USDA/CSREES. ($177,728). FUNDED.


1 non-refereed journal article published in scientific proceedings:

**Summary of Current Research Foci:**
- The Vermont vegetable industry has an estimated worth of between 6.5 and 10 million dollars. Vermont vegetable growers face many unique climate and weather challenges, some of which can be managed by improved irrigation scheduling. In order to make improved scheduling recommendations to growers, maximum yields for vegetable crops need to be established on various soil types in different microclimates. Additionally, irrigation scheduling regimes need to be optimized with the small and large-farm in mind. The resulting increases in irrigation efficiency will maximize yields and minimize water waste, thus helping to protect Vermont water resources and preserve natural areas.
- Members of the Solanaceae family will be used as model crops for the experiments. A standard experimental design has been developed that can be replicated on many soil
types eventually resulting in more comprehensive recommendations to growers. Likewise by utilizing weather stations and soil moisture probes careful studies of irrigation scheduling will produce recommendations to improve water use efficiency thus increasing profit by reducing water costs. Progress: We have completed the first replication of a potato yield study examining the effects of compost on potato production in Vermont. Preliminary findings include: the amount of irrigation water required to maintain 65% plant available water was 23% less in the 40 tons/acre compost treatment as compared to the control, however compost had no effect on total marketable yield, and the number of culls and weight of culls significantly increased with the addition of compost. An abstract has been submitted to the 26th International Horticultural Congress & Exhibition to be held August 11th-17th, 2002. Depending on selections made by an International committee the research will be presented as a poster or formal paper this summer.

• Many New England growers are producing heirloom tomato varieties in order to attract consumers to retail farm operations. In 2001, we tested eleven different heirloom varieties of tomato (Lycopersicon esculentum Mill.) for production characteristics and fresh market suitability in Vermont. ‘Amish Paste,’ ‘Brandywine,’ ‘Cherokee Purple,’ ‘Cosmonaut Volkov,’ ‘Costoluto Genovese,’ ‘Green Zebra,’ ‘Ida Gold,’ ‘Mosvich,’ ‘Purple Calabash,’ ‘Prudens Purple,’ and ‘Yellow Brandywine’ varieties were produced organically using plastic mulch beds and drip irrigation. ‘Better Boy’ served as a hybrid control. Tomatoes were harvested weekly (9 total harvests) and every fruit was individually graded according to USDA standards. Sample findings include: ‘Costoluto Genovese’ produced significantly greater total marketable yield by weight when compared to ‘Brandywine’, ‘Mosvich’ produced the greatest amount of US#1 large fruit, and ‘Cherokee Purple’ had a significantly greater amount of culls by weight when compared to ‘Cosmonaut Volkov,’ ‘Green Zebra,’ and ‘Ida Gold’. Interestingly, several heirloom varieties outperformed ‘Better Boy’ in certain instances during this trial. For example, the round red variety ‘Mosvich’ produced significantly more U.S. No. 1 large fruit (11.35 kg) than ‘Better Boy’ (2.26 kg). An abstract has been submitted to the 26th International Horticultural Congress & Exhibition to be held August 11th-17th, 2002. Depending on selections made by an International committee the research will be presented as a poster or formal paper this summer.

• The organic management of soil and utilization of compost results in an alteration of microbial diversity and biomass. Understanding this chaotic system requires a multidisciplinary approach (Ann Hazelrigg, Plant Pathology; Buddy Tignor, Horticulture; and Margaret Skinner, Entomology). We will examine the impact of organic soil management and compost by perturbing the system through heat sterilization of the microbe population. It has been shown that heating removes much of the disease suppression properties of several different types of compost. However, the activity of microbial populations was not completely predictive of the level of disease suppression. Recently, at the 2001 Annual Meeting of the American Society of Horticultural Science, it was stated that current experiments comparing organic systems to conventional farming systems needed to be complimented by experiments that alter components of organic farming directly. Additionally, it was highly recommended that soil for experiments
examining the effects of organic management practices be collected from farms that have been organically managed for at least 10 years. In summary, there have been many documented positive outcomes to managing soils organically, but the next generation of research will, out of necessity, involve a systems approach utilizing a multidisciplinary team of researchers. We will be conducting a preliminary greenhouse investigation (winter 2001-2002) to examine the effects of organic management of soil (soil will be collected from a farm that has been certified organic for at least 10 years), including compost amendment, on tomato plant nutrient status, physiology, productivity, yield, disease loads, and insect pest populations. The treatments in this factorial experiment will be (+/-) soil steam sterilization, (+/-) compost soil sterilization, and synthetic vs. organic liquid injectable fertilizer. This effort will serve the purposes of gathering initial findings to enhance the chances of winning a larger grant, beginning an ongoing conversation among the investigators about ‘systems’ research, initiating a collaborative effort among several different disciplines, and selecting the methodologies and statistical analyses necessary to apply the results. Plant tissue and soil samples will be preserved for future microbial population analysis contingent on the procurement of additional funding.

- Treating dairy wastewater in the unique environment and harsh climate of Vermont presents special challenges. A multi-disciplinary group (Don Foss, CALS Dean’s Office; Nancy Hayden and Cully Hession, Civil and Environmental Engineering; and Buddy Tignor, Plant and Soil Science) have initiated a project that will target improving wastewater management utilizing phytoremediation technology in a subsurface constructed wetland at the Paul Miller Research Center working dairy farm. The integrated project proposed here has several goals, including **increasing the understanding of the plant’s role in remediation of agricultural wastes** and engaging students in active research involving a ‘real world’ problem. *However, ultimately the research is designed to reduce the environmental impact on water quality resulting from dairy wastewater in a manner that will be acceptable to the public and the farmer.* Regardless of the current opinions of these land grant university clientele, the national trend is towards increased governmental regulation. *The results of this research will address the problem of dairy wastewater remediation in advance of the development of new regulations that might produce insurmountable financial barriers to farmers.* Recently, we received funding from the U.S. Department of Agriculture for initiating this project with the specific goal of developing low cost and effective stormwater and milkhouse waste treatment for Vermont farmers. Research activities will commence following completion of subsurface wetland construction in the summer of 2002.
3.) Service (professionally related):

University
I have been active in CALS and PSS academic committees since my arrival at UVM. I am also currently serving on a Botany faculty search committee. List of committees presently or formerly a member of:

- CALS Honor Committee. 2000 – present.
- BOT Search Committee for new Ecologist Faculty Position. 2001 – present.
- PSS Search and Screen Committee for Master Gardener Coordinator. 2000.
- PSS Curriculum Committee. April 2000 - present

Organized Fall Seminar Series: for the Plant and Soil Science Department Fall of 2000: included eight speakers, three of which were from organizations outside of UVM (UF, USDA, and Cornell).

Extension and Outreach: Although I have no official extension appointment, the nature of the work I do on vegetable crops provides many opportunities for extension and outreach.

*Highlights for the period from March 2000, until December 31st, 2001 include:*


