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Curriculum Development for Organic Horticulture

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Curriculum Development for Organic Horticulture: Introduction

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Summary. As organic agriculture continues to grow, pressure from students and the public to develop novel curricula to address specific needs of this sector of agriculture also will increase. More students from the cities and with limited background in production agriculture are enrolling in agricultural programs with special interest in organic production. This new student population is demanding new curricula based on a better understanding of agroecology principles and more experiential training. Several universities throughout the nation have engaged in a profound curriculum transformation to satisfy the emerging need of students in organic production. This workshop was organized to bring together experts that are working on different organic and sustainable agriculture curricula throughout the country to share their experiences and lessons learned. Most of these curricula include a traditional classroom teaching component, a major experiential component, a student farm for hands-on experience and internships, and in some cases a marketing—typically a community supported agriculture (CSA)—component. Others programs are more extension oriented, providing applied training to growers outside of the university teaching curriculum.

Traditional agriculture teaching programs at the graduate and undergraduate levels across the nation and the world have been undergoing significant transformation in the last decades. General enrollment has declined steadily since the early 1990s (Bradley et al., 2003; Dyer et al., 1996, 1999; Newcomb, 1993) and more and more students from the cities (with limited farming background) are getting interested in agriculture (Borsari and Vidrine, 2005; Dyer et al., 1996, 1999). The impetus for curriculum change is driven by pressure from the general public, students, and academic community (Boyer Commission, 1988; National Research Council, 1996; St. Hilaire and Thompson, 2005). As we become increasingly aware of agriculture as a key component of our ecosystem, there is greater need to use sustainable production practices. In a recent survey conducted in the United States and foreign countries, Borsari and Vidrine (2005) and Borsari et al. (2002) found a general consensus toward the emergence of sustainable agriculture as a cornerstone of agricultural programs despite the large diversity in the different curricula. This interest has led to the creation of many programs on sustainable agriculture across the country in the last decade. As a part of the new trend there has been a renewed interest in organic agriculture. The organic production

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segment has maintained the fastest growth rate in agriculture over the last decade. Students from numerous American universities have joined the trend and are demanding or initiating the discussion on developing specific curricula for organic production. Yet there are currently few, if any, programs that have been developed specifically for organic agriculture. However, several universities are in the initial phase of curriculum development for organic production either as a separate program or as an integral component of a sustainable or agroecology program. Extension programming is also increasingly responding to grower and consumer demand for information on organic production (Beaver, 2005; Carey et al. 2006).

In order to share these important experiences, the American Society for Horticultural Science (ASHS) through its working group on Organic Horticulture (ORGH) organized a workshop entitled "Curriculum Development for Organic Horticulture." Ten presentations were made by experts from various universities across the country and most of those are published in this issue of *HortTechnology* as full papers. Included are programs at Iowa State University (Delate, 2006), Kansas State University (Carey et al., 2006), Michigan State University (Biernbaum et al., 2006), North Carolina State University (Schroeder et al., 2006), Oregon State University (Stone et al., 2005), University of California, Davis (Parr and Van Horn, 2006), University of California, Santa Cruz (Shennan and Miles, 2005), University of Florida (Ferguson et al., 2006), University of Idaho (Beaver, 2005), and University of Minnesota (Markhart, 2006). Key components of the programs are indicated in Tables 1 and 2. There were multiple questions that were explored by the speakers at the workshop. Should there be a specific curriculum for organic agriculture? What are some of the common factors in the programs currently being developed? This article summarizes some of the key questions, issues, and answers discussed.

