Virginia Tech
VIRGINIA POLYTECHNIC INSTITUTE
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Virginia Agricultural Experiment Station **Bulletin 96-1**

Horticultural Shipping-point Market Study for Southwest Virginia

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August 1996

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This Bulletin Series of the Virginia Agricultural Experiment Station provides a medium for publishing information on scientific research. Results presented may be substantive data collected over a period of years or data from experiments conducted in a single year that net significant scientific breakthroughs. Manuscripts considered for publication have a state or regional focus and may be longer articles than would be accepted by the various scientific journals. Bulletin manuscripts are peer reviewed before publication at both the Department and Experiment Station levels.

Horticultural Shipping-point Market Study

for

Southwest Virginia

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This research was conducted under a cooperative agreement, administered by the U.S. Department of Agriculture, Agricultural Marketing Service, Transportation and Marketing Division, Wholesale and Alternative Markets Program (W&AM). Arthur F. Burns, Program Manager, W&AM, was the USDA project leader. Joseph P. Anthony, Economist, Errol Bragg, Agricultural Marketing Specialist, and Gerrald E. Berney, Agricultural Engineer, W&AM, also participated in this study.

August 1996

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ACKNOWLEDGMENTS

The authors are indebted to many individuals for their charitable contributions to this study. The county extension agents who have represented the Southwestern growers in bringing their needs to the attention of the policy makers deserve recognition for initiating the study. Among these county agents, special thanks to the following for their collaboration with the study: Mr. Charlie Conner, Mr. Mike Cassell, Mr. Henry Snodgrass, Mr. Phil Blevins, Mr. Richard White, Mr. Frank Smith, Mr. Gary Larrowe and Mr. Joe Hunnings.

The farmers of Southwestern Virginia were very generous with their time and contributed invaluable information to this study. We are particularly indebted to the following growers for receiving us on their farms: Mr. David Mann, Mr. David Buchanan Sr. and Jr., Mr. Jackie Thomas, Mr. Paul Combs and Mr. Steve Haynes.

Many produce purchasing agents from large and small firms were generous with their valuable time. Their names are being withheld for confidentiality, but we the authors are grateful to all who responded to written and in-person interviews. Mr. Danny Neel of the Virginia Department of Agriculture and Consumer Services provided an invaluable introduction to the region and support throughout the study. We are also grateful to Hillsville Farmers' Market manager, Mr. Kevin Semones, for his extensive assistance and cooperation. Mr. J.S. Staley of the State Farmers Market Board also generously gave of his time and expertise.

We received assistance from many individuals at Virginia Tech. Dr. Paul Hoepner and Dr. Jeff Alwang from the Department of Agricultural and Applied Economics provided important assistance. Dr. Greg Welbaum and Mr. Charlie O'Dell from the Department of Horticulture very generously provided important horticultural expertise.

Mr. Jack Runyon is thanked for information about a previous study in the region. Larry Snell, from Cumberland Products Cooperative in Monticello, Kentucky, contributed invaluable information about production and marketing which greatly benefited the study. We are also indebted to Karen Mundy who charitably volunteered her time to edit this document.

A special recognition belongs to Congressman Rick Boucher and Deputy District Administrator Linda Diyorio for their relentless efforts in carrying this project forward.

Numerous others contributed to various aspects of the study. The authors appreciate their assistance.

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EXECUTIVE SUMMARY

Community leaders and farmers in Southwest Virginia have expressed the need to establish a shipping-point market facility where fresh horticultural products can be cooled, graded, and packaged. These products can then be marketed to larger distribution centers which have the ability to purchase large volumes of produce and offer competitive prices. This report represents the results from the first part of a two-phase study sponsored in part by the U.S. Department of Agriculture (USDA). The study is designed to assess the viability of, and to develop strategies for the establishment of a shipping-point market(s) for the nineteen county Southwest Virginia region. This first phase indicates that there is potential for the successful establishment of the shipping-point market(s) in the study region, if farmers and shipping-point market management address several key constraints.

This initial phase, as described in the project agreement, has six mandated objectives:

- to identify present and potential producers in the study area,
- to identify present and potential horticultural crop production,
- to determine horticultural crops suitable for establishing a shipping-point market,
- to identify and survey potential produce buyers to determine market requirements,
- to develop and identify the most suitable production budgets for the region for the selected horticultural crops, and
- to conduct profitability and market-window analysis for the potential horticultural crops.

