



## **Tennessee Produce Growers: Production and Post-Harvest Handling Activities\***



David B. Eastwood, John R. Brooker, Alice J. Rhea, and Charles R. Hall

\*Funding for the project was provided by the U. S. Department of Agriculture, Cooperative State Research, Education, and Extension Service, Initiative for Future Agriculture and Food Systems.

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## **THE GROWER SAMPLE**

The research reported here is part of an Initiative for Future Agriculture and Food Systems research project. Small-volume growers have difficulty meeting the purchasing requirements of outlets that favor larger scale growers. Market development is a complex process, dependent to a significant degree on the simultaneity of the interaction between buyers and sellers. Markets become established and expand as growers provide adequate supply, but in order for growers to do so, they must have access to distribution channels that can accommodate the larger volumes. Difficulties relate to market access. Many of these producers are searching for alternative enterprises that may allow them to diversify their operations and increase their net returns. Fruit and vegetable production can enhance the viability of smaller growers and/or those who are considering transition from livestock, row crops, or tobacco to produce. Successful transition will depend to a large extent on market development. Market development entails overcoming the simultaneity of generating enough production and having reliable outlets for the volumes grown. Increased sophistication in the supply chain has presented additional market challenges to smaller, limited resource producers. Value-added job creation will also occur with market development and expansion.

The scope of this project is to identify factors contributing to different produce market development experiences in four states, compare them, and draw conclusions about overcoming the barriers to market development. The goal is to implement ways to overcome simultaneity problems small vegetable producers encounter in securing outlets for their production. Guidelines for market development will be generated, and could serve as a benchmark for other states that would like to enhance market opportunities for fruit and vegetable growers.

Produce growers in Tennessee were surveyed during the first six months of 2002. The

Appendix contains all of the questions and response categories. The survey provided an opportunity to examine the behaviors of small-volume produce operations in a rapidly changing marketing channel. Questions focusing on decisions about what to plant, post-harvest handling, current marketing activity, and anticipated changes in the produce industry were included in the survey. The questionnaire asked about growers' use of feedback from marketing agents for decisions about what to plant. Other questions focused on post-harvest handling requirements as part of growers' decisions regarding their commodities and acreage.

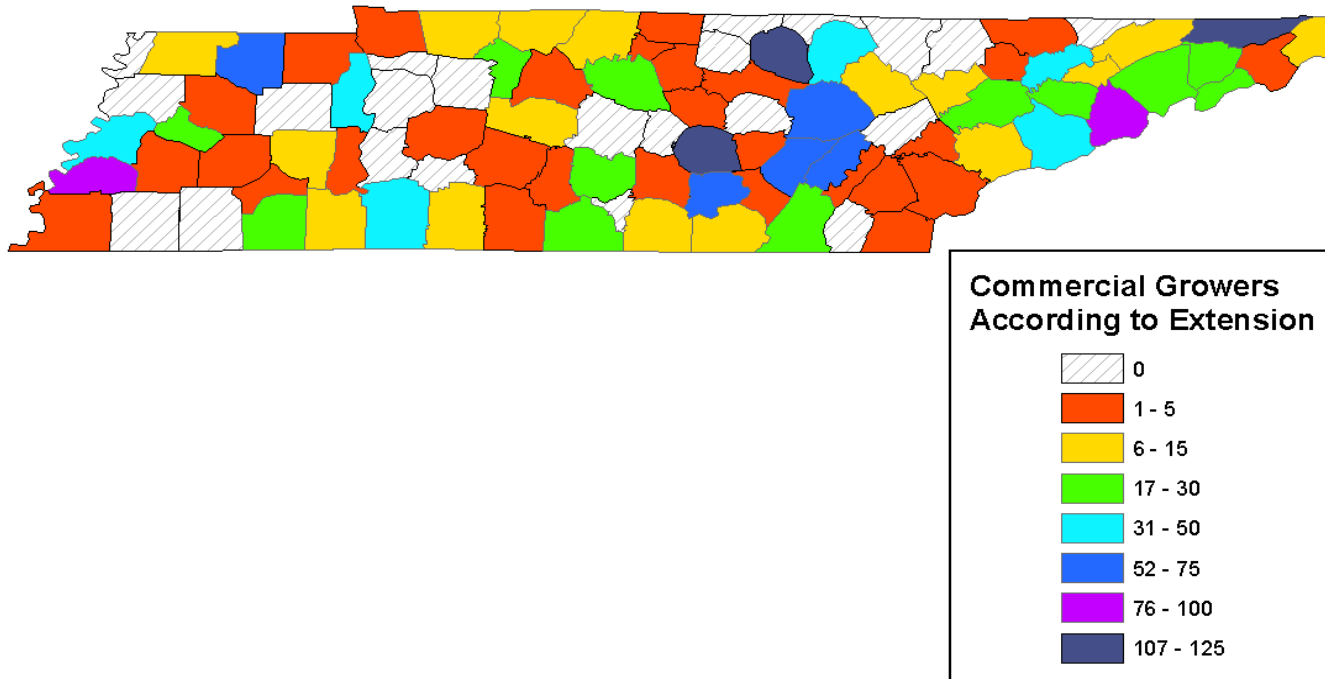
For the study described here, produce growers in the state were identified with the help of County Extension Agents, resulting in 1,483 operations in the target population. Figure 1 shows the distribution of these growers by county across the state. Some agents reported no commercial grower activity for their counties, which is shown on the map.

The survey was conducted two ways. One was through personal interviews. County Extension agents, in addition to providing lists of growers, were also asked to suggest growers to be interviewed. This led to 22 personal interviews, plus 9 additional interviews at county grower meetings. The remaining producers on the county lists received the questionnaire in the mail and were asked to complete it and to return the form in the provided postage paid envelope. Altogether, 189 questionnaires were returned for a response rate of roughly 12 percent or nearly 11 percent among those who received the mail-out. These were coded, and the responses analyzed to form a basis for the overview of small produce growers' marketing activities.

Figure 2 provides the distribution of grower respondents by county across the state. Ten of the survey respondents did not disclose their county location. Comparing Figures 1 and 2, East Tennessee has a higher concentration of commercial fruit and vegetables grower

Figure 1.

### 2002 Tennessee Produce Growers Survey Commercial Growers by County



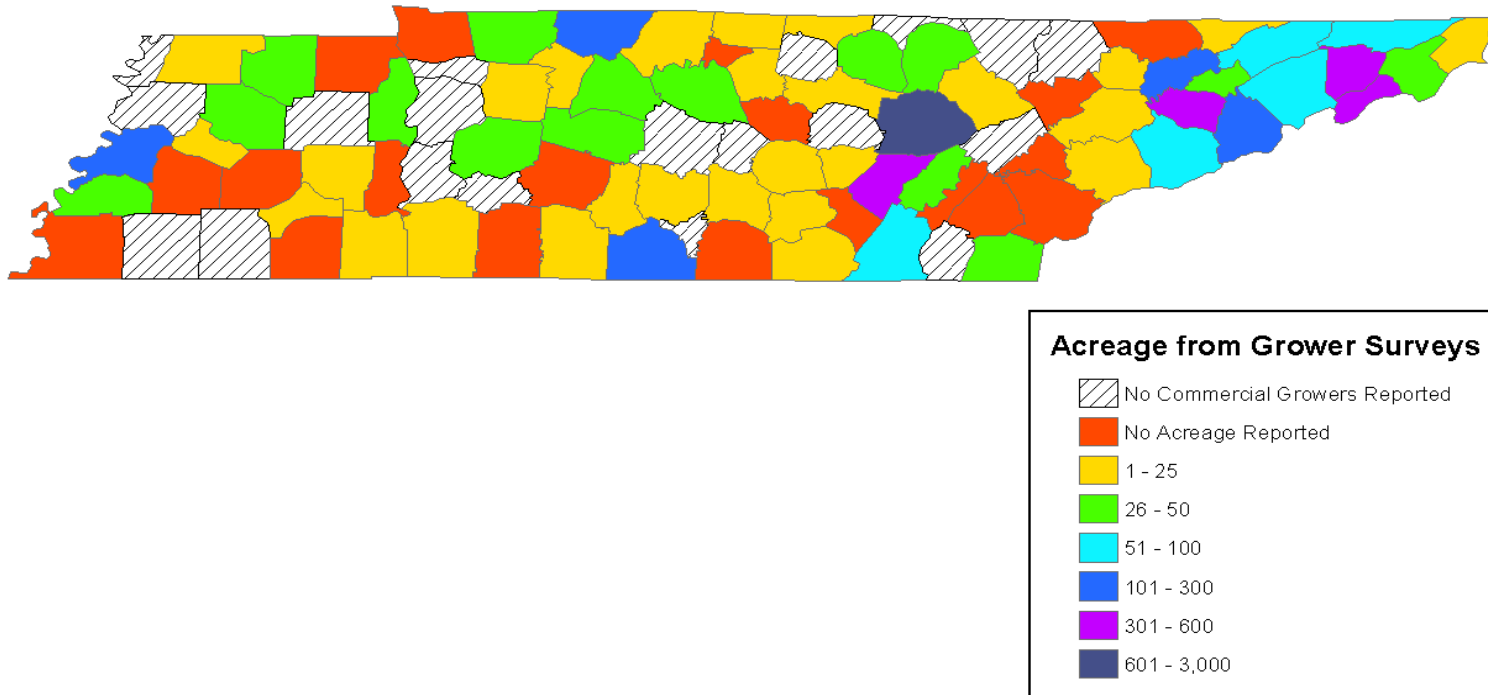
respondents relative to the distribution of operations identified by Extension agents.

Approximately 7,136 acres were used in fruit and vegetable production among the growers in the sample. Figure 3 depicts the total produce acreage by county. There were an additional 404.5 acres are not shown on the map because of the ten respondents who did not identify their counties. Just as the number of growers tended to decline moving west, so did the acreage under produce cultivation. Cumberland had the highest county aggregate produce production acreage of 2,626 acres.



Figure 3.

