

ning activities as an independent garden and landscape architect; as head or co-worker in planning bureaus; or as an entrepreneur in firms specializing in garden, landscape, or sports-field architecture. Others are involved with the conception and supervision of landscaping and maintenance work in the garden and parks bureaus of cities and townships and in landscape development and conservation projects.

A "certified agricultural engineer" (U) could function in activities of high-level administrative offices in federal and state ministries, or in the administration and organization of professional groups. He or she may also elect to be an assessor or consultant in the public service or supply industry. They may participate in the activities of statistics boards, financial administrations, and in third-world development projects as a consultant, teacher, and/or expert. Participation in scientific research establishments is possible, especially while serving as a doctoral or professorial candidate.

Since horticulture is a highly diverse field, a certain degree of specialization of all training levels is inevitable. On the practical level, apprentices and master course participants must specialize in one of the following fields: Floriculture, vegetable production, tree and shrub production, fruit production, plant breeding and seed production, landscape architecture, or cemetery management. In the technical school, engineering academy, and university levels, the specialization is somewhat more general.

Our present number of training sites, including all vocational schools, master schools, technical schools, engineering academies, and universities that offer horticultural training are shown in Table 2. The number of apprentices, master-course participants, and students currently in training are listed in Tables 3 and 4. Thus, the magnitude of our training program for a relatively small profession in the Federal Republic of Germany becomes evident.

Future outlook

The present horticultural training program in the Federal Republic of Germany is both diverse and encompassing. To offer those from

each of the different training levels described here the possibility to develop their training further, a center for further education sponsored by the German horticultural trade has been in existence since 1961. At this center, a wide range of courses lasting 1 or 2 days to 1 or 2 weeks are offered. In addition, a multitude of events serving to provide further information and training are organized and carried out by universities and training and research centers, these being distributed throughout the whole country. The number of participants in these courses ranges from 30 to 500.

This overview of the horticultural training possibilities in the Federal Republic of Germany would not be complete without mentioning the fact that foreigners also are given an opportunity to take part in horticultural training programs. Participation is possible at all of the existing training centers, and especially at organized courses conceived to provide horticultural training for third-world countries. Such courses, which include language classes, theoretical training, and practical work, have a duration of 12 to 15 months.

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U.S. Floricultural Education

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A survey of floricultural education was conducted for presentation at an International Horticultural Congress Workshop in Aug. 1986. Based on discussion at the workshop, data collected were double-checked with contact persons at each college or university, and the revised data are presented herein (Table 1).

FOUR-YEAR COLLEGES

Admission standards for most of the 4-year colleges included receiving appropriate ACT or SAT scores, ranking in a certain percentile of the high school graduating class, and/or completing certain core courses such as English, mathematics, sciences, and social sciences. Standards vary with individual colleges. The ratio of basic science to plant science courses required in college ranges from 1:1 to 1:2 A. "C" (2.0 on a scale of 1 to 4, with 4 best) minimum average is required to graduate.

Internships varying from 8 to 24 weeks are required by eight of the 34 colleges reporting, and are suggested or recommended by the remainder (Table 1). Practical ("hands-on") experience is part of the classroom program in all but one college.

Relatively few changes in course offerings have been made during the past 10 years. There is a stronger emphasis today on supplementing the horticultural offerings with business and computer science courses. Greater changes apparently have been made in the content of existing courses to keep abreast of new developments.

Horticultural student enrollment reached an all time peak in the 1970s (1976 or 1977 in most colleges). Almost all colleges reported significant drops in floricultural student enrollment from 1975 to 1985, but several reported that enrollment had now stabilized (Table 1). In fact, a random telephone survey in Oct. 1986 indicated an increase in floricultural student enrollment in Fall 1986.

Thirty-three percent of the students are primarily interested in retail and 67% are interested in production and production-related sections of floriculture (Table 1). Retail emphasis students are 80% female and 20% male, whereas production emphasis students are almost equally divided. An average of 85% of the students graduate, and an estimated 9% reportedly enter graduate school in floriculture. The actual count of graduate students, with an average of six and one-half students per each of 28 colleges, indicates that the estimated percentage is slightly low.

Graduates reportedly receive an average of three job opportunities and starting salaries range from \$7000 to \$26,000 per year (Table 1). Starting salary varies with the experience and ability of individuals, and the average is certainly below the midpoint of \$16,500. Reportedly, 58.5% of the graduates are still working in floriculture 5 years after graduation (Table 1). Some colleges do not maintain detailed records, and the contact persons sometimes made what they considered reasonable estimates. The majority of the reporting persons thought that opportunities on the job were good for capable workers.