In order to accomplish the above mentioned objectives, and to make a preliminary assessment of the shipping-point market feasibility, several research tasks have been undertaken, including:

- a survey of extension agents in the nineteen county study area,
- a survey of potential purchasing agents for horticultural crops produced in Southwest Virginia,
- a survey of farmers interested in horticultural production,
- field tours and personal interviews with growers and produce purchasing agents, and
- interviews with regional horticultural and marketing specialists.

Extension agent, farmer, and purchasing agent surveys, and advice from horticultural experts were used to select horticultural crops for a financial feasibility analysis. The surveys, interviews with experts, and secondary sources were used to assess potential constraints to the establishment of a shipping-point market.

Role of the shipping-point market

The produce and food industries are currently undergoing significant change. Because of the volume of produce handled by large supermarket chains, they are not well suited to creating direct relationships with producers. They often purchase the bulk of their produce through brokers working from shipping-point markets located close to the major centers of production which are usually located in the warm areas of Florida and California (McLaughlin 1994). The suppliers to these markets are able to meet the volume and quality standards that the large organizations require.

In order to be successful, the proposed shipping-point market must be able to serve these larger organizations. The current markets for Southwest Virginia produce are small regional outlets which already have low cost, local sources for fresh produce and are unable to expand sales. Another current market for local produce is the Southwest Virginia Farmers' Market located in Hillsville, Carroll County. The new market facility would complement, but not serve the same role as, the wholesalers located at the Hillsville Farmers Market. These wholesalers are serving small, independent outlets and

not the large produce purchasers or retailers that the shipping-point market needs to market to.

Survey results

Key issues, identified by the purchasing agent survey, need to be resolved in order to establish a viable shipping-point market. Broad interest was expressed in purchasing produce from the study area, but in most cases, local produce does not meet the buyer's standards, and therefore limited quantities have been purchased.

Definitions of quality are diverse and very specific to individual firms and firm types. In general, poor quality and its causes include the following:

- small product size, often due to a lack of irrigation or inadequate production technologies and grower management;
- poor variety selection, with respect to consumer demand and shelf-life;
- lack of uniform shape and color caused by inadequate agricultural practices;
- lack of cooling facilities, resulting in reduced shelf-life; and
- improper grading and packaging due to unavailability of adequate equipment and infrastructure.

Purchasing agents noted that local farmers have not been reliable in delivering adequate volumes at predetermined times. A shipping-point market can and must address these types of problems as well as the other factors listed above.

The extension agent and farmer surveys revealed an extensive interest in increasing local production of horticultural crops and taking advantage of the large amounts of potential acreage available in the region. Extension agents estimated that there are currently 403 horticultural growers with 2,000 acres planted in the study region. They estimated 8,200 potential acres in the area, a conservative estimate since several county agents did not report. Twenty-five of the farmers surveyed indicated that they would commit 460 additional acres to horticultural production to be sold through the

proposed shipping-point market . This acreage may also be a conservative estimate, because several extension agents and farmers indicated that many growers are waiting for the establishment of the shipping-point market before committing acreage to the project.

The horticultural crops selected for financial analysis are, in alphabetical order: asparagus, fall-bunched broccoli, cucumbers, green beans, green bell peppers, green cabbage, pumpkins, sweet corn, strawberries, and vine-ripened tomatoes. The survey results indicate that some exotic horticultural crops, such as specialty vegetables, flowers, and herbs, are not suitable for the establishment of the market. This lack of suitability is due to farmer inability to produce the necessary volumes of such crops or a lack of purchasing agent interest in such commodities from the region. The marketing infrastructure and organization for large fruits already exists, so that there is no need for a new shipping-point market for these products.

The potential market

An analysis of potential large markets in close proximity to the study area reveals large distribution warehouses serving 2,701 supermarkets. In addition to the large chains serving the area, there are several large food-processing firms in the region that are potential purchasers. The industry trade publication, *The Progressive Grocer (1995),* defines three market areas that would be easily accessible though the I-77 and I-81 corridors: Charlotte, Nashville, and Richmond with total food sales of $15.9, $9.7, and $8.4 billion, respectively.

Market-window and profitability analysis

The market-window and profitability analysis reveal the potential success of the proposed facility and explain the current low profits obtained by the region's farmers for

their horticultural products. At the prices paid for top quality produce, all of the potential crops are profitable. These high prices are the levels that should be obtained by a well-functioning shipping-point market. At prices paid for low quality produce, all selected crops are unprofitable or marginally profitable. Currently, most growers in the region are producing a product that falls into the lower quality price range and hence is not very profitable.

