

3. Both major faculty and faculty who offer supporting courses are key people in the operation of non-baccalaureate programs. Excellent major courses combined with inadequate supporting courses result in a poorly trained student. Weak major courses and excellent supporting work fail to provide the desired level of student motivation. A team effort should prevail that involves all teachers working to fulfill the mission cited for the program. Dedicated faculty are generally recognized by students, and they should also be recognized by other faculty and administration. Senior faculty and junior faculty together often provide a breadth of interpretation missing from either group alone.

4. Well defined major courses of study are essential in promoting student identification with some segment of the industry. Details concerning the exact nature of these courses should be worked out with industry representatives. These major courses must be realistic in terms of technology involved and in terms of the opportunities presented for employment. Student motivation is very closely related to how well opportunities for employment fit the interests of the individual. Some special effort is required to develop courses which place emphasis in this area.

5. Clubs designed to service major areas of specialization provide students with an opportunity to develop leadership and to become better acquainted with industry leaders through programs of mutual interest. Horticulture club programs that feature off-campus speakers help to develop contacts for students and staff alike. A system for providing club advisors who have a continuing interest in these programs is essential for realization of the full potential from these activities.

6. Relationships between authority and responsibility are often demonstrated through participation in student government. Development of leadership characteristics is recognized as an important objective of student activity in this area.

7. Necessity for student rules and regulations administered by students is well recognized. Involvement of students in these processes helps them to relate to the campus as a place where they belong and not as strangers. Greater value from the educational opportunity afforded can be expected where students live under these conditions.

8. Student yearbook, newspaper and other literary projects provide an opportunity to develop organizational skills that involve publications and meeting of publication deadlines. Pride in an institution results from realization that accomplishments are being made. The recording of individual and group achievements in publications of this type helps to build and maintain a unity of purpose for the entire program. As with major clubs, a system for providing advisors who have a continuing interest in these projects is essential for realization of the full potential from these activities.

9. Scholastic recognition is important for all students. The fact that the program is non-baccalaureate in nature does not change this. Awards and recognition of other types are strong motivators for some individuals. These forms of recognition should be featured as industry sponsored where possible.

10. Extracurricular activities such as participation in choral groups are of value to the individual and provide recognition for the institution. These activities help to develop personalities which have breadth of outlook and which can contribute most to our society.

11. Participation in intramural or interscholastic sports contributes to the development of the individual as a leader and as a member of a team. Gaining an appreciation for accomplishments brought about by group effort is a rewarding experience in itself. For those who have interest in and talent for these activities, programs should be provided. Major sports such as football and basketball may be featured; however, other sports including golf and tennis are also important.

12. Recognition and awards are important in areas of student achievement in addition to scholarships. An awards banquet is a fitting occasion to recognize the place of extracurricular activities in the educational experience. Programs which fail to emphasize these activities do not make the most of the opportunity to be of service to all students.

13. Such activities as horticulture shows provide further contact between students and the public. Coordinated student-faculty effort directed towards projects of this type are of special educational value to the student. Good showmanship is impressive and has public relations value with the agricultural industry.

14. Social activities including carnivals and dances bring students together in ways which build school spirit and help to maintain high morale. These events are considered important in the overall educational process.

15. Fraternities and sororities and other social groups have a place on campuses where student interest favors the development of programs in these areas. In most instances the strengths and weaknesses of these groups depend on counsel received from faculty advisors.

16. Finally, a tradition of excellent educational opportunity and the identification of the program by school name result in pride in the institution and in confidence in its instructors, the various courses of study and in its graduates.

This is what it takes to fully meet the challenge of providing non-baccalaureate training worthy of recognized standards in horticultural specialization. Industry needs are too great and career opportunities too promising for us not to make our best effort in developing and maintaining excellent non-baccalaureate programs.

## HORTICULTURAL TEACHING IN OREGON'S SECONDARY SCHOOLS

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Horticultural instruction in secondary schools is not new. In fact, it dates back to the middle ages in Western Germany (2). Some of the earlier high school horticultural programs in the United States are found in Los Angeles, 1908 (1), Cleveland, 1911 (1), and Boston 1918 (11). However, only since 1963, has horticultural instruction in secondary schools become widespread in the United States. Loewen (4) conducted a survey of the 50 states in 1968 and found 31 of the 43 states responding had such horticultural programs.