### 2002 Tennessee Produce Growers Survey Acreage by County

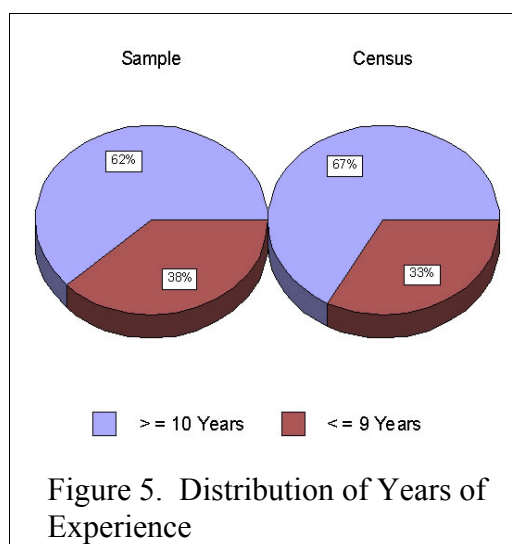
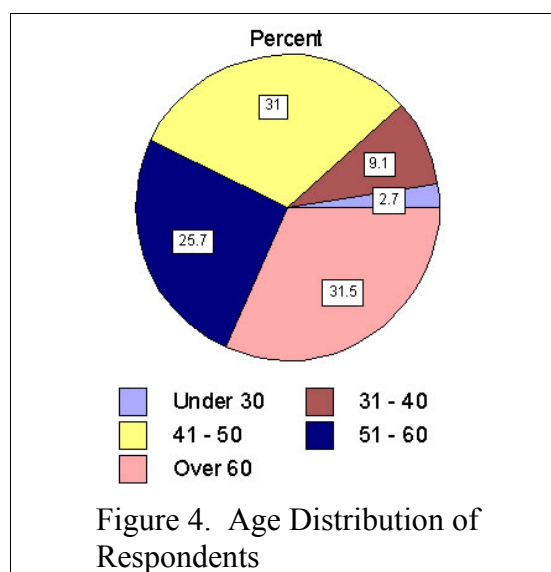


## GROWER CHARACTERISTICS

The types of information and categories of responses included in the survey instrument did not provide the opportunity for many comparisons with the 1997 Census of Agriculture. Those that can be made are provided below. Tennessee is not a major commercial production state and can be characterized as having a large proportion of small operations, which were the focus of this research. For example, the 1997 Census of Agriculture, Tennessee ranked 5<sup>th</sup> in number of farms with 4 percent of the U.S. total, but for most fruits and vegetables, Tennessee was not in the top 20 production states with the exceptions of green peas, snap beans, and tomatoes (USDA).

With respect to the age distribution of growers, approximately 31 percent fell in the 41 - 50 years old range, and 31.5 percent fell in the over 60 age range (Figure 4). This figure suggests the majority of Tennessee fruit and vegetable growers were over age 41, and it appears that not many younger producers had entered into production.

The age categories for the survey do not match those of the Census. However, two comparisons can be made which suggest the two age distributions are comparable. The 50 through 54 year



old group comprised 25 percent of the Census distribution, and for the survey the percentage was 26 percent. Those 70 and older were 39 percent of the Census distribution and 32 percent of the survey distribution. Years of farm experience had similar distributions with 38 percent of the sample reporting 9 years or less versus 33 percent for the Census (Figure 5).

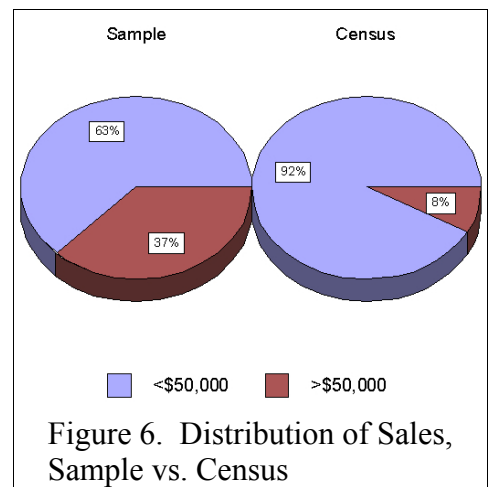
Fruit and vegetable growers tended to have diversified operations as reflected by over 42 percent raising livestock, 29 percent involved in row crops and over 24 percent producing tobacco (Table 1). Several Tennessee producers are also involved in ornamentals, entertainment farming, and timber.

Table 1. Other farm enterprises of survey respondents

Enterprises	Fruit and Vegetable Growers	
	number	percent
Livestock	80	42.6
Row crops	55	29.3
Tobacco	46	24.5
Ornamentals	15	8.0
Entertainment farming	1	0.5
Timber	1	0.5

Approximately 76 percent of the respondents had used a computer and 66 percent had internet access. Only 4.8 percent used the internet to sell products, while 17.6 percent bought inputs over the internet. Widespread use of the internet as a source of information is reflected in 91 percent of the survey respondents having utilized it for this purpose.

The census and sample distributions of farms on the basis of total sales are displayed in Figure 6. These data suggest that the sample had a lower proportion of



very small operations on the basis of sales, as only two-thirds of the respondents reported sales of \$49,000 or less, whereas the Census reported 92 percent. An interpretation is that the target sample of commercial growers generated by Extension did result in small enterprises, but tended to omit farmers who had small, part-time operations.

Tables 2 and 3 show the survey results of the distribution of total gross sales from produce in 2001 and total gross sales from farming in 2001, respectively. Survey results indicate that a majority (60.6 percent) of the gross sales from produce was below \$20,000 in 2001. Results indicate that 44.8 percent of respondents had gross sales under \$20,000 for their total farming operations.

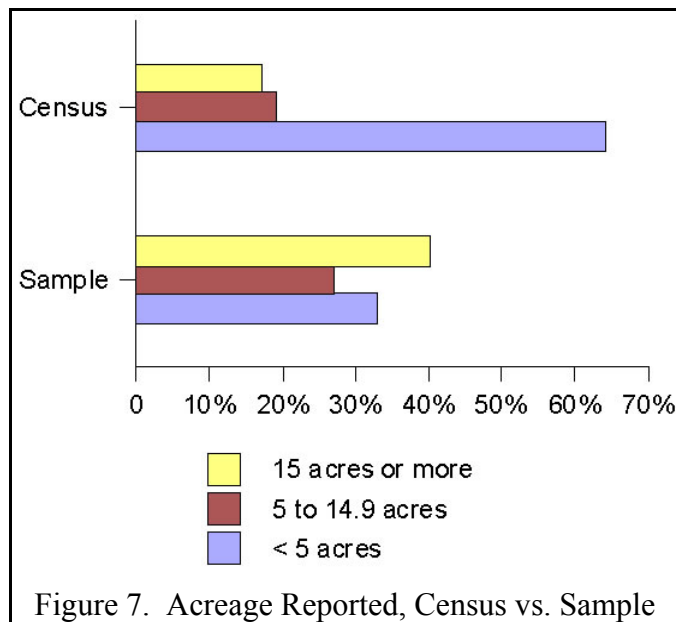
Table 2. Approximate total gross sales from produce in 2001

Sales range	Fruit and Vegetable Growers	
	<u>number</u>	<u>percent</u>
Under \$20,000	109	60.6
\$20,000 to 49,999	25	13.9
\$50,000 to 99,999	14	7.8
\$100,000 to 249,999	17	9.4
\$250,000 to 499,999	9	5.0
\$500,000 or more	<u>6</u>	<u>3.3</u>
Totals	180	100.0

Table 3. Approximate total gross sales from farming in 2001

Sales range	Fruit and Vegetable Growers	
	<u>number</u>	<u>percent</u>
Under \$20,000	78	44.8
\$20,000 to 49,999	31	17.8
\$50,000 to 99,999	20	11.5
\$100,000 to 249,999	18	10.3
\$250,000 to 499,999	16	9.2
\$500,000 to 749,999	4	2.3
\$750,000 to 999,999	0	0.0
\$1,000,000 or more	<u>7</u>	<u>4.0</u>
Totals	174	99.9

Focusing on produce sales also suggests that small produce growers tended not to respond. Only 33 percent of the respondents reported less than five acres, whereas 64 percent of the Census respondents fell in this acreage category. In addition, the survey sample appears to be more representative of the commercial growers in the state with fewer respondents in the 5 acres or less category (Figure 7). This suggests grower lists received from Extension agents were a more accurate reflection of commercial farmers across the state.



## **PRODUCTION DECISION MAKING**

There have been significant changes in produce production technology in recent years, and these have impacted the marketing of fresh produce and have also facilitated change in the distribution channel. Since the viability of growers depends on production and the ensuing marketing, there is a need to learn more about the production oriented decision making. Consequently, several questions focused on this aspect of grower activity.

Expansion of produce enterprises depends on several factors, including growers' interest and perceived production constraints. Just over half (52 percent) of respondents indicated interest in expanding their produce operations. The questionnaire provided a list of factors that could be limitations and asked respondents to indicate the extent to which each was a constraint (1 = not limiting to 5 = very limiting). Table 4 summarizes the responses. The limiting factors are listed in descending order of their average scores. The percentages of the respondents who indicated not limiting and very limiting are also shown. The percentages suggest divergent situations for some of the factors. With respect to weather, disease control, insect control, equipment, transportation, and credit availability, the not limiting percentages are much larger than those for very limiting. However, the sample seems to be divided with respect to harvest labor, market outlets, prices received, labor management, labor housing, irrigation, cooling, and land for which at least 10 percent indicated the respective factor was a serious constraint.

Table 4. Factors limiting growers' abilities to expand their produce operations

Factor	Average <sup>a</sup>	Percent Not Limiting	Percent Very Limiting	Factor	Average <sup>a</sup>	Percent Not Limiting	Percent Very Limiting
Harvest labor availability	2.96	31.7	24.9	Irrigation	2.16	52.4	14.3
Market outlets	2.78	33.9	22.2	Insect control	2.07	47.1	5.8
Prices received	2.76	31.8	18.0	Cooling	2.05	61.4	13.2
Weather	2.45	34.9	9.0	Land	2.00	61.4	12.7
Labor management	2.41	43.9	16.4	Equipment	1.75	59.3	4.2
Disease control	2.35	38.1	6.9	Transportation	1.65	67.7	3.7
Labor housing	2.17	59.8	18.5	Credit availability	1.46	75.7	1.6

<sup>a</sup> Responses ranged from 1 to 5, with 1= not limiting and 5 = very limiting.