The need for an organic agriculture curriculum

Speakers at the workshop recognized several factors that justify the need for an organic curriculum. These included:

- Growth of organic agriculture
- Linkage with sustainable agriculture, natural resources and the environment
- New generation of students
- Student involvement in the training process

Table 1. Examples of organic (sustainable) agriculture curricula across the U.S.[z]

University	Program name/facility	Type					
		Major	Minor	Certificate	Undergraduate	Graduate	Other
University of Florida	Interdisciplinary minor in organic and sustainable crop production/center for organic agriculture (COA)	Proposed	Yes	---	Yes	---	---
Michigan State University	Organic farming program /Student Organic Farm (SOF)	---	---	Yes	Yes	Proposed	---
North Carolina State University	Interdisciplinary agroecology/ center for environmental farming systems	Proposed	Yes	---	Yes	Yes	Yes[y]
University of California, Davis	Student Experimental Farm (SEF)	Proposed	---	---	Proposed	Yes[x]	---
Iowa State University	Graduate program in sustainable agriculture	Yes	Yes	No	No	Yes	Yes[w]
Kansas State University	Growing Growers Training Program	---	---	Yes[w]	Yes	---	Yes[v]
Oregon State University	Ecological and sustainable horticultural farming/food systems	Proposed	---	---	Yes	---	Yes[x]
University of Idaho	Sustainable small acreage farming education program	No	No	Yes	---	---	---
University of Minnesota	Student Organic Farm	---	---	---	---	---	---

[z]Compiled from multiple sources: Beaver, 2005; Biernbaum et al., 2006; Carey et al., 2006; Delate, 2006; Ferguson et al., 2006; Markhart, 2006; Parr and Van Horn, 2006; Schroeder et al., 2006; Stone et al., 2005.
[y]Program also includes a "sustainable agriculture summer internship program" and an "apprenticeship in sustainable agriculture program."
[x]University of California, Davis, graduate programs include an agroecology area of emphasis in Ecology Graduate Group.
[w]Extension organic program.
[v]Apprenticeship program provides nondegree experiential learning for those interested in market gardens/farms. Undergraduates may participate for university internship credit. Incorporation into continuing education program is planned.

Table 2. Some characteristics of the organic/sustainable education curricula.[z]

Program	Student involvement	Farm		CSA[x]	Internship
		Certified	Size (acres)[y]		
University of Florida	Yes	Yes	10	No	No
Michigan State University	Yes	Yes	10	Yes	Proposed
North Carolina State University	Yes	No	11[w]	No	Yes
University of California, Davis	Yes	Yes	20	Yes	Yes
Iowa State University	Yes	No[v]	6	No	No
Kansas State University	Yes[u]	No	0	No	Yes
Oregon State University	Yes	Yes	12[t]	No	Yes
University of Idaho	Yes	Yes	3	Yes	Yes
University of Minnesota	Yes	No	1	No	No

[z]Compiled from multiple sources: Beaver, 2005; Biernbaum et al., 2006; Carey et al., 2006; Delate, 2006; Ferguson et al., 2006; Markhart, 2006; Parr and Van Horn, 2006; Schroeder et al., 2006; Stone et al., 2005.
[y]1 acre = 0.4047 ha.
[x]Community supported agriculture.
[w]An 11-acre "Student Farm" is located within a 2000-acre farm.
[v]A 46-acre certified organic farm is available for student research and demonstration projects.
[u]In this extension program, the client/trainee population of current and future growers was involved and continues to be involved in shaping the program.
[t]This acreage is certified research farmland that supports the undergraduate and graduate teaching mission.

Growth of organic agriculture. With a steady growth rate of about 20% in retail sales between 1990 and 2002, organic agriculture has emerged as a mainstream activity (Dimitri and Greene, 2002). The number of organic growers continues to increase, thereby creating the need to train organic farmers, extension agents, advisors, and consultants. A strict respect of the organic standards is critical for organic growers. The necessity to follow these rules furthered the need to develop courses on "organic principles and practices." Organic agriculture requires a new set of skills (soil quality building, weed, pest, and disease management, and marketing) that are not taught at traditional agricultural programs and therefore new and more appropriate curricula need to be created.

New generation of students. In a study conducted at the University of Illinois, Dyer et al. (1996) found that the majority of new freshman in the college of agriculture had no background in agriculture. This is in contrast with the situation a few decades ago when most students in agricultural programs had a farm background. Today, the new student body requires more experiential training than in the past.

Student involvement in the training process. Student involvement was identified by all speakers as a major impetus to the current trend in organic curriculum development (Table 2). In some universities, movement in favor of new curricula was not always welcomed by the faculty. However, with time student advocacy for organic and sustainable agriculture led to the creation of certificate, minor, and major programs at several universities (Table 1).