The selection of optimal crops to be marketed through the shipping-point market facility cannot be based solely on quantitative financial results. Financial analysis forms the basis for establishing product profitability, but final product selection depends on a myriad of factors such as labor availability, agricultural viability, grower experience, etc. The second phase of the study will address in greater detail optimal scenarios for establishing the shipping-point market. Key issues to be addressed include: the degree to which the facility should add value to produce, complementary products, product diversification, and facility utilization.

Preliminary financial analysis reveals that, at the highest quality levels, all selected crops are profitable. Tomatoes, asparagus, green bell peppers, pumpkins and strawberries are high profit crops (Table 1). Asparagus and strawberries are new to the region for large-scale commercial production and would be riskier than other crops since quality and yields are unknown.

Table 1. Potential crop profitability*.

Crop	$/Acre
Tomato	$12,589
Asparagus	$ 6,516
Bell Peppers	$ 3,908
Strawberry	$ 3,383
Pumpkin	$ 2,448

* Based on top quality price levels averaged for 1992-95

Key management functions for the establishment of the shipping-point market

To serve the larger markets, the management of the shipping-point market must fulfill several principle functions regardless of the organizational structure. These functions include:

- the selection of specific horticultural product mix to be marketed;
- information gathering for the selection of the most suitable varieties and technologies based on horticultural factors and market demand;
- a farmer education role which consists of training the farmers in the proper techniques for producing a top quality product;
- coordinating the market and all the regional producers, to ensure that selected crops are produced in sufficient volumes and of a high, homogeneous quality;
- the training of growers in administering migrant labor; and
- the coordination of migrant labor between large and small producers to minimize labor costs among all producers and maximize the workers' productivity.

During the market establishment period, the initial market manager must work closely with growers to educate them with respect to crop selection, market requirements, and the best available technologies. Coordination of these functions will require, at a minimum, the establishment of a horticultural product growers association.

The management would need to be in close contact with local experts, including product purchasing agents, county extension agents, marketing specialists, and horticultural experts. The role of the extension agents, during the initial years, would be particularly crucial and should be formally recognized. The agents will need to serve a coordination function and an education function and should be closely involved in variety selection trials.

The role of government in establishing the shipping-point market

The current difficulty that Southwest Virginia growers are experiencing in marketing stems from a failure to perform the key functions outlined above. The difficulty does not stem from a production cost or geographic disadvantage, as shown in the financial analysis section above. There are several regional factors that contribute to the growers inability to meet the purchasing agent standards.

Due to hilly topography and existing agricultural production patterns in Southwest Virginia, individual horticultural growers have smaller acreage than similar growers in major production areas. The smaller acreage per grower makes private sector investment in initiating the functions outlined above expensive and risky. In a region such as Southwest Virginia, a private firm that engages contract growers, or maintains a close relationship with its growers, would need to expend great amounts of capital in order to achieve the necessary product volumes.

The role of government assistance in the successful establishment of the shipping-point market is to provide the means to reduce the cost of organizing the growers into an appropriate organizational structure that would allow them to meet market requirements. At the end of the initial establishment phase, growers and private entrepreneurs would have the opportunity to develop and negotiate a long-term organizational structure that would continue to meet ever-changing market requirements.

Concluding remark

A market role and the potential for success of the proposed shipping-point market exists. However, success can only be achieved if farmers and decision-makers can adhere to strict market requirements. Based on interviews and surveys, a broad interest in the establishment of the facility exists, but farmers are currently unaware of the stringent

market requirements that larger firms demand. This lack of awareness can be seen in their resistance to purchase irrigation equipment, which is a necessity for successful, high quality production. The production of high quality produce over a sustained period of time is necessary in order to establish a favorable reputation for the producers. The difficulties of administering migrant labor and the lack of available housing must also be surmounted before horticultural production can be greatly expanded in the region.

In order for the project to succeed, farmers must commit to planting sufficient acreage, coordinating production, and adopting technological practices to ensure that the fresh produce meets market requirements. Project decision makers need to establish close relationships with growers, extension agents, purchasing agents, and regional specialists to ensure that such requirements are met.

I. Introduction

A. The need for a regional shipping-point market

The lack of a regional market infrastructure to collect, pack, and market fresh produce is inhibiting the growth of horticultural production in the ninth congressional district. Currently the largest retailers of fresh produce in the Southwest Virginia region are the large supermarket chains. These large chains are purchasing their produce almost exclusively from suppliers located outside the state, and this practice exists even during peak periods of local production. Horticultural experts have demonstrated that the region is capable of producing a low cost product that could meet the quality standards that supermarket chains and large national produce purchasers require.