### Acreage

Many growers were involved in numerous enterprises and avenues of production. Figure 8 illustrates the distribution of commodities grown in 2001 in Tennessee based on survey responses.

The combined acres across all respondents by commodity are in Appendix Table 1. Snap beans accounted for 2,666 acres of

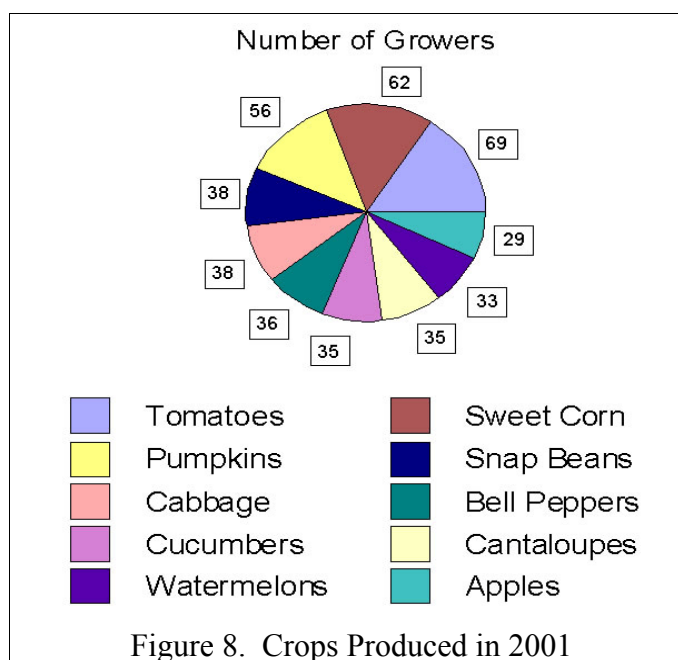


Figure 8. Crops Produced in 2001

production in the state. Tomatoes were second at 985.3 acres followed by pumpkins with 960.7 acres. Apples were fourth with less than half the pumpkin acreage (354.2 acres). Other relatively high acreage crops included sweet corn, cantaloupes, peaches, strawberries, sweet potatoes, watermelons, cabbage, and winter squash.

Respondents were asked to list any produce commodities for which they planned to

increase production in 2002 along with the acreage. Surveyed growers planned to expand by a total of 522.3 acres in the next year. Seven growers planned to add 19.2 acres of strawberries, 11 growers expected to produce 264.5 more acres of pumpkins, 76 more acres of corn produced by 3 growers, and 3 growers adding 70 acres of winter squash. Six growers also planned additions of 8.3 acres of grapes.

Operators were also asked to indicate any produce that was grown organically. Five Tennessee growers were involved in organic production with acreage totaling 26.0 acres. Sweet corn accounted for the highest acreage crop at 6.1 acres. Approximately 5.3 acres of tomatoes were grown organically in the state.

Respondents were grouped by region within the state where the four regions coincided with boundaries of Extension districts (see Figure 9). Given these divisions, the eastern region, Smoky Mountain District, accounted for 38 percent of fruit and vegetable respondents in the state (Table 5). This is due

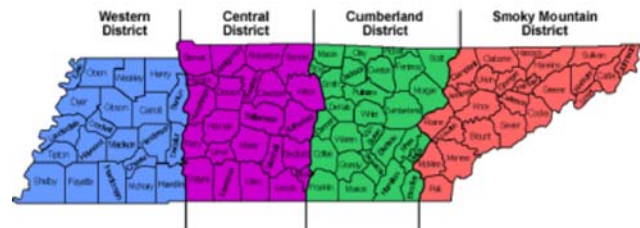


Figure 9. Tennessee Extension Districts

in large part to topography and climate conditions, as they vary dramatically from one end of the state to the other. Production declined westward where row crop operations are more prominent.

Table 5. Distribution of respondents by region

TN District	Fruit and Vegetable Growers	
	<u>number of respondents</u>	<u>percent of total</u>
Western	41	21.7
Central	35	18.5
Cumberland	41	21.7
Smoky Mountain	<u>72</u>	<u>38.1</u>
Totals	189	100.0

## *Information Sources*

A related question asked survey participants to check factors they used in deciding what to grow. The responses suggest that they sought information from different sources when producing crops (Table 6). The sources varied from state personnel to no one. Extension was a source of information for 78.9 percent of the sample. Other growers accounted for 61.6 percent, followed by the State Department of Agriculture at 34 percent. Only 7 percent of survey respondents did not ask anyone for information about growing new crops.

Table 6. Sources of information for growing new crops

Source	Fruit and Vegetable Growers (n=185)	
	<u>number</u>	<u>percent</u>
Extension	146	78.9
Another grower	114	61.6
State Department of Agriculture	63	34.0
Buyer	60	32.4
Internet	51	27.6
Grower organization	34	18.4
Farm Service Agency	25	13.5
Input supplier	22	11.9
Farm Bureau	18	9.7
No one	13	7.0

Growers ranked the usefulness of selected agencies and organizations in the state in terms of the usefulness in their produce operations. Response categories ranged from 1 to 5, with 1 = not useful and 5 = very useful. The agencies included in the survey reflected their provision of assistance throughout the entire production process. Agencies included the Farm Credit Bureau, which supplies initial capital needed to plant crops, to the State Department of Agriculture's marketing programs, which help to market locally grown products. Survey results indicate that growers regarded University Extension Area Agents as the most useful with an average of 3.89 (Table 7). University Branch Stations with an average of 2.62 were second. The

State Department of Agriculture Marketing Programs and Input Suppliers were ranked next at 2.35 and 2.31, respectively. Farm Credit Bureau and State Department of Agriculture Regulatory Programs were the least useful with average ratings of 1.86 and 1.79, respectively.

Table 7. Average grower ratings of selected agencies as useful in their produce operations

Agency	Average <sup>a</sup>
University Extension Area Agents	3.89
University Branch Stations	2.62
State Department of Agriculture Marketing Programs	2.35
Input suppliers	2.31
Farm Credit Bureau	1.86
State Department of Agriculture Regulatory Programs	1.79

<sup>a</sup> Responses ranged from 1 to 5, with 1= not useful and 5 = very useful.

A list of factors related to decision making about what to grow was included, and respondents were asked to check all that applied. Figure 10 shows the distribution of responses. Most growers (72 percent) used experience to determine planting choices. Approximately 54 percent consulted with State Department of Agriculture personnel. Nearly half (48 percent) checked market access. Price (37 percent), production expertise (29.3 percent), equipment needs (28.7 percent), labor timing/availability (27.1 percent), and lastly, risk (16 percent) were used by smaller proportions of the sample.

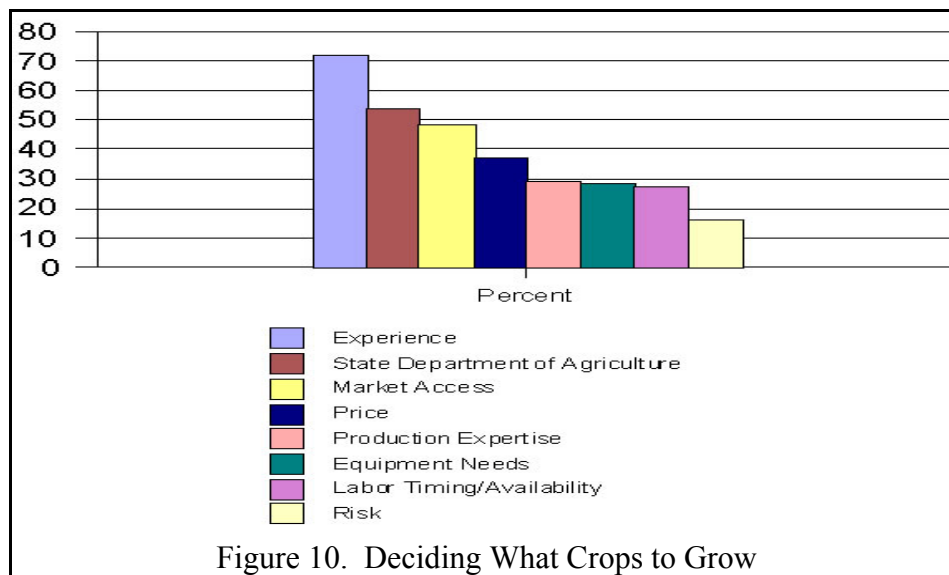
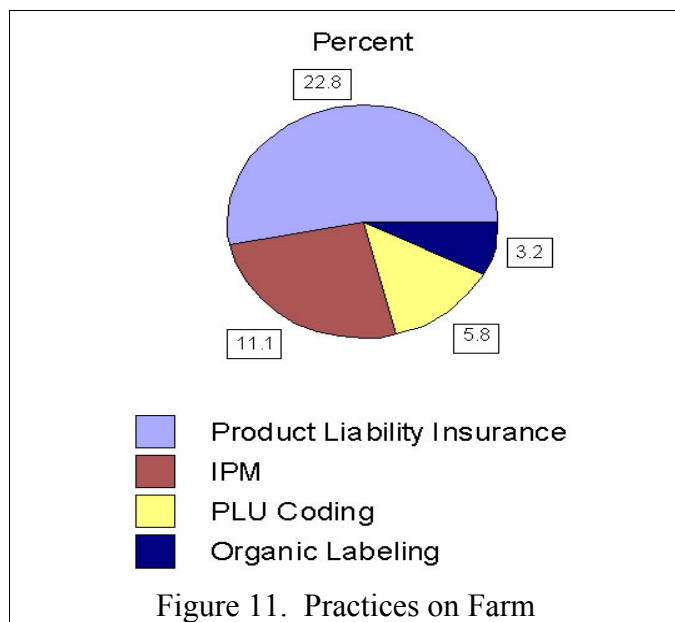


Figure 10. Deciding What Crops to Grow

Since labor has been frequently cited in the media as a production constraint, a question asked respondents if they used a service to find workers. Approximately 8 percent of survey respondents used a service to find workers to hire. This is less than the percentages of respondents who indicated labor management, harvest labor availability, and labor housing were limiting factors. It suggests that these respondents did not have access to those services or felt they were not worthwhile for their operations.

