

# Technology Transfer

## Colorado Commercial Greenhouse Needs Assessment Survey-1991

Karen L. Panter<sup>1</sup>

**Additional index words.** evaluation, educational programming, demographics

**Summary.** The *Commercial Greenhouse Needs Assessment Survey-1991* was mailed to 201 greenhouse firms throughout Colorado in Aug. 1991. One-hundred-twenty-two usable surveys were returned, a return rate of 61%. The survey contained four sections: Educational Programming Topics; Educational Program Delivery Methods; Needs Other Than Classes; and Personal/Business Data. Results of the Programming Topics section indicated that non-chemical pest control was the subject of most interest (70.6% of respondents), followed by chemical pest control (62.2%). Results of the Programming Delivery Methods section showed that greenhouse operators most wanted workshops (77.1%). A monthly format (54.7%) was preferred, with evenings (41.4%) the best time. The Needs Other Than Classes section indicated that greenhouse operators across the state expected visits from the Commercial Greenhouse Extension Agent on an as-needed basis (59.6%), and that 39.2% of the survey respondents were aware of services available from the Commercial Greenhouse Extension Agent. The Personal/Business section indicated that most respondents had a bachelor's or master's degree (53.3%), and were wholesale growers (66.9%) with greenhouses < 50,000 ft<sup>2</sup> (67.5%).

The commercial greenhouse industry in Colorado is large, with  $\approx$  288 acres (115 ha) under cover (Colorado Greenhouse Growers Assn., personal commu-

nication). Crops grown range from fresh cut flowers and herbs to bedding plants and tomatoes. A large part of the total greenhouse production area in Colorado (62%) is located in the northern Denver metropolitan area. Colorado has the 10th-largest area in greenhouse production in the United States, behind California, Florida, Michigan, Ohio, Texas, New York, Pennsylvania, North Carolina, and Illinois (Agricultural Statistics Board, 1992).

The Colorado State Univ. Cooperative Extension (CSUCE) Agent for the commercial greenhouse industry has regional responsibility and assists growers in the northern Denver metro area via educational programs, written information, telephone calls, and field visits. Although the agent is a regional specialist, the mailing list for written materials, including this survey, covers the entire state. It was determined in early 1991 that a survey of growers, whether around Denver or in the rest of Colorado, had never been undertaken to determine what growers really wanted and expected of the CSUCE agent. As a result, the *Commercial Greenhouse Needs Assessment Survey-1991* was developed and used for Colorado growers. The information gathered would be used to coordinate future educational programs and field visits for the Denver area and Colorado growers.

Several models were used to determine the final format of the survey [Fisher and Layman, 1986; McGhee, 1987, and an unpublished survey (Professional Development Needs Assessment) from the Colorado State Univ. Education Dept.]. A survey instrument was developed that contained four separate sections: A) Educational Programming Topics; B) Educational Programming Delivery Methods; C) Needs Other Than Classes; and D) Personal/Business Data. Each section was comprised of a minimum of three questions, each with several possible responses, with a total of 26 items. The respondents were to circle the answer or answers that best fit their needs.

To maximize the number of surveys filled out and actually returned, several steps were taken. First, survey respondents were assured of confidentiality in the cover letter. Second, the instrument itself was designed to be easy to complete with clear instructions and a reasonable length. Third, and probably most important, were the pre-letter and post-survey follow-ups to remind respondents to complete and return the survey. Each of the four mailings were signed by the greenhouse agent, as well as the county extension director, and was printed on CSUCE letterhead.

The pre-letter was sent to 201 greenhouse operation throughout Colorado on 19 Aug. 1991. The pre-letter informed growers of when the survey would be coming to them, who was sponsoring the survey, areas questions would cover, how the survey should be completed, and the confidentiality statement.

The next step was the mailing of the cover letter, survey, and return envelope on 23 Aug. 1991. The cover letter reminded the grower of the pre-letter, specified a return date, and provided contact names and a telephone number if questions arose. A CSUCE business reply envelope was included with each survey to improve chances of the survey being returned. Each survey was numbered as a means of tracking responses. As surveys were returned, the number was checked off so that the greenhouse operator was not bothered with any follow-up mailings. On 9 Sept. 1991, a follow-up reminder postcard was sent to those operators whose surveys had not been received.

Colorado State University Cooperative Extension-Adams County, 9755 Henderson Road, Brighton, CO 80601.

<sup>1</sup>Extension Agent (Commercial Greenhouse).