The recent increase in horticultural instruction is associated with the passage of the Vocational Agricultural Education Act of 1963. This act along with its 1968 amendment, supercedes the Smith-Hughes Act of 1917. It specifies training students for both farm and off-farm agricultural occupations (8,15). As reported by Tenney (14) in 1965, 16 million people were working in off-farm agricultural occupations while only 6 million people remained in production agriculture.

Horticulturally trained high school graduates are presently in great demand by industry. A 1967 survey of graduates from 17 Los Angeles high schools taken 6 months after graduation revealed that over 90% of those taking horticulture in high school were either employed in a horticultural industry or enrolled in a university to continue their education (10).

According to Feek (1) a typical high school horticulture program consists of:

Freshman:	Agriculture I, a concept or exploratory course covering the entire field of agriculture.
Sophomore:	Horticulture I, a lecture-lab course with encouragement for home projects and summer employment in a horticultural industry.
Junior:	Horticulture II, a lecture-lab course with compulsory summer employment in a horticultural industry.
Senior:	Horticulture III, a lab-lecture course emphasizing work experience and horticultural instruction relevant to the students needs.

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Since members of ASHS frequently function as instructors or as administrators, it is important that we be aware of the needs of the present high school instructor as well as the needs of university students who plan to teach high school horticulture in the future. Recently, Kenworthy (3) and Stevenson (12, 13) recognized one of the major current problems in university horticultural instruction as the trend away from practical vocational type courses to courses oriented around scientific principles. Martin, (5, 6) on the other hand emphasized that in a good vocational program 25% of the time should be devoted to academic and theoretical knowledge of horticulture and 75% to acquiring a practical knowledge of horticulture through on the job training.

Since the teaching objectives at the university and the needs of the university agricultural education student appear so drastically different, horticultural instruction in secondary schools of Oregon was investigated with the desire of obtaining information to serve as a guide for improving curriculum and individual horticulture courses for students planning to teach horticulture in the secondary schools. The objective was to obtain information concerning 1) qualifications of the instructors, 2) horticultural curriculum, 3) instruction and facilities available, 4) information available to the instructor and 5) high schools horticultural instruction in relation to the horticultural areas of the state.

## Methods

Names and addresses of 31 instructors representing approximately 25% of the total number of vocational agricultural education instructors in the state who teach horticulture at 28 high schools were obtained from the Oregon State Department of Education-Vocational Agriculture Education Division (7). Each instructor was mailed a questionnaire and asked to fill it out and hold until time for a personal interview which began 2 weeks after mailing. All interviews were prearranged by phone in order to eliminate inconvenient interruptions and delays. Interviews were scheduled to last 45 min. Although all instructors were interviewed, only 26 of the questionnaires were returned.

Of the 5 instructors who failed to return their questionnaires, 2 had never graduated from a university or college and were given a temporary Educational Speciality Certificate for teaching because of their practical experience in ornamental horticulture, and the remaining 3 were generally not interested in horticulture. The results of this study are based on the 26 questionnaires returned.

## Facts from questionnaires

1. *Qualifications of the instructors.* Most of the instructors (77%) graduated from Oregon State University. The remaining 23% represents six other state Universities (Arizona, Utah, Colorado, Minnesota, Idaho, and Wyoming). Of the 26 reporting there were 23 BS degrees, 3 BA degrees, 3 MA degrees, and 1 MEd degree.

The number of horticulture courses taken by instructors while in the university and the number he teaches in high school are illustrated in Fig. 1. All but one instructor had at least one horticulture course;

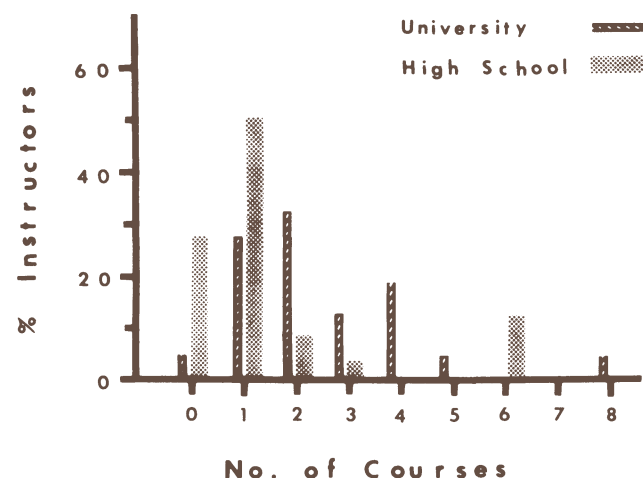


Fig. 1 The relationship between the number of horticulture courses taken by the instructors at the university and the number of courses he taught in high school

on the other hand 61% had not taken more than 2 courses. Table 1 illustrates the most frequent courses taken by the instructor.