**Practices**

Significant changes in produce production at the farm level have occurred in recent years. Four of them were listed on the survey, and respondents were asked to indicate whether they have been implemented. Over one-fifth (22.8 percent) had some form of product liability insurance, 11 percent had incorporated Integrated Pest Management (IPM) practices on their farms, and only 5.8 percent did PLU (price look up) coding (Figure 11).



The low organic labeling response rate is consistent with 3 percent of the respondents growing organic produce.

Six activities associated with staying up-to-date in terms of production were listed, and respondents were asked to indicate whether any applied to them. Table 8 shows that 73.5

percent of survey respondent's tried new varieties in their operations. Approximately 51.8 percent received market news publications. Over 40 percent attended field days and trade shows. Participation in grower organizations occurred across 38.6 percent of respondents. Integrated pest management (IPM) was used by 31.8 percent of the sample. This percentage is nearly three times larger than that associated with the question about having implemented an IPM practice. The difference could be due to respondents feeling the former referred to a formal program, and the latter referred to less comprehensive management.

Table 8. Grower participation in production information gathering

Activity	Fruit and Vegetable Growers	
	<u>number</u>	<u>percent</u>
Try new varieties	139	73.5
Receive market news publications	98	51.8
Attend field days	80	42.3
Attend trade shows	77	40.7
Participate in grower organizations	73	38.6
Practice integrated pest management	60	31.8

A list of production practices was provided, and respondents were asked to indicate if the respective activities would increase, stay the same, or decrease. Table 9 presents the results with the four activities listed in descending order of the number of respondents who expected increases. Most did not anticipate any change in the activities, and relatively few planned reductions as reflected in over 70 percent of the sample having chosen the “stay the same” response. Participation in cooperatives was expected to increase by 5.3 percent for the sample.

Table 9. Expected changes in farming operation during the next year (n=189)

Activity	Increase		Decrease	
	number	percent	number	percent
Use of irrigation	41	21.7	4	2.1
Change crops	29	15.3	6	3.2
Organic production	17	9.0	4	2.1
Participation in cooperative	10	5.3	7	3.7

## MARKETING

Several questions in the survey were designed to learn about producers' marketing activities and their sources of information about outlets. The goal was to gather information on the extent of the use of marketing strategies in their enterprises.

### *Information Sources*

Information sources included in the survey are listed in Table 10 in descending order of frequency. Sixty percent of the respondents indicated they obtained information from other growers, and over half used Extension. Less frequently cited sources were the State Department of Agriculture, grower organizations, no one, input supplier, and Farm Bureau. Approximately 12 percent of the sample did not seek information from any source listed on the survey.

Table 10. Sources of information for marketing a new commodity

Source	Fruit and Vegetable Growers (n=178)	
	<u>number</u>	<u>percent</u>
Another grower	107	60.1
Extension	93	52.2
Buyer	63	35.4
State Department of Agriculture	44	24.7
Grower organization	33	18.5
No one	22	12.4
Co-op	16	9.0
Input supplier	12	6.7
Farm Bureau	10	5.6

### *Practices*

Changes were expected in the area of marketing crops with 26.5 percent of growers anticipating increased direct marketing of their products and only 2.6 percent expecting decreased direct marketing (Table 11). Over 12 percent of growers planned to increase wholesale/broker marketing and on-farm cooling, whereas 6.9 percent expected it to decrease. Few growers expected to expand on-farm packing/grading, branding, and traceback (tracking

products from the field to the retailer).

Table 11. Expected changes in post-harvest handling during the next year (n=189)

Item	Increase		Decrease	
	<u>number</u>	<u>percent</u>	<u>number</u>	<u>percent</u>
Direct marketing	50	26.5	5	2.6
On-farm cooling	23	12.2	7	3.7
Wholesale/broker marketing	23	12.2	13	6.9
Value-added processing	19	10.0	5	2.6
On-farm packing/grading	16	8.5	5	2.6
Branding	10	5.3	6	3.2
Traceback	8	4.2	5	2.6

Respondents were asked to indicate how important several factors were when considering a new crop. A scale of 1 = not important to 5 = very important was used. Table 12 presents the results in descending order of the average rating. The table also provides the percentages of the sample giving not important and very important ratings. The first three factors have large proportions of respondents at the extremes, and these refer to interactions with the commercial distribution system. There was much more agreement within the sample for the factors which were more mechanical/processing oriented as not important.

Table 12. When considering a new crop, how important are the following factors.

Item	Fruit and Vegetable Growers (189)		
	<u>Average</u> <sup>a</sup>	<u>Percent</u>	
		<u>Not Important</u>	<u>Very Important</u>
Buyer-seller relationship	3.23	35.4	41.8
Market location	3.08	35.4	32.8
Meeting buyer standards	3.08	38.1	37.6
Volume requirements	2.66	48.5	23.8
Transportation	2.46	48.7	20.1
Grading	2.37	52.3	19.6
Cooling	2.32	54.5	19.0
Contracting	2.08	61.4	14.3
Insurance	1.95	58.7	9.5
Broker/packing fees	1.79	69.3	8.5

<sup>a</sup> Respondents circled a number ranging from 1 to 5. Not important = 1 and very important = 5.

Just over one-third (65 of 189) considered themselves to be grower-shippers (Figure 12). These enterprises grow commodities and transport them to other stages in the distribution system. Most growers pack their produce themselves rather than send it off to a packing shed. About a quarter (26.5 percent) indicated they did not pack themselves.

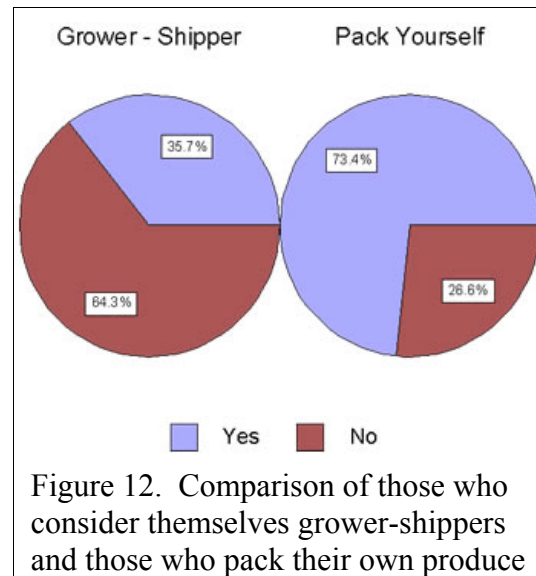


Figure 12. Comparison of those who consider themselves grower-shippers and those who pack their own produce

Figure 13 shows the percent distribution of respondents who paid someone else to do a service. Approximately 18.6 percent paid someone else to sell their products while 15.4 percent paid to have them packed. Grading services were purchased by 12.2 percent, and only 1.1 percent of growers paid to have products cooled.

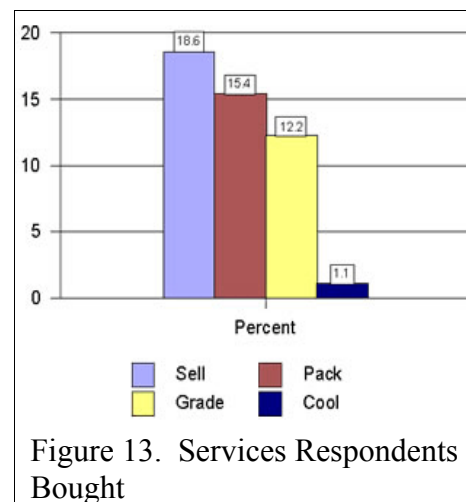


Figure 13. Services Respondents Bought

Small growers often find it difficult to work with brokers and wholesalers. Several problem areas were listed. If a grower did not use a broker or a wholesaler, the person was asked to indicate which two problem areas were the most important factors in the decision not to use a broker or wholesaler. There were 132 growers (69.8 percent) who answered the question, and Table 13 shows the distribution of responses. Volume requirements was the most frequently selected reason (65 percent of those answering). Over 34 percent chose fees as a reason they do not use a broker. Broker availability came in as the third choice at 31.8 percent followed by payment practices, pre-cooling, grading, and

packing. The personal interviews that were conducted with growers also revealed trust was a concern among this subgroup.

Table 13. If you do not use a broker/wholesaler, which factors are the most important?

Item	Fruit and Vegetable Growers (n=132)	
	<u>number</u>	<u>percent</u>
Volume requirements	85	64.4
Fees	46	34.8
Broker availability	42	31.8
Payment practices	29	22.0
Precooling	23	17.4
Grading	22	16.7
Packing	19	14.4

A list of post-harvest equipment was provided, and respondents were asked to indicate any that they used (Table 14). Nearly two-thirds (65 percent) used boxes. However, the frequency of use of the other types of equipment was much lower. Sorting tables, the second most frequently selected item, had just over half the frequency of boxes (56 percent). Lower frequencies for the other equipment are consistent with smaller operations not being able to justify the expense. These growers were also more likely to use direct outlets for which retail packing and branding were not necessary.

Table 14. Equipment and activities used on the farm

Item	Fruit and Vegetable Growers (n=189)	
	<u>number</u>	<u>percent</u>
Boxes	123	65.1
Sorting tables	69	36.5
Washing equipment	57	30.2
Retail packing	50	26.5
Holding coolers	47	24.9
On-farm processing	34	18.0
Sizers	29	15.3
Pre-coolers	17	9.0
PLU labels	13	6.9
Quick cooling	12	6.4
Branding	10	5.3

Four emerging practices are product liability insurance, organic labeling, PLU coding, and IPM. Growers were asked if they had implemented any of them (Table 15). Product liability insurance was used by nearly 23 percent of the sample. Very few growers had organic operations, so it was not surprising to find that only 3 percent of the sample (the organic growers) labeled their organic produce. Placing PLU stickers on their produce was done by less than 6 percent of the sample. Respondents were also asked if they believed traceback would impact their operations. Only 4 percent felt that it would be used more.

Table 15. Implementation of Selected Practices.