The cost of publishing this paper was defrayed in part by the payment of page charges. Under postal regulations, this paper therefore must be hereby marked advertisement solely to indicate this fact.

The final mailing took place on 17 Sept. 1991 and consisted of a reminder letter plus another copy of the survey and another return envelope sent to those who had not returned their survey forms. The final result of all four mailings was 122 surveys returned out of 201 sent out, for a return rate of 61%.

In Nov. 1991, the surveys were taken to the Statistical Laboratory at Colorado State Univ., where simple frequencies were calculated on each of the responses to the questions using the Statistical Package for the Social Sciences (SPSS) Release 4.0. Written comments were compiled within each question. Final results of the survey were sent out in Jan. 1992 to those respondents who requested them.

By far, the subjects in the Educational Programming Topics section that were of most interest to growers were non-chemical pest control (70.6% of respondents), chemical pest control (62.2%), and perennial production (61.4%) (Table 1). Several types of cut flowers were clearly of little interest in 1991: Carnations (12.7%), snapdragons (11.8%), and chrysanthemums (15.5%). Topics of interest written in by respondents included: "Water recycling/recirculation," "financial ramifications of automation," "gerbera," "anemone," "exacum," "gloxinia," "herbs," and "bedding plant trial results."

Results from the Educational Programming Delivery Methods section of the survey indicated that workshops were the most-preferred presentation method (77.1%) (Table 2). Tours (44.1%) were the second-most effective method. Half-day sessions (41.9%) were the most-preferred time length. Most respondents (54.7%) indicated that a monthly interval was best. Tuesday (49.6%), Wednesday (52.2%), and Thursday (53.0%) were the best days for educational sessions; January (71.8%) was the most-preferred month. The majority of respondents (59.0%) were willing to travel up to 1 h to attend a workshop. Greenhouse operators wanted speakers to be local business and industry personnel (68.7%). Private consultants (29.6%) were clearly last on the list as preferred speakers. Comments concerning program delivery methods that were written in by respondents included: "newsletters," "one or two intense days," and "any day but Monday."

The Needs Other Than Classes section of the survey was included because of the responsibility of the greenhouse agent for weather-monitoring equipment (Table 3). The data can be made available to growers in several ways. Information on the agent also was sought to strengthen the overall program.

The most-useful weather data for growers was air temperature (73.2%). A monthly reporting basis was most-preferred (64.5%). Most of the survey respondents expected the Commercial Greenhouse Extension Agent to visit as needed (59.6%), with insect (63.0%) and disease (83.3%) problems leading the list of reasons they would call to request a visit. As many respondents (39.2%) were aware of the services of the Commercial Greenhouse Extension Agent as were unsure (39.2%) of the services available. Comments in this section included: "hail patterns/probabilities," "didn't know there was such a person" (referring to the greenhouse extension agent), and "I don't know who he is or what he does."

Responses from the Personal/Business Data section of the survey indicate that a large number of respondents (owners and growers) had bachelor's or master's degrees (53.3%) (Table 4). The majority of respondents (64.9%) had

some training beyond the high school or GED level and had been in the greenhouse industry for at least 16 years (51.2%). Most were either wholesale (66.9%) or retail (39.7%) growers. Only 32.4% of the greenhouses in the survey were > 50,000 ft<sup>2</sup>, and most (69.5%) employed 10 or fewer people. Bedding (70.2%) and potted plants (49.6%) were the crops grown by the largest percentage of respondents. The organizations to which most respondents belonged were the Colorado Greenhouse Growers Assn. (79.3%), the Professional Plant Growers Assn. (27.2%), and the Ohio Florists Assn. (26.1%). Most respondents (76.7%)

Table 1. Responses regarding Educational Programming Topics from the Colorado Commercial Needs Assessment Survey-1991.

Question	Response (%) <sup>a,b</sup>
<i>What specific topics in greenhouse operations would you be interested in learning more about?</i>	
Heating/cooling	31.9
Non-chemical pest control	70.6
Chemical pest control	62.2
Soil/water/nutrient interactions	57.1
Structures and covers	20.2
Chemical growth regulation	10.9
<i>What specific topics in greenhouse business management would you be interested in learning more about?</i>	
Wholesale marketing	51.4
Retail marketing	46.7
Mass marketing	13.1
Personal issues	40.2
Tracking finances	41.1
<i>What specific crops would you be interested in learning more about?</i>	
Cut crops	
Roses	17.3
Carnations	12.7
Alstroemeria	17.3
Snapdragons	11.8
Bulb crops	27.3
Chrysanthemums	15.5
Field crops	25.5
Potted crops	
Chrysanthemums	18.6
Easter lilies	18.6
Poinsettias	36.3
Bulb crops	26.5
Begonias	24.8
Cyclamen	26.5
Edible crops	
Tomatoes	24.6
Cucumbers	14.0
Herbs	43.9
Bedding plants	
Plug production	36.0
Flowering annuals	49.1
Vegetables	21.9
Perennials	61.4
Geraniums	34.2
Garden mums	22.8