Table 1. Survey of university (and college) floricultural education programs, 4-year undergraduate study.

Univ. no.	Univ. name	Program	Internship		No. students (1985)							Percent that graduate	No. job offers per graduate	Starting salary	Percent working in floriculture 5 years after graduation	Enrollment trends in the past 10 years	Percent graduates entering grad school	Graduate students currently in floriculture in department			Comments
			Re-quired (R) or sug-gested (S)	Class-room hands-on expe-rience	Retail			Production			Com-bined total										
					Male	Female	Total	Male	Female	Total								MS	PhD	Total	
1	Auburn Univ.	Available	S	Designing and some production	0	1	1	3	0	3	4	40%	3 to 4	\$12,000-15,000	5%	Declining	---	1	---	1	All of ornamental horticulture
2	Univ. of Calif.	Available	S	None	---	---	---	12	18	30	30	95%	Place all	\$12,000-15,000	High	90 (high) to 40 now	15%	4	10	30	
3	Calif. Polytech State Univ.	Urged	S	Special problems	---	---	82	---	---	118	200 ²	80%	4	\$14,000-26,000	85%	Declined but steady for 3 years	7%	---	---		
4	Colorado State Univ.	Two semesters (4 credits min.)	R	Production	---	---	---	4	17	21	21	90%	2	\$14,000-16,000	90%	30% drop	2%	4	---	4	
5	Univ. of Conn.	Available	S	Lab. periods	---	---	---	---	---	---	20	90%	3 to 4	\$14,000-22,000	---	Declining	6%	4	---	4	
6	Cornell Univ.	Fifteen credits available	S	Analyze a business, grow a crop	3	7	10	3	3	6	16	90%	4	\$14,000-22,000	80%	Declined but stable now	15%	4	3	7	
7	Delaware Valley Coll.	24 weeks min. paid	R	Special and regular classes	---	---	---	---	---	---	65	65%	3	\$11,000-25,000	50%	50% drop in 3 to 4 yrs	3%	---	---	---	
8	Univ. of Florida	Available	S	Lab. periods	---	---	15	18	17	35	50	95%	---	\$14,000-17,000	50%	Declining	5%	5	2	7	
9	Univ. of Georgia	For credit	R	Special problems	---	---	---	10	10	20	20	85%	3	\$15,000-21,000	60%	Steady	10%	2	1	3	
10	Univ. of Illinois	Available	S	Special topics	2	8	10	4	2	6	16	90%	3 to 4	\$16,000-18,000	80%	40% drop	10%	3	3	6	
11	Iowa State Univ.	Class	S	Lab. periods	1	4	5	10	10	20	25	85%	3 to 4	\$ 8,000-25,000	60%	Declining	10%	4	1	5	
12	Univ. of Kentucky	Yes	R	Limited in lab. periods	3	1	4	2	2	4	8	---	1 to 2	\$11,000-18,000	20%	Declining	2%	---	---	---	
13	Kansas State Univ.	Available	S	Special problems	---	---	---	8	13	21	21	90%	2 to 3	\$15,000-18,000	---	Declining	3%	2	1	3	
14	Louisiana State Univ.	Available	S	Lab. periods	---	---	---	11	4	15	15	90%	1 to 2	\$16,000-24,000	33%	Steady	10%	1	1	2	
15	Univ. of Maryland	Available	S	None	---	---	---	20	30	50	50	90%	3 to 4	\$15,000-20,000	40%	Declining	20%	2	3	5	
16	Univ. of Mass.	Available	S	Lab. periods	1	4	5	3	2	5	10	---	3 to 4	\$12,000-18,000	---	Steady	5%	2	---	2	
17	Michigan State Univ.	6 months	S	Lab. periods	9	9	18	6	8	14	32 ²	40%	2 to 3	\$12,000-18,000	---	Declining	10%	7	1	8	Also have 15 students in science, whse, PM, & design
18	Univ. of Minnesota	3 months	R	Special problems, lab. periods	1	5	6	11	7	18	24	85%	2 to 3	\$10,000-16,000	60%	Declined but stabilized	5%	4	4	8	
19	Mississippi State Univ.	Available	R	Lab. periods, special problems	5	26	31	18	9	27	58	95%	2 to 3	\$14,000-19,000	98%	Declining	5	5	1	6	
20	Univ. of Missouri	Available	S	Lab. periods	---	5	5	10	15	25	30	90%	2+	\$12,000-20,000	50% to 60%	Declining	10%	1	2	3	
21	North Carolina State Univ.	Available	S	Lab. periods	4	3	7	4	4	8	15	90%	1	\$ 9,000-19,000	50%	Declining	35%	3	3	6	
22	North Carolina A&T State Univ.	Available	S	Lab. periods	2	5	7	15	3	18	25	95%	2	\$14,000-20,000	75%	Declining	20%	---	---	---	
23	Ohio State Univ.	Available	S	Lab. periods	1	1	2	18	20	38	40	95%	5	\$16,500	75%	Declining	<5%	4	4	8	
24	Oklahoma State Univ.	Available	S	Lab. periods & special problems	---	---	---	7	13	20	20	75%	2	\$13,000-20,000	45%	Declining	---	2	1	3	
25	Penn State Univ.	Available	S	Lab. periods & special problems	---	---	---	12	13	25	25	85%	3 to 4	\$10,000-22,000	50%	Declining	20%	6	2	8	