Practice	Percent Having Implemented
Product Liability Insurance	22.8
PLU Coding	5.8
Organic Labeling	3.2
IPM	11.1

### ***Outlets***

Tennessee producers used an array of outlets to sell their products. Table 16 indicates the number of growers who used each type, the average share of their sales attributed to the respective outlet, and the number of growers who sold at least 90 percent of their production through the respective outlets. Most growers in Tennessee sold portions of their produce at direct markets (farmers' markets, u-pick, etc.) . Eighty of the survey respondents made 90-100 percent of their sales going through direct outlets. Wholesale markets accounted for the highest share of produce sales at 44.1 percent; however, only 54 respondents sold through the wholesale market. Retail stores and green grocers received 16.4 percent of the sales of Tennessee produce according to survey results. Sixty-six growers supplied retail stores by way of direct delivery.

Other outlets included direct to local restaurants, processors, community supported agriculture, cooperative/marketing associations, shipper-packers, auctions, and Internet.

Table 16. Distribution of respondents' total produce sales by outlet.

Outlet	Growers	Share of weighted produce sales	Growers with 90-100 percent of sales to one outlet category
	number	percent	number
Direct market (farmers' market, u-pick, etc.)	139	32.8	80
Direct to retail store (grocery, green grocer)	66	16.4	10
Wholesale market (non-cooperative)	54	44.1	16
Direct to local restaurant	23	0.6	0
Processor	15	3.0	8
Community supported agriculture	8	0.4	1
Cooperative/marketing association	5	2.4	1
Shipper, packer (sell via another grower)	5	0.2	2
Auctions	1	<0.1	0
Internet	1	<0.1	1
Totals	(n=143)	100.0	---

There were 138 growers (73.0 percent of the sample) who only sold through direct markets. They were asked to

circle any factors they felt were barriers to shifting completely to wholesaling. Figure 14 displays the distribution of responses.

Small volume and lower prices were the biggest reasons for growers not shifting to wholesale markets. Approximately 66.7 percent of survey respondents felt that their volumes of production

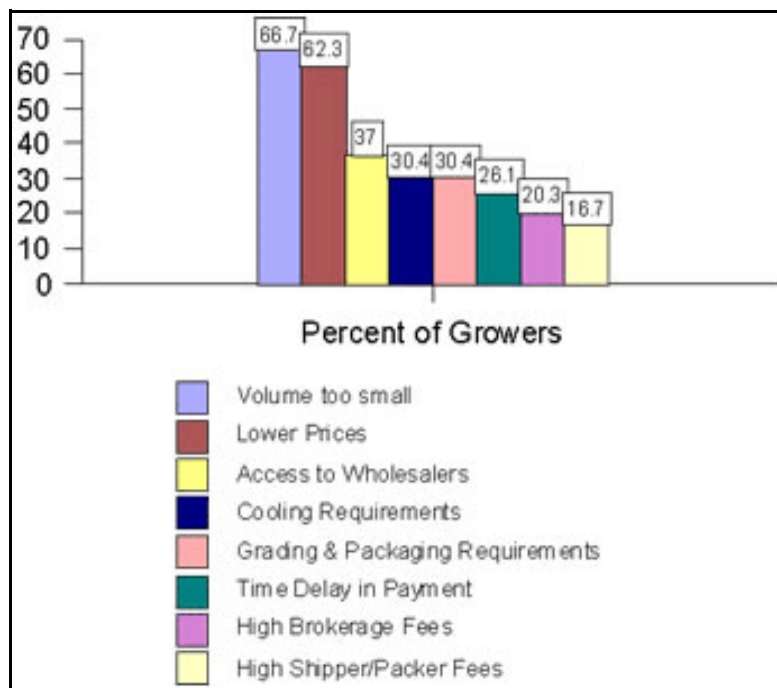


Figure 14. Barriers Preventing a Shift to Wholesale Outlets

were too small for a wholesale market. Lower prices was a reason for 62.3 percent of growers. Some growers felt they did not have access to wholesalers to do business while others could not meet requirements necessary such as cooling, grading, and packaging. Other reasons consisted of time delay in receiving payments (26 percent), high brokerage fees (20.3 percent), and high fees charged by the shipper/packer (16.7 percent).

### **Outlook**

Growers were asked to identify fruits and vegetables expected to increase and decrease in market opportunities over the next five years for their region. One-third of the sample listed fruit for which they expected to have increasing market opportunities, and nearly 40 percent did the same for vegetables. Tables 17 and 18 list the produce items identified. Fewer growers anticipated declines (9.5 percent for fruit and 26.5 percent for vegetables).

**Table 17. Growers expecting an increase in market opportunities over the next five years**

Crop	Fruit growers (n=53)		Crop	Vegetable growers (n=59)	
	number	percent		number	percent
Blueberries	11	20.7	Corn, sweet	17	28.8
Apples	9	17.0	Tomatoes	15	25.4
Grapes	9	17.0	Beans, snap	12	20.3
Blackberries	8	15.1	Pumpkins	12	20.3
Peaches	8	15.1	Cantaloupes	7	11.9
Raspberries	2	3.8	Cucumbers	7	11.9
Other fruits <sup>a</sup>	7	13.2	Squash, summer	5	8.5
			Peppers, bell	4	6.8
			Watermelons	3	5.1
			Asparagus	2	3.4
			Cabbage	2	3.4
			Okra	2	3.4
			Sweet potatoes	2	3.4
			Other vegetables <sup>a</sup>	15	25.4

<sup>a</sup> Unspecified or only one grower.

Table 18. Growers expecting a decrease in market opportunities over the next five years

Crop	Fruit growers (n=11)		Crop	Vegetable growers (n=42)	
	number	percent		number	percent
Peaches	5	45.4	Tomatoes	18	42.9
Apples	4	36.4	Pumpkins	9	21.4
Strawberries	2	18.2	Corn, sweet	5	11.9
Other Fruit <sup>a</sup>	3	27.3	Beans, snap	3	7.1
--	--	--	Cabbage	2	4.8
--	--	--	Corn, ornamental	2	4.8
--	--	--	Potatoes, sweet	2	4.8
--	--	--	Peppers, bell	2	4.8
--	--	--	Cantaloupes	1	4.0
--	--	--	Other vegetables <sup>a</sup>		

<sup>a</sup> Unspecified or only one grower

The top five vegetables expected to increase were sweet corn, tomatoes, snap beans, pumpkins, and cantaloupes. The top five vegetables expected to decrease were tomatoes, pumpkins, sweet corn, snap beans, and cabbage. These results show there were varying opinions on what produce varieties will be viable future options. The top five fruits expected to increase include blueberries, apples, grapes, blackberries, and peaches. Decreases were expected for peaches, apples, and strawberries.

## RELATIONSHIPS AMONG RESPONSES TO SURVEY QUESTIONS

Several chi square tests of independence were conducted. The purpose was to draw inferences about possible systematic response patterns among types of growers. Areas of interest included differences between respondents who indicated they were grower-shippers versus other growers and decision making with respect to produce items to grow, sources of information about production and post-harvest handling, and limiting production factors. Interest in expansion of produce production compared to limiting production factors, marketing and production behaviors and various production practices were also evaluated. The results are summarized here. Tables are in the Appendix. Statement numbers in parentheses in the prose below refer to the questionnaire statements also found in the Appendix.

### *Grower-shippers*

Responses to whether the person was a grower-shipper (21) were compared to those for the production-oriented questions. With respect to gross income from produce operations (32), it was necessary to combine the three highest income categories into a single subgroup of \$100,000 or more grower-shippers in order to have sufficient observations in each cell (Appendix Table 2). The pattern of responses was found to be independent. An implication is that grower-shippers did not have operations that generated significantly greater incomes from produce. The question about whether the person had livestock, tobacco, row crops, or other enterprises (4) was recoded to reflect whether the operation had any other farm activities aside from produce. This chi square test of independence led to the inference that the presence of alternative enterprises to fruit and vegetable production was independent of whether the operator was a grower-shipper (Appendix Table 3). Consequently, grower-shippers are not necessarily produce only operators.

There were fourteen factors listed that could limit the ability to expand produce production (8). The five-point scale for each was collapsed by combining the 1 and 2 into 1 (not limiting), the 3 into 2 (neutral), and 4 and 5 into 3 (limiting) in order to have adequate numbers of observations in the cells (Appendix Table 4). Five factors were found to be related to whether the respondent was a grower-shipper (21). Proportionately more grower-shippers found prices received and market outlets to be limiting. Other growers tended to indicate harvest labor and disease control were limiting and that labor housing was not limiting. An interpretation is that grower-shippers were more likely to have had experience in the commercial distribution system leading to greater likelihood of prices received and market outlets being problematic. A separate chi square analysis of grower-shippers versus use of a service to hire labor (13) suggested that this type of farmer was more likely to use a service, which is consistent with their not having indicated labor availability (as opposed to housing) as a problem (Appendix Table 5).

Relationships between whether the person was a grower-shipper (21) and factors that affected decision making about what to grow (20) were tested for independence (Appendix Table 6). Separate analyses were completed for each of the ten items listed. In only one instance were there too few observations using the original 1 to 5 rating scale, so it was kept for the tests of independence. In two cases (insurance and cooling) the inferences were no systematic relationships between the importance of the item and being a grower-shipper. For the other seven factors, other growers tended to rate them as not important. This suggest that grower-shippers were more inclined to use these factors in their decision making.

Closely related to decisions about other crops to grow is interest in expansion. No systematic pattern was found in the responses to the grower-shipper question (21) and interest in expansion (5) (Appendix Table 7). Thus, interest in expansion does not appear to be more likely

among either the grower-shippers or the other producers. However, some relationships were found with respect to two questions focusing on decision making about what to grow. The first (18) pertained to eight personal decision making factors. No significant differences were found for grower-shippers with the exception of market access for which there was a significantly higher frequency of grower-shippers checking this item (Appendix Table 8). The next question in the survey (19) focused on whom the respondent would ask about marketing another crop (Appendix Table 9). Significantly more grower-shippers were more likely to have asked another grower and buyers (brokers/wholesalers), whereas other growers tended to ask grower organizations. There were no significant differences for Farm Bureau, Extension, input supplier, state Department of Agriculture, or no one. Having larger volumes of produce to sell, it was not surprising to find that grower-shippers were more inclined to ask other grower-shippers and buyers for information about marketing other crops.