Table 1. Most frequent horticulture courses taken by instructors.

Course	Percentage of instructors
Elements of horticulture (a general course for non-hort. majors)	85
Plant propagation	62
Vegetable production	35
Basic horticulture (a basic course for hort. majors)	15
Greenhouse construction and management	15
Small fruit production	12
Nursery management	8
General floriculture	3
Commercial floriculture	3
Spraying, dusting and fumigation	3

Nearly half (46%) of the instructors since graduating from the university, have taken additional in-service or short courses prepared by county extension agents and industry personnel. Areas studied include general botany, basic horticulture, plant propagation, greenhouse management, and nursery management.

Over half of the instructors (62%) felt that they had not had enough formal horticultural education (Fig. 2), whereas, all agreed that more practical training would be beneficial. Areas of additional instruction requested by instructors are shown in Table 2.

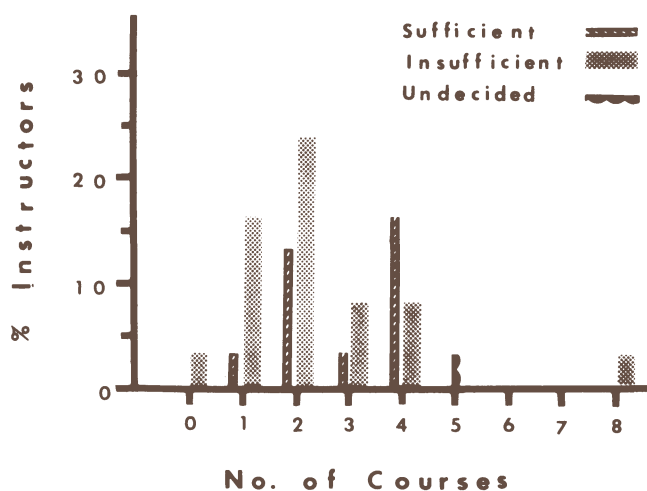


Fig. 2 The relationship between the number of horticulture courses taken by the instructors at the university and the expressed needs for additional horticultural education.

Table 2. Areas of instruction requested by instructors.

Area	Percentage of instructors
Greenhouse construction and maintenance	42
Nursery management	42
General floriculture	38
Landscape design	35
Spraying, dusting and fumigation	31
Commercial floriculture	31
Handling and distribution of florist crops	31
Plant material identification	27
Flower shop operations	23
Flower arrangement	19



2. *Horticultural curriculum.* The divisions of horticulture and the percent of instructors studying them while at the university and stressing them in high school are illustrated in Table 3.

Table 3. Divisions of horticulture studied at the university and stressed in high school.

Horticultural division	Percentage of instructors	
	Studying at the university	Teaching at the high school
1. Fruits	12	38
Tree	0	35
Nuts	0	12
Small	12	15
2. Vegetables	35	46
3. Ornamentals	19	77
Floriculture	19	38
Nursery management	8	77
Landscape design	0	77
4. Plant propagation	62	100
5. Others	3	--

3. *Instruction and facilities available.* As part of their general agriculture curriculum, 27% of instructors stress horticulture on a limited basis. The remaining 73% teach one or more horticulture classes on a basis comparable to other high school subjects such as English, biology, science, or history (Fig. 1).

The lectures vary from 20-50 min and laboratories from 60-180 min, depending on the school system. Because of the apprentice nature of vocational education, the high school instructor finds it difficult to teach large classes. Table 4 shows that 17 instructors (65%) have horticulture classes containing 16 or more students.

Table 4. Number of students in high school classes.