Table 1. *Continued*

Univ. no.	Univ. name	Internship			No. students (1985)							Percent that graduate	No. job offers per graduate	Starting salary	Percent working in floriculture 5 years after graduation	Enrollment trends in the past 10 years	Percent graduates entering grad school	Graduate students currently in floriculture in department			Comments	
		Pro-gram	Re-quired (R) or sug-gested (S)	Class-room hands-on experience	Retail			Production			Combined total											
					Male	Female	Total	Male	Female	Total												
26	Purdue Univ.	8 weeks	R	Lab. pe-riods & special problems	4	5	9	10	5	15	24	90%	2	\$10,000-17,000	50%	Declining	5%	0	2	2		
27	S. Illinois Univ.	Available	S	Lab. pe-riods & special problems	---	---	5	---	---	15	20	90%	2	\$14,000-18,000	---	Declining	5%	1	0	1		
28	Texas A&M	Available	S	Lab. pe-riods	12	104	116	15	23	38	154	90%	7	\$16,500-21,500	---	Declining	---	5	2	7		
29	Virginia Polytech Inst. & State Univ.	Available	S	---	0	8	8	4	8	12	20	90%	---	---	Declining	5%	---	1	1			
30	Wash. State Univ.	One se-mester	R	Lab. pe-riods & special problems	---	---	---	13	17	30	30	---	2 to 3	\$ 7,000-20,000	50%	Declining	5%	4	1	5		
31	Univ. of Wis.-Madison	Available	S	Lab. pe-riods	---	---	---	---	---	35	35*	90%	---	---	70%	Declining	10%	5	1	6		
32	Univ. of Wis., Platteville	Available	S	Lab. pe-riods & special problems	---	---	---	4	5	9	9	95%	3 to 4	---	Declining	15%	---	---	---			
33	Univ. of Wis., River Falls	10 weeks, 12 credits available	S	Lab. pe-riods & special problems	2	4	6	10	12	22	28	80%	2	\$12,000-16,000	90%	---	5%	---	---	---		
34	Univ. of Guelph, Canada	Available	S	Lab. pe-riods	---	---	---	5	3	8	8	---	2 to 3	\$15,000 (Canada)	40%	Stable	6%	6	4	10		
Total					50	200	352	270	293	711	1168								91	54	161	

*Majority in production and wholesale sales.

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How do these data relate to the needs and the future of floriculture as a profession? Floriculture production has become an international, rapidly changing, expanding, technical field. If we take the total student number, consider the graduation percentage, the percentage working in floriculture after 5 years (58.4%), and the 4-year duration of the college program, we have 144 new and fairly

permanent individuals annually to fill the needs of industry in 50 states. Remove the 33% who choose a retail emphasis and the average is just about two new college-educated, fairly permanent individuals per state per year with the production emphasis. Figured on a per-school basis, the average is three individuals per year. Either way, the number is inadequate.

TWO-YEAR AND VOCATIONAL PROGRAMS

Students also may study floriculture at 2-year technical schools, some of which are affiliated with colleges offering 4-year programs. In addition, there are many vocational schools that offer training programs, usually 6 to 9 months in duration. A limited survey was made of technical schools and two vocational schools (Table 2).

High school graduation is required for admission to a technical school or college. Individual schools vary, but they usually offer a 3:1 ratio of applied to basic courses (Table 2). All schools offer appreciable "hands-on" experience in their classwork. Five of the nine listed technical schools offering production training also require internships for additional learning prior to graduation.