### ***Sources of information***

A broader question (9) asked those being surveyed how useful six sources of information were in their produce operations (Appendix Table 10). In order to have sufficient observations in the cells, the five point scale was reduced by combining the 1 and 2 into 1 (not useful), the 3 into 2 (neutral), and the 4 and 5 into 3 (useful). The only instance of a systematic pattern in responses was for the Farm Credit Bureau for which grower-shippers were more inclined to have found it useful.

Responses to the question about sources of information if the respondent was to start the production of a new crop (6) were analyzed with respect to interest in expansion (5) and whether the person was a grower-shipper (21). Appendix Table 11 has the results of the former. For the ten sources listed, only one systematic pattern was found. Respondents who were interested in

expansion were more likely to have checked Extension as a source of production information. With respect to whether the person was a grower-shipper, people who were not grower-shippers were more likely to use the Farm Bureau as a source of production information (Appendix Table 12). All of the other sources were independent of being a grower-shipper.

Two related behavioral equations were evaluated with respect to whether the person was a grower-shipper (21). Six behavioral ways of acquiring information were listed (10). Grower shippers were more likely to have tried new varieties, received market news, and used IPM (Appendix Table 13). No differences were found for attend trade shows, participation in grower organizations, attend field days. With respect to those who were interested in expansion (5) versus ways of acquiring information, these respondents were more apt to attend trade shows, participate in grower organizations, and try new varieties (Appendix Table 14). Implications are that both grower-shippers and growers who are interested in expansion attend trade shows and try new varieties, but the former operators also received market news and used IMP, whereas the latter were more inclined to also participate in grower organizations.

The patterns of responses to four management practices (29) were compared to whether the person was a grower-shipper (21) (Appendix Table 15). These operators were more inclined to use product liability insurance and PLU coding, which are common in the commercial distribution system. There were too few organic growers to conduct a statistical test, and the pattern of grower-shipper responses was independent of IPM.

## CONCLUSIONS

Produce growers included in this sample were more likely to be older operators with diversified enterprises. Most had produce sales in 2001 of \$20,000 or less, and 45 percent had gross sales from all operations in 2001 of \$20,000 or less. Producers tended to be more prevalent in the eastern part of the Tennessee. Respondent characteristics suggest the sample was representative of commercial operations, of which most are small.

Approximately one-half the sample indicated interest in expansion, and a statistical test of independence led to the inference that this interest was not associated with whether the person was a grower-shipper. Limiting factors were harvest labor availability, market outlets, prices received, labor management, labor housing, and irrigation. Weather, disease control, insect control, equipment, and credit availability were considered very limiting by 10 percent or less of the sample. A variety of produce commodities was grown. The largest acreage was in the production of snap beans followed by tomatoes, pumpkins, and apples. Other fruit and vegetables with notable acreage were sweet corn, cantaloupes, peaches, strawberries, sweet potatoes, watermelon, cabbage, and winter squash.

Extension and other growers were the most frequently cited sources of information about the production of a new crop. Extension agents were found to be the most useful source of information for respondents about produce production. Decisions about what to grow were based primarily on experience, follow by the Tennessee Department of Agriculture. Most growers had tried new varieties of produce commodities.

Three-quarters of the growers sold at least part of their production through direct outlets, and about a third sold directly to retail stores. Seventy percent did not use a broker/wholesaler. Three-quarters packed produce themselves. Over one-third of the respondents were grower-

shippers. About 25 percent expected to increase direct marketing, and few expected increases in on-farm cooling and selling to wholesalers/brokers. Most expected their post-harvest activities to stay the same.

Three factors (buyer/seller relationships, market location, and meeting buyer standards) had large proportions of respondents indicating they were not important or very important when considering a new crop. Post-harvest handling activities (grading, cooling) were considered not important by large proportions of the sample. In addition, volume requirements and transportation were also rated not important by many respondents. The respondents also indicated they were engaged in few post-harvest handling activities, especially retail packing. These results are consistent with most growers relying on direct outlets.

Factors that grower-shippers versus other growers tended to find limiting were prices received and market outlets. Other growers versus grower-shippers tended to indicate harvest labor and disease control were limiting. This suggests grower-shippers were more likely to have had experience in the commercial distribution system. Grower-shippers who are interested in expansion are more likely to attend trade shows and to try new varieties.

## Reference

U. S. Department of Agriculture. *1997 Census of Agriculture: Tennessee*. GPO, 1999.

## APPENDIX GROWER SURVEY

### GENERAL INFORMATION

---

1. In what county is your farming operation based? \_\_\_\_\_
  
2. What is your age?  
\_\_\_ under 30  
\_\_\_ 31-40  
\_\_\_ 41-50  
\_\_\_ 51-60  
\_\_\_ over 60 years
  
3. How many years have you been growing produce commercially?  
\_\_\_ Less than 3    \_\_\_ 3-6    \_\_\_ 7-10    \_\_\_ Over 10
  
4. What else did you raise on your farm in 2001? (Circle all that apply)  
  
Livestock      Tobacco      Row crops  
  
Other, please list \_\_\_\_\_  
\_\_\_\_\_
  
5. Are you interested in expanding your produce production?  
Yes    No
  
6. If you were to start production of a new crop, what sources of information for **growing** the commodity would you use? (Circle all that apply)  
  
Farm Bureau                  Another grower  
Extension                      Input supplier  
Buyer                              Internet  
Grower organization        State Department of Ag.  
Farm Service Agency        No one

7a. In terms of acreage, what are the types of produce that you are growing or plan to grow in 2002?

VEGETABLES	ACRES	VEGETABLES	ACRES
Asparagus		Peppers, Jalapeno, etc.	
Beans, Snap		Potatoes, White	
Beets		Pumpkins	
Broccoli		Squash, Summer	
Cabbage		Squash, Winter	
Cantaloupes		Sweet Potatoes	
Carrots		Tomatoes	
Chinese Cabbage		Tomatoes (greenhouse)	
Chicory, Endive		Turnips	
Cauliflower		Watermelons	
Corn, Sweet		Herbs	
Corn, Ornamental		Other Vegetables	
Cucumbers			
Eggplant			
Cabbage		FRUITS	
Greens		Apples	
Leaf Lettuce & Romaine		Blackberries	
Lettuce (greenhouse)		Grapes	
Okra		Peaches	
Onions		Pears	
Parsley		Strawberries	
Peppers, Bell		Other Berries	
Peppers, Pimento		Other Fruits	

7b. If any of the above were grown organically, please circle the acreage.

7c. Please list any crops you plan to expand in 2002 along with anticipated acreage.

8. For each factor listed below, please indicate the extent to which you feel it is a factor that limits your ability to expand your produce operation.

	<u>Not Limiting</u>				<u>Very Limiting</u>
Land	1	2	3	4	5
Labor management	1	2	3	4	5
Harvest labor availability	1	2	3	4	5
Credit availability	1	2	3	4	5
Equipment	1	2	3	4	5
Insect control	1	2	3	4	5
Prices received	1	2	3	4	5
Market outlets	1	2	3	4	5
Weather	1	2	3	4	5
Irrigation	1	2	3	4	5
Disease control	1	2	3	4	5
Transportation	1	2	3	4	5
Cooling	1	2	3	4	5
Labor housing	1	2	3	4	5
Other	1	2	3	4	5

9. In your opinion, how useful are the following in your produce operation? (There are no right answers; we are just interested in your opinion.)

	<u>Not Useful</u>				<u>Very Useful</u>
University Branch Station	1	2	3	4	5
University Extension/area agents	1	2	3	4	5
State Dept. of Ag. marketing programs	1	2	3	4	5
Farm Credit Bureau	1	2	3	4	5
Input suppliers					

10. Do you ... ? (Circle all that apply)

Attend trade shows	Participate in grower organizations
Try new varieties	Receive market news publications
Attend field days	Practice integrated pest management

11. About what percentage of your produce sales goes to:

Direct markets (farmers' markets, u-pick, etc.)	_____%
Direct to retail market (grocery, green grocer, etc.)	_____%
Cooperative/marketing association	_____%
Wholesale (noncooperative) market	_____%
Processor	_____%
Direct to local restaurants	_____%
Internet	_____%
Shipper/packer (sell via another grocer)	_____%
Community supported agriculture	_____%
Auctions	_____%
Total	100%

12. If you only direct market, what do you feel are the barriers to shifting completely to wholesaling? (Please circle all that apply.)

- Lower price
- Access to wholesalers
- My volume too small
- Cooling requirements
- Grading and packaging requirements
- Time delay in receiving payment
- Fees charged by shipper/packer too high
- High brokerage fees

13. Do you use a service to find workers to hire?    Yes    No

14. Do you have a computer?    Yes    No

15. Do you have Internet access?    Yes    No

16. If your answer was "Yes" to question 15, how do you use the Internet? (Circle all that apply.)

- Selling
- Buying inputs
- Finding information

17. Do you expect any changes in your operation in the next year related to each of the following? (Please check each item.)

	Increase	Stay the Same	Decrease
Organic production	_____	_____	_____
Direct marketing	_____	_____	_____
Wholesale/broker marketing	_____	_____	_____
Value-added/processing	_____	_____	_____
Participation in cooperatives	_____	_____	_____
Use of irrigation	_____	_____	_____
Branding	_____	_____	_____
Traceback (tracking from field to retail)	_____	_____	_____
Change crops	_____	_____	_____
On-farm cooling	_____	_____	_____
On-farm packing/grading	_____	_____	_____

18. How do you decide what produce to grow? (Circle all that apply.)

- |                  |                           |
|------------------|---------------------------|
| Experience       | Production expertise      |
| Market access    | Labor timing/availability |
| Risk             | Price                     |
| Profit potential | Equipment needs           |

19. If you considered production of another crop, who would you ask about **marketing** the commodity? (Circle all that apply.)

- |                          |                     |
|--------------------------|---------------------|
| Farm Bureau              | Another grower      |
| Extension                | Input supplier      |
| Buyer(broker/wholesaler) | Grower organization |
| State Dept. of Ag.       | Co-op               |
| No one                   |                     |

20. When considering a new crop, how important is each of the following in your decision making.

	<u>Not Important</u>				<u>Very Important</u>
Contracting	1	2	3	4	5
Broker/packer fees	1	2	3	4	5
Market location	1	2	3	4	5
Grading	1	2	3	4	5
Cooling	1	2	3	4	5
Volume requirements	1	2	3	4	5
Buyer-seller relationships	1	2	3	4	5
Transportation	1	2	3	4	5
Meeting buyer standards	1	2	3	4	5
Insurance	1	2	3	4	5
Other _____	1	2	3	4	5

21. Are you a grower-shipper?    Yes    No

22. Do you pack your produce yourself?    Yes    No

23. If you do **not** use a broker or wholesaler to sell any of your produce, which **TWO** of the following are the most important factors in your **not** using them? (Circle two.)