The inability of farmers to market their produce beyond small local establishments has resulted in an overall regional decline in horticultural production. Farmers in this region are rapidly losing the ability to earn much-needed additional farm income, to diversify production to reduce risk, and to make economic use of existing complementary assets through horticultural production.

There is a consensus among regional specialists and farmers that, if a shipping-point market with the capability to grade, pack, cool, and market horticultural produce were available in the region, local growers would greatly expand their current horticultural production. Such a market would further increase the efficiency of regional grower operations by allowing growers to expend their efforts on producing high quality fresh horticultural products. The existence of a market facility would allow growers to focus on tasks at which they are most efficient and not on the ancillary and time consuming tasks of post-harvest handling and marketing, which tend to be prohibitively expensive for small individual growers.

The role for government assistance in the establishment of a regional shipping-point market facility must be assessed, and the reasons that such a facility has not been developed through private market action identified. Justification for external intervention rests on the answer to the key question "If the project is truly a profitable venture with the potential for long term economic success, why has the private sector not invested in the project?". The term "market failure" is used to denote a situation where a profitable private market action is prevented by a market constraint that can be overcome by government, by collective private action, or by research to provide critical information. This study will outline the nature of the "market failure" that has inhibited private market action and will establish that horticultural production in the region can be profitable *if farmers and facility management meet market requirements.*

B. Overall study objectives

The purpose of the study is to assess the viability of a shipping-point market in the study area and examine regional horticultural production and marketing strategies to develop a preliminary plan for the feasible operation of a regional shipping-point market. The objective of the shipping-point market facility is to assist in establishing a market for fresh produce and to promote a means to increase levels of farm income. The study will also include an examination of the justification for government assistance to establish the facility.

In developing an operational plan, the critical factors that must be considered for the project to be profitable will be identified, and strategies to overcome existing barriers to production will be proposed. The study will address the following three primary issues in the formulation of the preliminary operational plan:

1. the selection of the most profitable horticultural products to be marketed through the shipping-point market facility;

2. an assessment of market requirements for the selected horticultural products; and

3. an analysis of the most viable market scenarios with regard to choosing the optimal product mix, the extent of value-added preparation, and marketing strategies.

Possible organizational structures of the market board and management, as well as the organizational structure of the firm and its relationship to farmers will be discussed in terms of the market functions that must be accomplished.

C. Specific objectives and methodology

This study was undertaken under a cooperative agreement between the United States Department of Agriculture, Agricultural Marketing Service(USDA-AMS) and the Department of Agricultural and Applied Economics at Virginia Tech. The study includes six specific objectives which are viewed as being critical in order to meet the overall study goal. In the following sections each objective will be presented, and the methodological approach used to meet the objective will be explained. Within the body of the report, the results of the work conducted for each of the objectives will be integrated into the appropriate report sections.

1. Identify present and potential producers in the study area

The agricultural census of 1992 was used to characterize agriculture and to estimate vegetable production in the Southwest region. The estimate is an approximation due to the time lapse since the census was taken and the smallest producers not being represented in the census. A survey of county extension agents[4] was used to estimate the

[4] See Appendix #1

number of current and potential horticultural producers and acreage and crops under production. Using the extension agent's list of present and potential growers, a questionnaire was distributed to collect information on production technologies and to gauge the interest of growers in the shipping-point market facility.

2. Identify present and potential crop production.

Analysis on this objective was conducted simultaneously with objective number one. The agricultural census and the extension agent and farmer surveys described above were used to identify present and potential crop production.

3. Determine horticultural crops to be studied, including specialty crops

This objective was accomplished by procedures discussed in objectives one and two. Extension agents were asked to rank the horticultural crops they considered to be most profitable for their county and farmer capabilities. Growers were asked to rank the crops they preferred to produce. A survey of important fresh produce purchasing agents was used to determine the crops they would be most likely to purchase. Horticultural experts were consulted to determine the suitability of crops not generally grown in the region and to determine the suitability of newly-available crop varieties. It should be noted that, during the preliminary analysis of potential horticultural products, exotic and specialty goods were discouraged by all three groups: purchasers, horticultural experts and growers. It should also be noted that, for larger fruits such as apples, local processing and marketing capabilities exist therefore a new facility for such products is not required.

4. Identify potential buyers to determine marketing needs and requirements

Representative firms in the region that purchase fresh produce were identified by marketing specialists and through regional trade publications. Telephone and personal interviews were then conducted with purchasing agents representing the firms. A formal questionnaire was designed to gauge buyer interest and to determine the volumes and market requirements that must be met by the Southwest Virginia growers. (Appendix 3).