Technical school student numbers are less meaningful than those for the 4-year colleges because of the limited number of schools represented (Table 2). They do show 52% of the students in the production programs. Twenty-six percent of retail emphasis students and 45% of production students are males. Graduation rate is 75% with three and one-half job offers per person with a salary range of \$7000 to \$15,500 per year. An estimated 82% obtain work in floriculture and 18% enter a 4-year floricultural college program. Reportedly, 65% are still working in floriculture 5 years after graduation, vs. 60% for 4-year program graduates.

The two vocational-technical type schools represented are especially well-known and starting salaries for their graduates may be above the average (Table 2).

Table 2. Survey of floriculture education in some 2-year technical programs.

School no.	School name	Entry requirements	Applied basic course ratio (%)	Practical experience requirements	No. student 1985							Percent of students who graduate	Starting salary	No. job offers per graduate	Percent of graduates employed in floriculture	Percent working in floriculture 5 yrs after graduation	Percent students who enter a 4-year program	Do credits transfer to 4-year college in-state	Enrollment trend over last 10 years
					Retail			Production			Combined total								
					Male	Female	Total	Male	Female	Total									
1	Univ. of Connecticut	High school graduate	75:25	"Hands-on labs"	---	---	---	---	---	---	8	90%	---	4-6	---	---	20%	Yes, with individual evaluation	Drastic decline
2	Kansas State Univ.	High school graduate	25:75	3-month retail flower shop (wire affil.)	1	24	25	---	---	---	25	80%	\$10,000-12,000	2 to 3	60%	---	25%	Yes	Slight decline but steady now
3	Univ. of Maryland	High school graduate	Mostly applied	Mostly "hands-on" work in classes + 8 weeks work experience	35	20	55	10	5	15	70	60%	\$9500	4-6	100%	80%	15% to 20%	Some especially to business mgm't	Declined, but steady now
4	Michigan State Univ.	High school graduate	Applied only	"Hand-on" labs + 6 months in industry	1	18	19	1	2	3	22	65%	\$8,300-12,500	2 to 3	80%	70%	25%	Some	Steady decline
5	Univ. of Minnesota	High school graduate	25:75	"Hands-on" labs + 12 weeks in industry	3	26	29	8	10	18	47	65%	\$7,200-12,400	9	72% + (20 con't. educ)	52%	20%	Yes	Increase to 1980, decline since until 1985
6	North Carolina State Univ.	High school graduate letters of reference	Applied only	"Hands-on" labs	---	---	27	Combination			49	85%	\$8,500-15,500	1	---	---	10%	No	Decline to under
7	North Dakota State Univ.	High school graduate	70:30	6 weeks work experience	---	---	5	Combination			20	90%	\$7,300	2 to 3	65%	40%	20%	Yes, most most credits	Decline 30 + %
8	Ohio St. Univ.	High school graduate	55:45	"Hands-on" labs + 10-15 weeks in industry	4	39	43	16	10	26	69	50%	\$7,000-12,000	2	85%	65%	10%	Yes	Declined but now steady
9	Temple Univ. ²	High in interview, ACT	70:30	"Hands-on" labs	---	---	15	Combination			52	75%	\$8,300-11,500	2	---	83%	30%	---	Decline
10	Univ. of Guelph	High school graduate	75:25	"Hands-on" labs	5	15	20	10	10	20	40	95%	\$12,000-15,000	2 to 3	90%	---	3%	Some	Slight decline
Total					49	142	191	92	111	203	402								
Technical (< 2 years)																			
11	DuPage Hort School	High school graduate	Mostly applied	4 months	---	---	---	32	3	35	35	89%	\$13,000-18,000	---	92%	89%	---	---	Declining
12	Gateway Tech. School	High school graduate	60:40	"Hands-on" classes	12	18	30	16	17	33	63	65%	\$10,800	3	87%	80%	5%	No	Declining

²Ornamental horticulture—60% floriculture, remainder mainly nursery management, horticulture therapy.

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Some inaccuracies may have been included in the survey because of inadequate record keeping of some schools and variations in reporting and interpreting data. I believe that data presented are sufficiently accurate, however, to justify the statements made herein.

Why do not more students study floriculture and enter the profession? Some of the reasons provided in the survey include the currently poor image of agriculture as a source of living, lack of knowledge of horticulture and floriculture, moving away from the "back to Mother Earth" fashion of the 1970s, poor wages for hours worked and employer's expectations, glamour of some other fields

(a few of which do not require a college education), a lack of dedication, lack of money to start one's own business, and a decline in the number of high school graduates.

Future floriculturists for responsible positions may come from college-trained graduates, some technical school graduates, people who grew up in the business, and, to a lesser extent, from elsewhere. Persons present at the August 1986 workshop did not believe that the current number of 4-year college program graduates is adequate.