- |                     |                   |
|---------------------|-------------------|
| Volume requirements | Fees              |
| Packing             | Grading           |
| Precooling          | Payment practices |
| Broker availability |                   |

24. Do you pay someone else to do any of the following with your produce? (Circle all that apply.)

- |       |      |      |      |
|-------|------|------|------|
| Grade | Pack | Cool | Sell |
|-------|------|------|------|

25. Please circle any of the following you use on the farm.

- |                    |                   |            |
|--------------------|-------------------|------------|
| Sorting tables     | Boxes             | Sizers     |
| Precoolers         | Quick-cooling     | Branding   |
| On-farm processing | Washing equipment | PLU labels |
| Retail packing     | Holding coolers   |            |

26. For growers in this area, what produce commodities do you expect to **increase** in market opportunities over the next five years?

Fruit: \_\_\_\_\_  
Vegetables: \_\_\_\_\_

27. For growers in this area, what produce commodities do you expect to **decrease** in market opportunities over the next five years?

Fruit: \_\_\_\_\_  
Vegetables: \_\_\_\_\_

28. Do you believe traceback (the tracking of products from the consumer to the grower-shipper) will impact your operation over the next few years? Yes No

29. Have you implemented any of the following? (Circle all that apply.)

Product liability insurance	PLU coding
Organic labeling	IPM

30. In 2001, did you contract the sale of any of your produce for the fresh market? Yes No

31. If you have transitioned from direct marketing to wholesaling; how did that occur?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

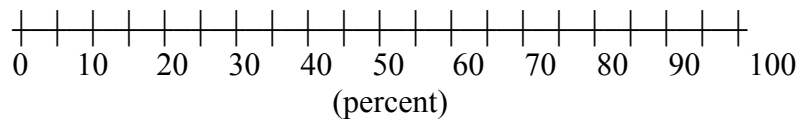
32. What were your approximate total gross sales from **produce** in 2001?

<input type="checkbox"/> Under \$20,000	<input type="checkbox"/> \$100,000 to \$249,999
<input type="checkbox"/> \$20,000 to \$49,999	<input type="checkbox"/> \$250,000 to \$499,999
<input type="checkbox"/> \$50,000 to \$99,999	<input type="checkbox"/> \$500,000 or more

33. What were your approximate total gross sales from **farming** in 2001?

<input type="checkbox"/> Under \$20,000	<input type="checkbox"/> \$250,000 to 499,999
<input type="checkbox"/> \$20,000 to \$49,999	<input type="checkbox"/> \$500,000 to 749,999
<input type="checkbox"/> \$50,000 to \$99,999	<input type="checkbox"/> \$750,000 to \$999,999
<input type="checkbox"/> \$100,000 to \$249,999	<input type="checkbox"/> \$1,000,000 or more

34. What percent of your approximate total household income (before taxes) in 2001 was from farming? (Please circle.)



**COMMENTS**

## APPENDIX TABLES

Appendix Table 1. Acreage of produce crops grown by survey respondents in 2001

Commodity	Growers (n=176)		Acreage		
	Number	Percent	Mean	Std. Dev.	Total
Beans, snap	38	21.9	70.2	405.1	2,666.0
Tomatoes	69	39.2	14.3	49.3	985.3
Pumpkins	56	31.8	17.2	25.3	960.7
Apples	29	16.5	12.2	21.1	354.2
Corn, sweet	62	35.2	4.1	6.1	254.8
Cantaloupes	35	19.9	7.1	20.4	249.3
Peaches	23	13.1	9.4	16.6	215.4
Strawberries	26	14.8	5.7	8.2	148.8
Sweet potatoes	13	7.4	9.5	13.7	123.7
Other fruits	6	3.4	19.6	35.3	117.5
Watermelons	33	18.8	3.3	3.8	107.8
Cabbage	38	21.6	2.8	5.2	108.7
Squash, winter	16	9.1	6.2	7.8	100.0
Grapes	20	11.4	4.6	5.2	91.0
Other vegetables	13	7.4	6.6	11.8	86.2
Greens	17	9.7	4.9	7.2	83.5
Turnips	13	7.4	5.2	8.0	68.2
Peppers, bell	36	20.4	1.9	3.7	67.6
Tomatoes, greenhouse	14	8.0	3.9	10.4	54.1
Potatoes, white	26	14.8	1.7	2.4	44.0
Cabbage	27	15.3	1.4	1.7	38.5
Blackberries	15	8.5	2.2	3.9	32.6
Cucumbers	35	19.9	0.9	1.4	30.8
Onions	8	4.6	3.1	5.4	24.5
Other berries	21	11.9	1.2	1.1	24.3
Corn, ornamental	11	6.2	1.5	3.7	23.4
Peppers, Jalapeno	14	8.0	1.5	3.3	20.6
Eggplant	13	7.4	0.4	3.3	19.3
Okra	23	13.1	0.5	0.6	9.6
Broccoli	12	6.8	1.5	0.8	5.9
Pears	4	2.3	0.5	2.4	5.9
Beets	8	4.6	0.5	0.4	3.6
Chinese cabbage	3	1.7	1.0	0.4	3.1
Asparagus	7	4.0	0.3	1.7	2.1
Cauliflower	6	3.4	0.2	0.4	1.5
Leaf lettuce	6	3.4	0.2	0.2	1.0
Herbs	4	2.3	0.1	0.2	0.6

Appendix Table 1 (continued)

Commodity	Growers	Acreage
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	<u>Number</u>	<u>Percent</u>	<u>Mean</u>	<u>Std.Dev</u>	<u>total</u>
Lettuce, greenhouse	3	1.7	0.1	0.1	0.4
Peppers, pimento	1	1.1	0.2	0.1	0.4
Carrots	1	0.6	0.1	0.0	0.1
Parsley	2	0.6	0.1	0.0	0.1

Appendix Table 2. Grower-Shipper Versus Gross Produce Income, Actual and Expected Frequencies and Chi Square.

Grower-Shipper	Gross Produce Income							
	Under \$20,000		\$20,000-\$49,999		\$50,000-\$99,999		\$100,000 or more	
	Actual	Expected	Actual	Expected	Actual	Expected	Actual	Expected
No	53	56	23	19	9	7	38	41
Yes	33	30	6	10	1	3	25	21

Chi Square = 6.42      n = 188

Appendix Table 3. Grower-Shipper Versus Other Farm Enterprises, Actual and Expected Frequencies and Chi Square

Grower-Shipper	Other Enterprises			
	No		Yes	
	Actual	Expected	Actual	Expected
No	50	55	68	73
Yes	29	34	31	36

Chi Square = 2.34      n = 188

Appendix Table 4. Grower-Shipper Versus Limiting Factors, Actual and Expected Frequencies and Chi Squares

Limiting Factor	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Land (n = 188)					
Not limiting	89	84	40	45	
Neutral	16	17	10	9	
Limiting	18	22	15	11	2.63
Labor Management (n = 188)					
Not limiting	69	71	39	37	
Neutral	19	11	13	11	
Limiting	35	17	13	17	1.82
Harvest Labor Availability (n = 188)					
Not limiting	38	46	33	24	
Neutral	26	26	14	14	
Limiting	59	50	18	27	8.72*
Credit Availability (n = 188)					
Not limiting	109	107	54	56	
Neutral	6	8	6	4	
Limiting	8	9	5	4	1.50
Equipment (n = 188)					
Not limiting	92	96	55	51	
Neutral	18	17	8	9	
Limiting	13	10	2	5	3.68
Insect Control (n = 188)					
Not limiting	75	80	48	43	
Neutral	27	26	13	14	
Limiting	21	16	4	9	4.97
Prices Received (n = 188)					
Not limiting	66	54	17	29	
Neutral	25	27	17	16	
Limiting	32	41	31	22	13.90*

Appendix Table 4(continued)

Limiting Factor	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Market Outlets (n = 188)					
Not limiting	63	53	18	28	10.53*
Neutral	27	29	17	15	
Limiting	33	41	30	22	
Weather (n = 188)					
Not limiting	59	63	38	34	2.79
Neutral	33	32	17	17	
Limiting	31	27	10	14	
Irrigation (n = 188)					
Not limiting	75	81	49	43	3.93
Neutral	21	18	7	10	
Limiting	27	24	9	12	
Disease Control (n = 188)					
Not limiting	58	66	43	33	10.12*
Neutral	33	33	17	17	
Limiting	32	24	5	13	
Transportation (n = 188)					
Not limiting	97	97	52	52	.51
Neutral	17	16	7	8	
Limiting	9	10	6	5	
Cooling (n = 188)					
Not limiting	83	84	46	45	2.54
Neutral	9	11	8	6	
Limiting	31	27	11	15	
Labor Housing (n = 188)					
Not limiting	88	82	37	43	6.19*
Neutral	6	10	9	5	
Limiting	29	31	19	17	

\*Significant at .05 level.

Appendix Table 5. Grower-Shipper Versus Service to Hire Labor, Actual and Expected Frequencies and Chi Square

Use a Service to Hire Labor	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
No	117	113	56	60	
Yes	6	10	9	5	4.66*

\*Significant at .05 level. n = 188.