Number of students per class	Number of instructors
Less than 5	0
6 - 10	4
11 - 15	5
16 - 20	7
21 - 25	3
26 - 30	2
31 or more	5

Many types of facilities are utilized in the teaching of horticulture at the secondary school level. All instructors have a greenhouse. They range in size from 140 to 16,000 ft<sup>2</sup> and are constructed of plastic (52%), fiberglass (35%) and glass (13%). Other facilities available and the percentage of instructors having them are as follows: land labs (ranging from ¼ to 35 acres) 35%; lath houses 31%; hot beds 19%; and cold frames 19%. Of the instructors interviewed only 23% felt they had sufficient equipment for students to work independently.

Students as individuals have an excellent opportunity for additional advancement of their skills and knowledge through supervised horticultural projects and work experience programs. This year 93 sophomore and junior students participated in supervised projects and 81 senior students participated in the work experience program involving 51 and 39% of the instructors respectively.

4. *Information available to the instructor.* The need for a horticulture text at the high school level was felt by 76% of the instructors, while 12% disagreed, and 12% were undecided. Popular magazines (73%) were used more widely by the instructors than professional publications (35%) in lectures and laboratories. Additional information was obtained from many sources, including nursery and greenhouse resource personnel, notes taken in college, State Department of Education, other instructors, and personal texts. Fully 80% of instructors felt that their high school libraries were not adequately equipped with books related to horticulture.

5. *High school horticultural instruction in relation to horticultural industry.* Fig. 3 illustrates the close relationship existing between the important horticultural regions and schools teaching Horticulture; 85% of the schools offering a horticultural program are found within the lower Columbia and the Willamette River Valleys. Two schools were found in the Rogue River Valley and one each along the Pacific Ocean and in the Coast Mountain Range.

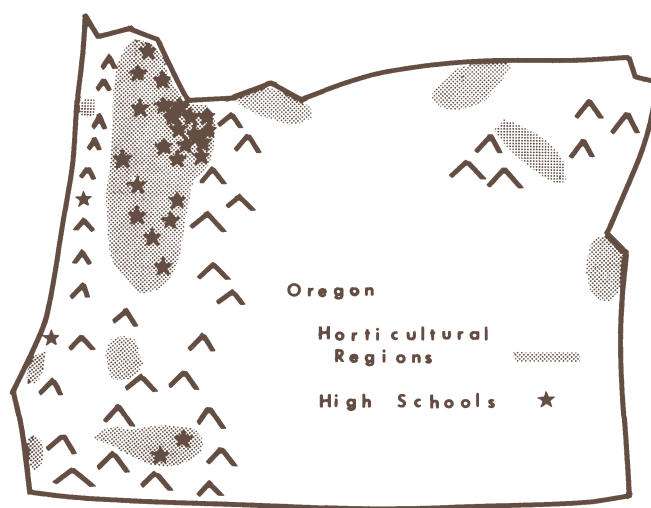


Fig. 3 The relationship between the important horticultural regions and the location of high schools providing horticulture instruction.

## Observations

With the passage of the Vocational Education Act of 1963 and its amendments of 1968, high school vocational agricultural education instructors were authorized to teach skills and knowledge covering several agricultural occupations (including horticulture) related to both farm and off-farm production. As a result of this new act, at least 62% of the states have a horticultural program as an integral part of their secondary education program.

In Oregon, 27% of the high schools teaching vocational agriculture offer some type of horticultural program to its students. Of the 28 schools surveyed, 17 (61%) had one man agriculture departments, and 11 (39%) had departments with 2 to 4 men. Greater specialization comes with additional instructors. From a pool of 2,765 agriculture students, approximately 440 (16%) freshmen through senior, had enrolled in some kind of horticultural class during the 1968-69 school year. High school programs in Oregon varied considerably depending on (A) training of instructor, (B) ability of the student, (C) school facilities and (D) horticultural industries within the community.

Some of the major problems and possible solutions concerning horticultural instruction in Oregon's secondary schools are given below. However, since 23% of the vocational agriculture instructors teaching in Oregon were trained in other states, it is possible that these problems are not necessarily unique to Oregon but rather widespread throughout the United States partly due to the newness of the program.

*Training of the instructor.* Apparently little is being done to allow specialization in the areas of agriculture. A university agricultural education student is required to take only one, 3-credit freshman horticulture course to satisfy the requirements for graduation (9). Yet 25% of the vocational agriculture instructors in the state are teaching some form of horticulture in their high schools. Most of the instructors are teaching in horticultural specialties for which they have had no formal education.