5. Develop production budgets for horticultural crops

Regional budgets developed through Virginia Tech and local extension offices, were utilized to estimate costs of production for the specific commodities selected for additional analysis. The budgets were further refined through consultation with extension agents and local experts.

6. Conduct market-window analysis

In order to determine the profitability of selected crops during various times of the year, USDA/Market News historic price data for various shipping-points and terminal markets at different periods of the year were compared with cost of production data determined from regional horticultural budgets. Results will be presented in graphical form to show the windows of profitability for the selected crops.

D. Horticultural product market trends in Southwest Virginia

In Southwest Virginia it is widely reported that horticultural production has decreased in the last ten years. Large supermarket chains report virtually no purchasing

of fresh produce from Southwest Virginia. Out-of-region purchasing has occurred for a number of reasons. First, enormous quantities of produce are moved through the large supermarket chains resulting in economies of scale that allow them to purchase produce directly from the larger, more consistent growing regions, rather than from small, regional producers.

Second, the form in which horticultural products are being marketed is changing rapidly with new developments in the food industry and the impacts of new communication technologies (McLaughlin 1994). Improved communications, such as facsimiles and the Internet have modified the distributional flows of fresh produce in the ever-shrinking global economy. A flow chart of the marketing channels for horticultural produce indicates the complexities of the distribution system (Figure 1). In the 1960's, terminal markets were the main channel connecting the farm to the retailer's shelf. The importance of these markets has greatly diminished. Currently about 20 percent of all fresh produce passes through terminal markets with only seven percent of larger supermarkets purchasing their produce in this fashion. (McLaughlin 1994).

This decreased reliability on terminal markets has opened several marketing opportunities for local growers that did not previously exist. Farmers producing horticultural products have the options of forging relationships with small local outlets, shipping to terminal markets, shipping to processors and shipping into the distribution system of larger supermarket chains. The processor and terminal markets generally offer the lowest prices. Local outlets (detailed below) offer high profits but generally only purchase low volumes of produce, and these outlets require considerable marketing efforts and expenditures by the farmer. Marketing to supermarket chains (potentially through intermediaries) offers a high price and the most stable market, but also requires the farmers to meet exacting standards.[5] In order to break into the distribution system of

[5] Purchasing standards are detailed in chapter II.

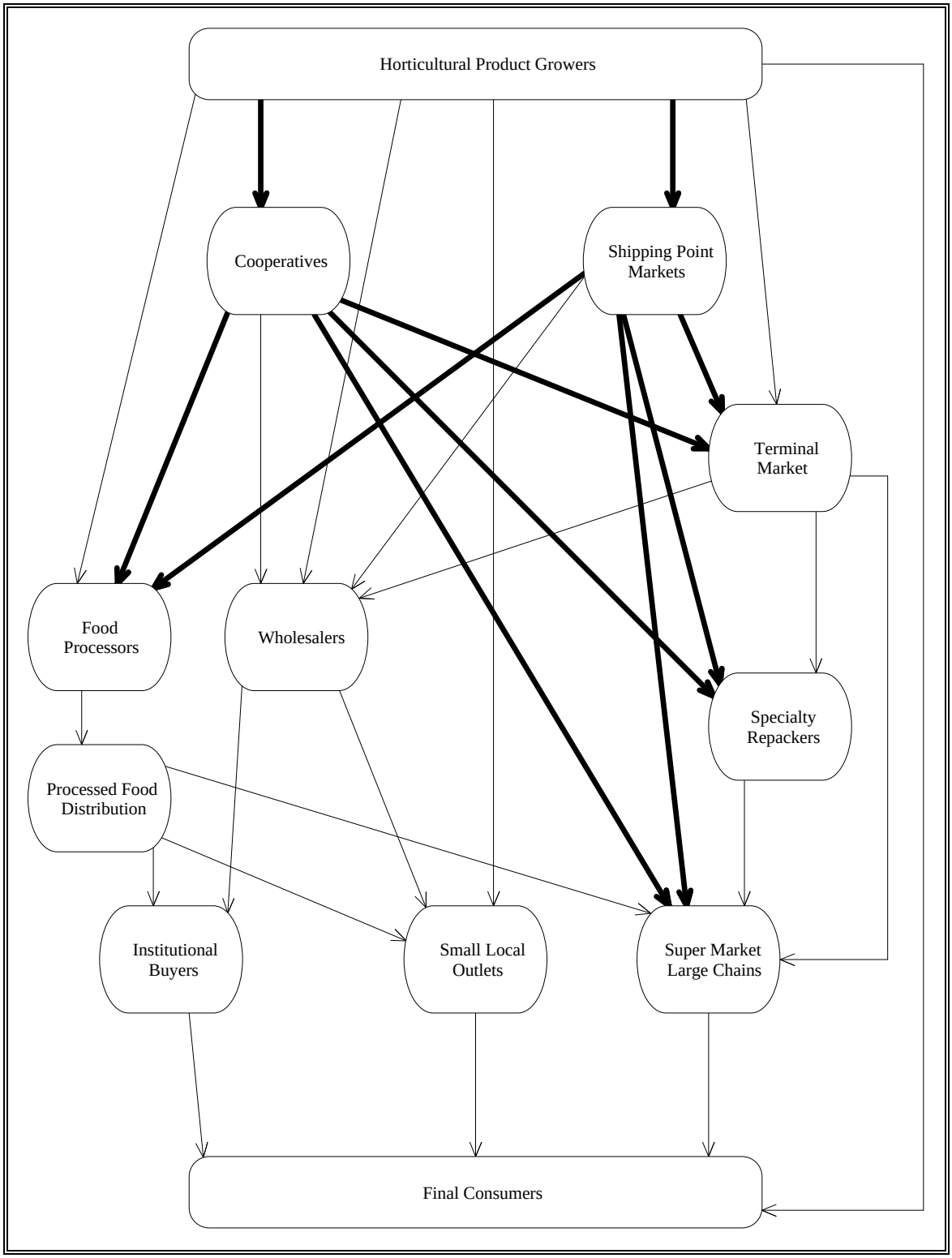
the large chains, growers generally must prepare their product through some type of shipping-point market.