<sup>a</sup>Percentages may not total 100 in all sections as respondents could circle as many answers as necessary.

<sup>b</sup>Based on 122 respondents.

Table 2. *Responses regarding Educational Programming Delivery Methods from the Colorado Commercial Greenhouse Needs Assessment Survey-1991.*

Question	Response (%) <sup>x,y</sup>
<i>Which methods do you feel are most effective for you to learn?</i>	
Workshops	77.1
Lectures	40.7
Professional meetings	22.9
On-the-job work experience	28.0
Tours	44.1
<i>Which formats for educational programming are best for you?</i>	
Once a week	9.4
Once a month	54.7
Two-hour blocks	39.3
Half-day blocks	41.9
All day	17.9
<i>Which time period is best for you for attending programs?</i>	
Morning	25.0
Over lunch	10.3
Early afternoon	32.8
Late afternoon	38.8
Evening	41.1
<i>What day of the week is best for you to attend educational programs?</i>	
Monday	20.0
Tuesday	49.6
Wednesday	52.2
Thursday	53.0
Friday	25.2
<i>Which months would you most prefer educational programming to be scheduled ?</i>	
January	71.8
February	59.0
March	34.2
April	13.7
May	6.8
June	15.4
July	31.6
August	45.3
September	52.1
October	59.8
November	50.4
December	35.0
<i>How much time are you willing. to spend traveling to educational programming?</i>	
Less than 1/2 h	19.7
1/2 to 1 h	59.8
1 to 2h	25.6
More than 2 h	12.0
<i>What types of speakers would you be most interested in hearing?</i>	
Local business and industry personnel	68.7
Private consultants	29.6
Colorado State Univ. faculty	58.3
National business and industry personnel	55.7
Educators from other universities	53.0

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<sup>y</sup>Based on 122 respondents.

Table 3. *Responses regarding Needs Other Than Classes from the Colorado Commercial Greenhouse Needs Assessment Survey-1991.*

Question	Response (%) <sup>x,y</sup>
<i>What types of local weather data would be of use to you in your business?</i>	
Relative humidity	46.4
Air temperature	73.2
Precipitation	46.4
Solar radiation	53.6
Wind speed	28.9
<i>On what basis would weather information be of most use to you ?</i>	
Monthly	64.5
Quarterly	20.4
<i>How often would you expect the Commercial Greenhouse Extension Agent to visit your greenhouse ?</i>	
Monthly	6.1
Quarterly	30.7
Annually	21.9
As-needed	59.6
<i>What type of problem would spur you to call the Commercial Greenhouse Extension Agent for information?</i>	
Insects	63.2
Diseases	83.3
Water quality	29.8
Nutrition/fertilization	50.9
Soil/water testing	41.2
Crop culture	47.4
<i>Are you aware of the services available from the Commercial Greenhouse Extension Agent?</i>	
Yes	39.2
No	21.7
Unsure	39.2

<sup>x</sup>Percentages way not total 100 in all sections as respondents could circle as many answers as necessary.

<sup>y</sup>Based on 122 respondents.

were interested enough in the survey to request a copy of the results.

Comments in the Personnel/Business Data section concerning the natures on the businesses included: "research horticulture/plant breeding," "mail order," "provide vegetables to local facility using inmate labor," "city parks department," "cuttings," "plugs," "conifers from seed," "water plants and fish," and "hybrid cucurbit seeds."

Other organizations to which respondents belonged were (complete list): Society of American Florists, Associated Landscape Contractors of Colorado, Colorado Nurseryman's Assn., American Assn. of Nurserymen, American Greenhouse Vegetable Growers Assn., American Horticultural Society, American Phytopathological Society, National Melon Breeders, and American Horticultural Therapy Assn.

