

Undergraduate Education in Plant and Soil Sciences at the University of Massachusetts¹

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Undergraduate interest in courses and curriculum in the agricultural sciences, including horticulture and plant and soil sciences (1), is at an all time high. Enrollment in agriculture in member institutions of the National Association of State Universities and Land-Grant Colleges more than doubled from 1963 to 1974³. This paper describes changes that have been made in the Department of Plant and Soil Science at the University of Massachusetts to serve our students and provides a vehicle for future changes in undergraduate horticultural education. Hopefully, other departments will report on their undergraduate activities so that others may benefit from their experience.

Precise explanations for student interest are not readily apparent, but we can speculate on a number of factors that may be involved based on student comment. The environmental movement and the return to the natural way of life have often been mentioned as important factors for many students. Another, perhaps more critical factor, may be general disillusionment of graduates seeking employment with undergraduate degrees in many disciplines customarily part of an arts and sciences college. This seems to be particularly true for some of the humanities and social sciences. On the other hand, students trained in horticulture and agronomy have generally gained positions with competitive financial reward and responsibility. Lastly, many undergraduates in large, state universities have been frustrated in large departments, huge classes, and with faculty sometimes preoccupied with activities unrelated to undergraduate education. Until recently, this had not usually been the case in most agricultural departments. In spite of responsibilities equal to or greater than colleagues in other colleges; smaller

classes, good advising, and close student-instructor relationships have been the rule in agricultural departments. This did not seem to affect declining enrollment in the 1960's, but may now be a factor with students wanting a better college experience. Students are now showing unprecedented interest in our courses and major and for their own individual reasons are enrolling or majoring in agricultural programs.

The surge in undergraduate enrollments in agriculture began in the late sixties and is continuing at many institutions³. Ironically, this occurred following the general increase in university enrollments and at a time when some institutions were stabilizing undergraduate enrollments. Major student enrollments in the College of Food and Natural Resources and Department of Plant and Soil Sciences at the University of Massachusetts (Table 1) may be indicative of the situation. According to 1974 statistics³, the University of Massachusetts ranked tenth in the country in agricultural enrollments and fourth in enrollment gain over the preceding year.

At the University of Massachusetts, the rapidity and magnitude of student influx into agricultural programs occurred after many years of low enrollment. During these years, faculty positions were reduced, and the remaining faculty were devoting a large portion of their time and energies to graduate training, two-year technical education, research and extension. As a consequence of low student interest, some courses were eliminated or were

offered only periodically. We were, therefore, not adequately prepared for this massive increase in student numbers in several ways. Faculty and space resources had been diverted to other activities, course offerings were reduced, and recently hired faculty had been recruited largely on their research interests and talents rather than instructional skills or specialties. With time, faculty cooperation, and student patience, adjustments have been made to ease if not completely resolve these situations. However, additional positive action seemed necessary to achieve the quality undergraduate program desired by both students and faculty.

Undergraduate program

Students may elect options within the Plant and Soil Science major. The *Plant Science option* is a discipline-oriented program designed for students preparing for graduate school and a professional career. The *Plant Industry option* is for students desiring an application of principles to practical horticultural and agronomic problems. The *Soil Science option* is discipline-oriented to provide training for the professional soil scientist.

The undergraduate program, through interested faculty, combines a strong advising system with a minimum number of required courses. Each major student has an individual program within one of the options that is tailored to the student's interest and educational objectives.

In addition to the core requirements of the University of Massachusetts, the department has established the

Table 1. Undergraduate students in the Department of Plant and Soil Sciences, the College of Food and Natural Resources and the University of Massachusetts. Fall Semester.

Year	Department ^z		College ^y		University		
	No. of students	% change from 1950	No. of students	% change from 1950	No. of students	% change from 1950	
1950	77	100	409	100	2776	100	
1955	36	47	324	79	3666	132	
1960	23	30	313	77	5331	196	
1965	26	34	487	119	8935	322	
1970	48	62	924	225	15125	545	
1971	63	82	1219	298	16027	577	
1972	114	148	1509	369	17280	622	
1973	175	227	2318	567	18319	660	
1974	213	277	2661	650	18794	677	
		% increase from lowpoint		926		850	677

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³Agricultural Enrollment in the National Association of State Universities and Land-Grant Colleges Members Institutions. A Report to the Resident Instruction Section, Division of Agriculture, Washington, D.C., November 17-20, 1974.

^zData of 1950, 1955, and 1960, include the former Departments of Agronomy, Floriculture, Olericulture, and Pomology. Data does not include Stockbridge School of Agriculture or Graduate School student majors.

^yName changed from the College of Agriculture to the College of Food and Natural Resources in 1972.

Table 2. Undergraduate course enrollments in the Department of Plant and Soil Sciences, University of Massachusetts.