Currently the bulk of locally produced horticultural products in Southwest Virginia [6] is marketed through what can be termed local outlets. The local outlets include, primarily, direct farm sales, pick-your-own operations, roadside fruit stands, independent grocers, local restaurants, small local supermarket chains and small wholesalers. The wholesalers generally serve the above mentioned organizations as well as institutional buyers such as hospitals, schools, food processors and prisons. These local outlets can be very profitable for farmers who have been able to develop a niche in the local marketing systems, because they are able to obtain a larger share of the retail price. However, in Southwest Virginia and most Mid-Atlantic States, these local outlets for horticultural products are rapidly decreasing in importance, compared to the large supermarket chains, because of market saturation by the local producers. This trend will change the nature of horticultural production in the Southwest Virginia region: either production will decrease, or standards and quality must increase in order to enable local production to enter into the distribution system of larger supermarket chains.

The Southwest Virginia Farmers' Market in Hillsville, Virginia, has not enabled local farmers to market produce to the larger retailers in the region. The facility has served largely as a site where wholesalers receive, break-down, and reload shipments for redistribution to small retailers and institutions located in the region.

[6] Grower survey

Figure 1. Horticultural produce marketing flows.



* Primary product flows are shown by the darkened arrows. It should be noted that the Southwest Virginia Farmers' Market would represent a location for small wholesalers.

E. National horticultural product market trends

Currently the national fresh produce marketing system is undergoing a rapid transformation. The industry is becoming increasingly sophisticated, with the size of individual growing operations expanding and becoming more tightly integrated with marketing systems[7]. The industry is driven by quality considerations and the ability to meet the market requirements of the large supermarket chains through which most fresh produce is marketed to consumers. The large supermarket chains not only demand high quality, but also require adequate volumes, reliability and very precise packaging standards. Other major purchasers of fresh produce, such as food service and processing operations, also have very exacting standards, although they may place an emphasis on different physical characteristics of the product in question than those of the supermarkets.

In the past, terminal markets located in close proximity to larger markets were the major distribution centers for horticultural produce. Growers delivered their product to the terminal markets, and from there, produce was distributed to retail outlets. The importance of terminal markets is rapidly decreasing (Coughenour 1992). As noted the large supermarkets are purchasing the bulk of their produce directly from large growers, though the actual relationship is often negotiated through intermediate brokers that may never handle the product.

This purchasing relationship has led to a number of new developments. Shipping-point markets in production regions have become increasingly more important. At these shipping-point markets, an individual or group of large growers integrate their production operation with a processing and marketing operation to enable them to sell their product directly to large supermarket chains. This arrangement with large growers has made it increasingly difficult for small grower operations to market produce directly

[7] Purchasing agent survey

to large supermarkets chains because of their inability to meet stringent and constantly changing market requirements.