Common factors among organic curricula

Key factors (Fig. 1) common to most curricula included 1) program identity, 2) traditional classroom teaching, 3) major experiential training, 4) a facility, usually a student farm, for hands-on experience and internships, and 5) an applied marketing unit - frequently a CSA program. These factors are most easily applied to integrated curricula targeting university student populations, but also apply to extension programs training new organic growers (Carey et al., 2006).

Program identity. The central piece for most sustainable/organic programs has been a specific name for its identity (Table 1). Most programs tended to embrace the whole sector of sustainable agriculture rather than being limited to organic agriculture. The program at the University of Florida was one of the few that specifically mention "organic" in its title (Table 1). Despite the large scope of most programs, organic agriculture was a center piece.

The facility. A farm was a key component common to most curricula (Tables 1 and 2, Fig. 1). The farms

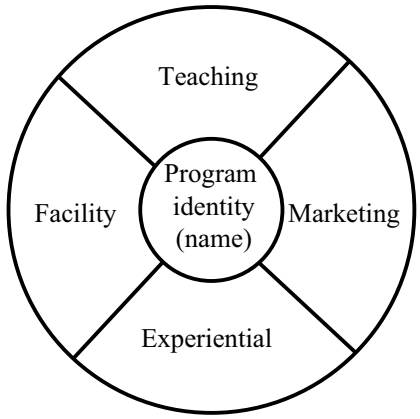

Fig. 1. Factors common to many organic programs currently being developed. The facility is generally a farm (certified or not) and a housing complex for students. The teaching component includes agroecology, sustainability, soil building and alternative farm approaches, critical thinking, integrative approaches, and the balance among social, agricultural, and environmental sciences. The experiential component includes internships, practical projects, or research projects. The marketing component is typically the management of a Community Supported Agriculture unit.

were either certified (Biernbaum et al., 2006; Ferguson et al., 2006; Parr and Van Horn, 2006) or not certified (Schroeder et al., 2006). The size of the farm varied from 10 acres or less to about 20 acres (1 acre = 0.4047 ha) (Beaver, 2005; Biernbaum et al., 2006; Ferguson et al., 2006; Parr and Van Horn, 2006; Schroeder et al., 2006). At North Carolina State, A 2000-acre experimental farm is available for student research and demonstration projects, while 11 acres are specifically cropped by students during the year (Schroeder et al., 2006). In addition to the "organic" farm, some of the programs had apartment housing where students stay during their internship.

The teaching component. The instructional topics of most programs focused on agroecology, sustainability, soil building and alternative farm approaches while the educational framework involved critical thinking, integrative approaches, and the balance among social, agricultural, and environmental sciences.

The experiential component. All programs emphasized experiential training as a major component of their curriculum. This deeper level of

involvement satisfies student requests for more active learning (St. Hilaire and Thompson, 2005). The experiential training included internships at the program farm, internships at growers' farm, small practical projects, dissertations and theses. The duration of the internship also varied significantly among institutions and depended strongly on the nature and goals of their particular program.

The marketing component (typically as a CSA). Although community-supported agriculture was recognized as an important component of an organic agriculture curriculum, only a few universities have integrated a CSA farm into their organic curriculum (Table 2). Specific agri-business information integrated within the curriculum is very valuable in providing marketing skills to the students during their training.

Conclusion

Several organic curricula are being developed at various universities. Despite the large diversity of those programs (minor, major, certificate, undergraduate, graduate) they all seem to share common ground and build upon common principles. All programs recognize the need to explore new teaching tools based on active learning, enhanced experiential training, integration of social and environmental sciences, and long-term sustainability of agriculture. Horticulture departments are actively involved in the development of these programs, often in collaboration with other departments, such as agronomy, animal science, crop science, as well as other sectors of agriculture and food systems. Several of the programs have been established with the expectation that graduates of systems-based experiential curricula will be in a position to provide answers to major problems of organic agriculture such as ecological management of weeds, pests, and pathogens.

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