To alleviate this problem, agricultural education departments should encourage the student to specialize in a broad area such as shop, animal industries or plant industries, but not all 3, as is currently the case. Horticulture departments should provide additional opportunities for education in the form of summer short courses and/or in-service training for those presently teaching high school horticulture. Horticulture departments should also offer special applied courses for agricultural education students, publish a monthly newsletter providing information concerning industry and the hobbyist as related to high school situations, and make curricular provisions for minors in horticultural education. On a national basis, possibly through the education committee, the ASHS perhaps should set requirements and provide certification of high school instructors for teaching horticulture through out the United States. Many instructors teaching horticulture stated "Why Not? We are certified to

teach, why not be certified to teach horticulture?"

*Abilities of the student.* Counselors are placing potential dropout students in horticulture programs as a last resort. For example, in one school a horticulture class of 26 received 14 'F' grades. Of the students receiving 'F' grades one had a high school GPA of 'C', five a GPA of 'D', and eight a GPA of 'F'. A possible solution would consist of developing a strong educational publicity program directed to inform counselors and students alike of the needs, demands, and qualifications of a good horticulture student. Possibly this could be a joint effort between horticulture departments and the ASHS. Also the high school would benefit by hiring only ASHS certified instructors who are interested in horticulture.

*School facilities.* There is a need for standardization of school equipment so all students can have equal opportunity to develop their horticultural skills and knowledge.

*Recognition by horticultural industries.* It has been observed by some instructors that industry has not recognized horticulturally trained high school graduates. Of the instructors responding 43% felt that only 1 to 30% of their horticulture students remained in a horticulture occupation. Students are discouraged with low starting salaries, often associated with unskilled jobs. Possible solution to this problem lies in having qualified instructors who have a general knowledge of the horticultural field and understand the needs of industry. For example, the current emphasis in Oregon is placed on training students for employment in the ornamental industry. Yet from a monetary standpoint based on dollars paid to the grower, this industry contributes only 15% to the total horticulture dollars for the state while fruits and vegetables contribute 43 and 42% respectively of the total.

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## TEACHING AND RESEARCH TRAINING FOR TROPICAL OVERSEAS HORTICULTURE

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Almost one quarter of the land surface of the world and one third of the population is found within the area limited by the Tropic of Cancer and the Tropic of Capricorn, which geographically constitutes the tropics. None of the continental United States lies within this area.

Tropical crops are grown on the climatic fringes well north and south of the tropics, with Florida producing such tropical fruits as mangos, avocados, guavas, and papayas. Moreover, there are transitional crops such as sweet oranges that are not well adapted to the hot, humid tropics, but which reach their peak of quality in relatively cool climates. Florida is the largest citrus area in the world. The citrus crop in the United States exceeds that of the combined deciduous fruit production of the entire nation. With few exceptions, the United States is not acquainted with the culture of such tropical fruits as coconut, pineapple, banana, oil palm, cacao, and coffee, which are major world crops. We have adapted certain tropicals, such as tomatoes and peppers, to production in limited periods of the year. There are also important tropical vegetable crops which are not

produced in the United States and their culture in the tropics is quite different.

Why then has there been a torrent of foreign students surging through horticultural departments of this nation? The answer is rather apparent. First, there is a tremendous potential for the production of horticultural crops in the tropics, a potential as yet hardly tapped and often not well understood. Some of this potential lies in the large plantation crops such as bananas, coconuts, cacao, coffee, and rubber. Many of these crops were formerly owned and managed by corporations in the United States and Europe in what was often an exploitation-type enterprise. This situation has greatly changed in recent decades. Corporate interests from North America and Europe still own and manage many of these crops, but to the benefit of both the tropic country and the corporation. Moreover, private, native ownership is becoming commonplace. In both cases, the plantation crops are major sources of income for these largely agrarian countries. The tropics are also the source of many of our spices such as nutmeg, clove, ginger, black pepper, and allspice.

With the development of rapid transport systems, cut flowers, such as carnations, chrysanthemums, and foliage plants, are being grown in tropical highlands for export. More exotic flowers, such as anthuriums, are being shipped regularly to North American and European markets.

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