II. Regional Horticultural Product Marketing

The marketing of fresh produce is increasingly more difficult for small growers outside of major production regions. This difficulty is due to the concentration of produce purchasing by large organizations that demand high volumes and precise product specifications. Firms purchasing produce are also becoming highly specialized and integrated downstream with retailers and processors through formal contracts, informal arrangements and intimate knowledge of downstream firm needs (McLaughlin 1994).

The large supermarket chains represent the optimal market for produce from the proposed shipping-point market facility, due to the high prices they can offer and their ability to receive large quantities of produce at warehouse locations. The large chains are now increasingly purchasing produce through intermediary firms, including brokers who arrange shipments from growing areas and repackers who purchase from the larger production area shipping firms. In the large growing regions, shipping-point markets have developed from the concentration and specialization of larger growers who cultivate, purchase produce from neighboring growers, and package produce to the specifications of large produce purchasers. These organizations are becoming multi-state enterprises with land and contract growers in various geographic regions of the country, with the goal of having a near constant stream of product.

An alternative market for produce from the proposed shipping-point market is food processing and food service firms. Food processing firms alter the nature of fresh produce, through thermal processing, cooking and/or freezing. Food preparation firms service institutions (such as hospitals, schools, prisons, etc.) and restaurants, with food

prepared to a specified level. These firms, like the large chains, can absorb large volumes of produce. They tend to offer the lowest prices, and though their demands for physically attractive produce and size requirements are generally less stringent than other markets, they still have very specific requirements. These markets can be profitable if transportation cost is minimized by producing large volumes and shipping minimal distances.

A. Description of the regional market

Three market areas, defined by the location of the supermarket chain's headquarters, cover the nineteen county study area. The retail food industry trade publication, the *Progressive Grocer* (1995), provides detailed information about food industry firms within specific markets. Charlotte is the largest area in terms of population, food sales, and store numbers, followed by Nashville and Richmond (Table 2).

Table 2. Regional market statistics.

Market Area	Population	Food Store Sales ($000)	Small Food Stores (#)	Supermarket (#)
Charlotte	8,316,931	15,920,768	10,265	1,336
Nashville	5,263,044	9,692,998	6,344	807
Richmond	3,712,026	8,355,386	4,486	478

Source: *Progressive Grocer* (1995)

The three supermarket retail firms that service the study area have several distributional centers and warehouses dispersed throughout the states of North Carolina, Tennessee, Kentucky and Virginia. These distribution centers are the focal points where fresh produce is received and inspected by the supermarket chains before being reloaded on out-going trucks and delivered to the supermarket retail stores. These distributional

centers, rather than the chain's headquarters, are the places where the Shipping-point market will have to deliver their produce in order to comply with the supermarket chain's requisites for purchasing.

Table 3. Produce distribution centers in regional markets.

Firm Distribution Center	Location	Supermarket Outlets Served
Nashville Market Area:		
Flemming	Johnson City, Tenn.	68
H.G. Hill Food Stores	Nashville, Tenn.	14
Kroger	Nashville, Tenn.	69
Mid-mountain	Abingdon, VA.	76
C.B. Ragland	Nashville, Tenn.	40
Super Value	Greenville, Ky.	178
Flemming	Warsaw, N.C.	180
Charlotte Market Area:		
Food Lion	Salisbury, N.C.	1039
Harris-Teeter	Matthews, N.C.	141
Ingles	Black Mountain, N.C.	181
Kroger	Roanoke, VA.	120
Merchants Distributors	Hickory, N.C.	310
Nash Finch	Lumberton, N.C.	50
Nash Finch	Rocky Mount, N.C.	50
Winn-Dixie	Charlotte, N.C.	99
Winn Dixie	Raleigh, N.C.	86
Richmond Market Area:		
Richfood	Mechanicsville, VA	305
Total	**2,701**	

Source: *Progressive Grocer* (1995)

Distribution hubs represent highly profitable product destinations capable of handling high volumes of product within a limited distance, thereby reducing transportation costs. These firms in the Charlotte, Nashville and Richmond area, service a total of 2,701 supermarket-type stores. They are located such that the I-77 and I-81 interstate corridors provide excellent access to most distribution points. The majority of the distribution points can be reached in less than 4 hours driving time. The proximity of the distributional warehouses gives Southwest Virginia producers a transportation advantage over the current suppliers of produce to these firms.

B. Purchasing agent survey results

To determine potential crops, market requirements, delivery systems, past constraints and general attitudes toward the establishment of a shipping point market in Southwest Virginia, purchasing agents were surveyed. The purchasing agents from a variety of firm types in the region were selected for the survey, including large chains (4), small independent operations (6), wholesalers[8] (8), processing firms, and firms that provide food for institutions and restaurants (3) (Table 4).