Appendix Table 6. Grower-Shipper Versus What to Grow, Actual and Expected Frequencies and Chi Squares

Factor	Grower-Shipper				Chi Square	
	No		Yes			
	Actual	Expected	Actual	Expected		
<b>Contracting (n = 188)</b>						
Not important = .....	1	86	75	29	40	18.87*
.....	2	4	7	6	3	
.....	3	11	14	10	7	
.....	4	4	10	11	5	
Important = .....	5	18	18	9	9	
<b>Broker/Packer Fees (n = 188)</b>						
Not important = .....	1	97	85	33	45	24.75*
.....	2	2	7	9	4	
.....	3	6	12	12	6	
.....	4	7	8	6	4	
Important = .....	5	11	10	5	6	
<b>Market Location (n = 188)</b>						
Not important = .....	1	53	44	14	21	29.62*
.....	2	0	3	4	1	
.....	3	11	17	15	9	
.....	4	12	19	17	10	
Important = .....	5	47	41	15	21	
<b>Grading (n = 188)</b>						
Not important = .....	1	75	64	23	34	14.66*
.....	2	6	9	8	5	
.....	3	14	13	6	7	
.....	4	9	12	10	7	
Important = .....	5	19	24	18	13	
<b>Cooling (n = 188)</b>						
Not important = .....	1	75	67	27	35	9.02
.....	2	5	7	6	4	
.....	3	15	15	8	8	
.....	4	7	10	9	6	
Important = .....	5	21	24	15	12	

Appendix Table 6 (continued)

Factor		Grower-Shipper				Chi Square
		No		Yes		
		Actual	Expected	Actual	Expected	
Volume Requirements (n=188)						
Not important =	1	76	59	15	31	
.....	2	1	1	1	1	
.....	3	12	14	9	7	
.....	4	12	19	17	10	
Important =	5	22	29	23	16	26.87*
Buyer-Seller Relationships (n=188)						
Not important =	1	54	44	13	23	
.....	2	2	3	3	2	
.....	3	8	9	6	5	
.....	4	11	16	13	8	
Important =	5	48	51	30	27	Not Computed
Transportation (n = 188)						
Not important =	1	69	60	22	31	
.....	2	4	8	8	4	
.....	3	19	20	11	10	
.....	4	9	11	8	6	
Important =	5	22	25	16	13	12.00*
Meeting Buyer Standards (n = 188)						
Not important =	1	59	47	13	25	
.....	2	0	5	7	2	
.....	3	8	10	7	5	
.....	4	15	16	9	8	
Important =	5	41	46	29	24	24.45*
Insurance (n = 188)						
Not important =	1	75	72	35	38	
.....	2	10	14	11	7	
.....	3	18	20	12	10	
.....	4	5	6	4	3	
Important =	5	15	12	3	6	6.64

\*Significant at .05 level.

Appendix Table 7. Grower-Shipper Versus Interest in Expanding, Actual and Expected Frequencies and Chi Square

Interest in Expanding	Grower-Shipper			
	No		Yes	
	Actual	Expected	Actual	Expected
No	63	58	25	30
Yes	60	65	40	35

Chi Square = 2.78      n = 188

Appendix Table 8. Grower-Shipper Versus Deciding What to Grow, Actual and Expected Frequencies and Chi Square

Use the Factor	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Experience (n = 180)					
No	31	32	18	17	.04
Yes	85	84	46	47	
Production Expertise (n = 180)					
No	88	82	40	46	3.58
Yes	28	34	24	18	
Market Access (n = 180)					
No	68	60	25	33	6.32*
Yes	48	56	39	31	
Labor Timing/Availability (n = 180)					
No	83	84	48	47	.25
Yes	33	32	16	17	
Risk (n = 180)					
No	101	97	50	54	2.44
Yes	15	19	14	10	
Price (n = 180)					
No	77	73	36	40	1.81
Yes	39	43	28	24	
Profit Potential (n = 180)					
No	58	53	24	29	2.60
Yes	58	63	40	35	
Equipment Needs (n = 180)					
No	85	82	43	46	.74
Yes	31	34	21	18	

\*Significant at .05 level.

Appendix Table 9. Grower-Shipper Versus Whom Would Ask About Marketing Another Crop, Actual and Expected Frequencies and Chi Square

Whom Would Ask	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Farm Bureau (n = 177)					
No	107	109	60	58	not computed
Yes	8	6	2	4	
Another Grower (n = 177)					
No	39	45	31	25	4.36*
Yes	76	70	31	37	
Extension (n = 177)					
No	50	55	34	29	2.08
Yes	65	60	28	33	
Input Supplier (n = 177)					
No	107	107	58	58	not computed
Yes	8	8	4	4	
Buyer (Broker/Wholesaler) (n = 177)					
No	92	74	22	40	34.63*
Yes	23	41	40	22	
Grower Organization (n = 177)					
No	87	94	57	50	7.04*
Yes	28	21	5	12	
State Department of Agriculture (n = 177)					
No	90	87	44	47	1.17
Yes	25	28	18	15	
Co-op (n = 177)					
No	103	105	58	56	.78
Yes	12	10	4	6	

\*Significant at .05 level.

Appendix Table 10. Grower-Shipper Versus Usefulness of Organizations, Actual and Expected Frequencies and Chi Square

Organization	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
University Branch Station (n = 188)					
Not useful	66	60	26	32	4.15
Neutral	23	23	12	12	
Useful	34	40	27	21	
University Extension/Area Agents (n = 188)					
Not useful	24	20	7	11	2.57
Neutral	20	20	10	10	
Useful	79	83	48	44	
Tennessee Department of Agriculture Marketing (n = 188)					
Not useful	73	70	34	18	2.18
Neutral	29	28	14	8	
Useful	21	25	17	9	
Tennessee Department of Agriculture Regulatory Programs (n = 188)					
Not useful	98	94	45	49	3.04
Neutral	15	16	10	9	
Useful	10	13	10	7	
Farm Credit Bureau (n = 188)					
Not useful	100	93	42	49	8.98*
Neutral	11	11	6	6	
Useful	12	19	17	10	
Input Suppliers (n = 188)					
Not useful	80	72	31	39	5.67
Neutral	18	20	12	10	
Useful	25	31	22	16	

\*Significant at .05 level.

Appendix Table 11. Interest in Expansion Versus Production Information Sources, Actual and Expected Frequencies and Chi Square

Source	Interest in Expansion				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Farm Bureau (n = 189)					
No	81	81	90	90	
Yes	8	8	10	10	.06
Another Grower (n = 189)					
No	41	35	34	40	
Yes	48	54	66	60	2.86
Extension (n = 189)					
No	28	20	15	23	
Yes	61	69	85	77	7.26*
Input Supplier (n = 189)					
No	82	79	85	88	
Yes	7	10	15	12	2.33
Buyer (n = 189)					
No	65	61	64	68	
Yes	24	28	36	32	1.77
Interest (n = 189)					
No	68	65	70	73	
Yes	21	24	30	27	.98
Grower Organization (n = 189)					
No	78	73	77	82	
Yes	11	16	23	18	3.61
State Department of Agriculture (n = 189)					
No	62	59	64	67	
Yes	27	30	36	33	.68
Farm Service Agency (n = 189)					
No	81	77	83	87	
Yes	8	12	17	13	2.63
No One (n = 185)					
No	76	79	96	93	
Yes	9	6	4	7	3.05

\*Significant at .05 level.

Appendix Table 12. Grower-Shipper Versus Production Information Sources, Actual and Expected Frequencies and Chi Square

Source	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Farm Bureau (n = 188)					
No	106	111	64	59	
Yes	17	12	1	6	7.41*
Another Grower (n = 188)					
No	50	49	25	26	
Yes	73	74	40	39	.09
Extension (n = 188)					
No	27	28	16	15	
Yes	96	95	49	50	.17
Input Supplier (n = 188)					
No	110	109	56	57	
Yes	13	14	9	8	.44
Buyer (n = 188)					
No	88	84	40	44	
Yes	35	39	25	21	1.96
Interest (n = 188)					
No	94	90	44	48	
Yes	29	33	21	17	1.66
Grower Organization (n = 188)					
No	99	101	55	53	
Yes	24	22	10	12	.49
State Department of Agriculture (n = 188)					
No	84	82	42	44	
Yes	39	41	23	21	.26
Farm Service Agency (n = 188)					
No	108	107	55	56	
Yes	15	16	10	9	.38
No One (n = 184)					
No	111	111	60	60	
Yes	8	8	5	5	.06

\*Significant at .05 level.

Appendix Table 13. Grower-Shipper Versus Ways of Acquiring Information, Actual and Expected Frequencies and Chi Square

Do You	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Attend Trade Shows (n = 188)					
No	77	73	34	38	1.86
Yes	46	50	31	27	
Participate in Grower Organizations (n = 188)					
No	75	75	40	40	.01
Yes	48	48	25	25	
Try New Varieties (n = 188)					
No	40	32	9	17	7.70*
Yes	83	91	56	48	
Receive Market News Publications (n = 188)					
No	69	59	21	31	9.64*
Yes	54	64	44	34	
Attend Field Days (n = 188)					
No	74	71	34	37	1.07
Yes	49	52	31	28	
Practice IPM (n = 188)					
No	93	84	35	44	9.27*
Yes	30	39	30	21	

\*Significant at .05 level.

Appendix Table 14. Interest in Expansion Versus Ways of Acquiring Information, Actual and Expected Frequencies and Chi Square

Do You	Interest in Expansion				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Attend Trade Shows (n = 189)					
No	61	53	51	59	6.00*
Yes	28	36	49	41	
Participate in Grower Organizations (n = 189)					
No	65	55	51	61	9.64*
Yes	24	34	49	39	
Try New Varieties (n = 189)					
No	34	26	16	26	11.93*
Yes	55	73	84	74	
Receive Market News Publications (n = 189)					
No	44	43	47	48	.11
Yes	45	46	53	52	
Attend Field Days (n = 189)					
No	58	51	51	58	3.87*
Yes	31	38	49	42	
Practice IPM (n = 189)					
No	65	61	64	68	1.77
Yes	24	28	36	32	

\*Significant at .05 level.

Appendix Table 15. Grower-Shipper Versus Management Practices, Actual and Expected Frequencies and Chi Square

Practice	Grower-Shipper				Chi Square
	No		Yes		
	Actual	Expected	Actual	Expected	
Product Liability Insurance (n = 188)					
No	108	95	37	50	22.99*
Yes	15	28	28	15	
PLU Coding (n = 188)					
No	120	116	57	61	7.52*
Yes	3	7	8	4	
Organic Labeling (n = 188)					
No	120	119	62	63	nc
Yes	3	4	3	2	
IPM (n = 188)					
No	111	109	56	58	.72
Yes	12	14	9	7	

\*Significant at .05 level.

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