Most of the results of this survey were not surprising, but simply had not been documented previously in Colorado. Interest in actual crop production procedures seemed to be relatively low, with the possible exceptions of annuals, perennials, and herbs. Greatest interest was in control of the various greenhouse pests that continually plague green-

Table 4. Responses regarding Personal/Business Data from the Colorado Commercial Greenhouse Needs Assessment Survey-1991.

Question	Response (%) <sup>a</sup>
<i>What is your highest level of education completed?</i>	
High school or GED	31.7
Associate degree	10.8
Bachelor's degree	42.5
Master's degree	10.8
Doctoral degree	0.8
<i>How many total years have you worked in the greenhouse industry?</i>	
1-3 years	4.1
4-6 years	13.2
7-10 years	11.6
11-15 years	19.8
16 or more years	51.2
<i>In what area of the industry are you employed?</i>	
Wholesale grower	66.9
Retail grower	39.7
Garden center	33.1
Florist	23.1
Supplier/distributor	6.6
<i>How large is your greenhouse ?</i>	
Less than 50,000 ft <sup>2</sup>	67.5
50,001-100,000 ft <sup>2</sup>	18.3
100,001-250,000 ft <sup>2</sup>	9.2
250,001-500,000 ft <sup>2</sup>	3.3
500,001-1,000,000 ft <sup>2</sup>	0.8
More than 1,000,000 ft <sup>2</sup>	0.8
<i>How many people do you employ?</i>	
Less than 5	44.9
5-10	24.6
11-25	18.6
26-50	5.9
More than 50	5.9
<i>What crops do you grow in your business?</i>	
Bedding plants	70.2
Potted plants	49.6
Cut roses	14.0
Cut carnations	24.8
Other cuts	28.1
Field cuts	8.3
Herbs	28.9
Foliage	33.1
Vegetables	31.4
<i>what organizations do you belong to ?</i>	
Colorado Greenhouse Growers Assn.	79.3
Professional Plant Growers Assn.	27.2
Assn. of Specialty Cut Flower Growers	4.3
Roses, Inc.	10.9
Ohio Florists Assn.	26.1
Garden Centers of Colorado	17.4
Wholesale Florists of Colorado	6.5
Retail Florists of Colorado	3.3
<i>I would like to receive a summary of the results of this survey</i>	
Yes	76.7
No	23.3

<sup>a</sup>Percentages may not total 100 in all sections as respondents could circle as many answers as necessary.

<sup>b</sup>Based on 122 respondents.

house operations. Greenhouse business practices and marketing were identified as areas of interest. The decline of the cut carnation industry, and cut flowers in general, was reflected by the lack of interest expressed in these specific topics.

In a state as large as Colorado, the results of this survey tell us that CSUCE needs to make an effort to hold educational programs in several different areas of the state. Many greenhouses are far from the Denver area and growers simply do not have the time or the inclination to travel across the mountains for a 2-h program. Growers are also quite specific about the types of speakers they want to hear at programs. Top-quality speakers at the local, state university, and/or national level are a must to attract greenhouse operators to meetings.

Weather information is vitally important to the industry, but must be made available on a timely and regular basis. Weather forecasting is not the aim of the greenhouse agent's weather station. But, a history of weather data can be of great value to greenhouse businesses, particularly when trying to determine the cause of a problem. Monthly weather data, available through the greenhouse agent's office, can be a large benefit.

Probably the most important questions in this entire survey were the three that asked specifically about the Commercial Greenhouse Extension Agent (Table 3). A large number of respondents (52.6%) wanted the agent to visit on a regular basis, at least annually, preferably quarterly. This means that the agent should spend quite a bit of time out in the field, whether invited to a greenhouse or not. The most telling question involves awareness of services available from the Commercial Greenhouse Extension Agent. Fully 21.7% of the respondents did not know about the position. This is interesting, given the fact that the mailing list for the survey was the same state-wide list that is used for the monthly *Floriculture Newsletter*, which comes from the greenhouse agent. Apparently bulk mail (the most economical way to send out masses of information) is not widely read. It would seem that a survey of the effectiveness of the *Floriculture Newsletter* needs to be conducted. Also, much information about the greenhouse agent's position has been published in mailings from the Colorado Greenhouse Growers Assn. One wonders how much of that gets read.

In short, the Commercial Greenhouse Extension Agent now has some specific data about what exactly the greenhouse growers want to learn and in what format they would like the information. Future programming, as well as field visits and plans for weather-monitoring equipment and reporting, have been and will be based on the results of the *Commercial Greenhouse Needs Assessment Survey-1991*.

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