Course title	1969-70	1970-71	1971-72	1972-73	1973-74	1974-75
Basic Plant Science	18	36	47	66	130	165
Soils	49	41	55	130	139	178
Plant Propagation	20	31	52	107	146	203
Plant Environment and Crop Production	—	—	110	125	110	80
Organic Farming and Gardening	—	—	81	104	140	178
Deciduous Orchard Science	3	8	11	10	29	34
Small Fruit Technology	3	6	10	12	32	41
Retail Floral Design	8	10	10	11	14	11
Floricultural Science	23	19	21	42	67	66
Greenhouse Management	16	11	25	39	57	60
Principles of Vegetable Crops	—	8	—	16	39	44
Plant Nutrition	4	—	20	24	35	37
Taxonomy of Economic Plants	6	10	5	17	12	29
Plant Breeding	8	6	8	4	11	15
Post-Harvest Physiology	8	12	8	27	19	22
Forage and Field Crops	8	—	10	—	10	45
Agrostology	8	8	8	10	18	11
Ecology of Weeds	8	9	20	12	25	27
Soil Formation and Classification	12	9	6	9	6	11
Soil Physics	3	2	8	6	11	18
Soil Chemistry	2	7	5	3	15	18
Soil Microbiology	8	10	9	11	14	9
Principles of Nursery Management	—	—	—	—	30	29
Food Production and Population Problems	—	—	—	12	13	15
Temperature and Water Stress	—	—	—	—	13	—
Seminar	6	15	16	24	41	66
Totals	221	258	545	821	1176	1412

following minimum requirements for completion of the BS degree: 32 semester science credits including two courses in chemistry, two courses in mathematics, and introductory botany; 25 semester departmental credits, including Basic Plant Science, Soils, Plant Propagation and Seminar; and 12 semester credits in related biological sciences. Requirements are summarized on a student and advisor course record sheet which is maintained in the advisor's file. In addition, many students maintain their own record of progress towards the BS degree.

Departmental courses (Table 2) are divided into four general categories. *Introductory courses* for majors and non-majors include Basic Plant Science, Soils, Plant Propagation, Organic Farming and Gardening, Floricultural Science, and Plant Environment and Crop Production. *Commodity production courses* are offered in vegetables, fruit, ornamentals, turf, and field crops. *Discipline courses* are available in nutrition, taxonomy, breeding, post-harvest physiology, environmental stress, weed ecology, and social and economic aspects of food production. *Soil science courses* are offered in formation and classification, physics, chemistry, and microbiology.

Plans are underway to add courses dealing with the physiology of crop plants, morphology of economic plants, and greenhouse crop production.

Departmental course enrollments (Table 2) have increased during the most recent 5-year-period. This is due in part to the increase in the number of major students, and to the addition of new courses in the curriculum during this period to expand the available choices. Interest by students in our

courses from outside of the department and college is high, particularly in the introductory courses. Sections have been added, when possible to accommodate these students.

We believe that enrollment of major students will continue to increase, but perhaps at a reduced rate. Course registration figures for 1974 only slightly surpass the previous year since enrollment limits have been reluctantly imposed in several courses.

Undergraduate Affairs Office

To accommodate the increase in student numbers in the area of counseling and advising and to improve and consolidate departmental student services, the department voted to establish an Office of Undergraduate Affairs. Until the fall of 1973, administrative activities relating to undergraduates were part of the Department Head's responsibilities. With increased majors, the various options within the major, and geographical separation of faculty in three academic buildings, more time had to be devoted to our undergraduate program.

The Director of Undergraduate Affairs was charged with all activities associated with undergraduates, specifically: initial contact and counselling of new students, assignment of academic advisors, class scheduling, preparation and maintenance of a faculty advisor's manual, coordination of the departmental honors program, career opportunities and job placement, maintenance of alumni files, checking records to determine fulfillment of graduation requirements, coordination of lab fee schedules, serving as a liaison with college and university officials,

curriculum development, soliciting student opinion, and arranging for student-faculty discussions. The Director also serves as chairman of the Undergraduate Affairs Committee, a policy recommending body of students and faculty.

The business of the office has been conducted with a part-time director and an undergraduate assistant. Based on student and faculty comments and the use of the facilities and services of the office, the initial year of operation has been successful and is being continued and expanded this year.

The recently developed undergraduate structure in horticultural education at the University of Massachusetts will allow us to react much more quickly to enrollment and resource shifts in the future. It is our opinion, however, that we should view the increased enrollment as an opportunity to further strengthen our undergraduate curriculum to provide a high quality program. By graduating well-trained students and by providing good service courses for non-majors, more people will be aware of the scope, importance, and problems of our industry and profession. This increased awareness of horticulture and agronomy can only enhance and complement our progress in other areas such as two-year and graduate education, research, and public service. A strong commitment to sound undergraduate training is vital to the progress and well-being of our industry and profession.

Literature Cited

- Childers, N. F. 1974. A survey of basic horticulture and plant science courses in U.S. and Canadian colleges and universities. *HortScience* 9:434-436.