Table 4. Description of surveyed firms.

Firm Type	Number of Firms	Supermarkets	Total No. of Food Stores	Sales (Millions)*
Large Chains	4	387	467	$5,857
Independents (known sales)	2	17	33	$137
Independents (unknown sales)	4	0	4	NA
Wholesaler	8	NA	NA	NA
Processing/ Preparation	3	NA	NA	NA
Total	21	404	497	$5,994

** Source: Progressive Grocer* (1995)

[8] Including Hillsville Farmers' Market firms

For six of the surveyed firms that retail fresh produce, detailed financial records from secondary data sources were available. These firms service 404 supermarkets in the regions with total retail sales of $6 billion (Table 3). For two of the firms, sales figures were calculated based on number of food stores and store size, using regional average sales; for the remaining firms surveyed, records from secondary sources were not available. Of the processing firms surveyed, basing their size on retail sales, three are considered very large operations, while for the wholesale firms, four are categorized as very large operations.

The survey was conducted both through field visits to purchasing agents at warehouse locations and through telephone interviews . For nine of the field visits, facilities were also toured. A condition of the interviews was that no specific information concerning the firms' operation would be revealed in this report, hence references to individual firms and information that could identify individual firms are not made. Of the 36 firms contacted, 15 declined to participate in the study (42%). This declining to participate does not necessarily imply they would not be interested in shipping-point market produce, but only that company policy or time constraints did not permit their response. Among these declining to participate, several invited the interviewers to contact them again after the growers have initiated their production and the shipping-point market is fully operational. This reluctance to cooperate in the initial stages of the project, again reflects the skepticism of several purchasing agents in the capabilities of local producers to organize themselves into a functional producing entity.

Of the firms contacted, cooperation varied. A survey checklist was used for all interviews, but due to varied levels of cooperation, some firms responded in great detail while others provided more general responses. Responses are presented at face value. Produce agents are reported to frequently behave by responding in a form they feel is strategically beneficial to their business, and that their responses should be gauged accordingly.

Much of the information collected through the purchasing agent survey is qualitative and anecdotal in nature, therefore, a non-response should not be interpreted as a negative response. The subjective purchasing agent responses are quantified as very positive, positive, medium interest, and negative. While it is important to note positive responses, such responses do not necessarily imply that the firm will purchase produce in the future.

Purchasing agent responses about general interest in the facility, and the products they would be most interested in, are presented in Table 5 as percentages for the various categories of firm types. The category that should be given the most weight is "**best firm**". Best firm information indicates responses from firms found to be most suitable for the shipping-point market, based on interest, delivery system, and ability to purchase large volumes of product. Best firms can be of any size or organizational structure, firms categorized as "best" have demonstrated a higher probability of being able to benefit from the purchase of locally grown produce. The large chain and processor responses should also be given considerable weight. Less important are small retailer responses. The wholesaler category has both suitable and unsuitable firms within it.

In response to the questions of general interest, 50 percent of the "best firms" responded very positively, 17 percent positively, and 33 percent expressed mild interest in working with the facility (Table 5). The 33 percent of best firms who expressed only some interest essentially consisted of current purchasers of Southwest Virginia produce who are skeptical of farmer ability to produce quality produce in sufficient volumes. For large chains and large processors, 75 percent and 100 percent respectively, responded very positively and implied that they would be willing to work closely with the shipping-point market to ensure that produce met firm requirements. In the best firm category, 75 percent noted that they would be interested in a broad range of regional produce that met their requirements, while 25 percent indicated that they were interested only in specific products. The latter tended to be processing firms that could only use specific products.

Table 5. Purchasing agent survey: product interest by firm type (percent).

Purchaser's Response	Large Chains	Small Retailers	Wholesalers	Processors	Best Firms[9]
General Interest					
Very Positive:	75	-	-	100	50
Positive:	-	100	25	-	17
Interested:	-	-	63	-	33
Negative:	25	-	-	-	
Multi-product					
Interest	75	50	63	67	75
Limited Interest	25	50	37	33	25
Tomato	-				
Very Positive:	25	33	13	33	17
Positive:	75	50	83	33	58
Through Repacker:		-	-	-	17
Sweet Corn					
Very Positive:	25	-	-	-	8
Positive:	-	33	-	-	-
Negative:	25	-	13	-	17
Strawberries					
Positive:	50	-	13	33	33
Squash					
Very Positive:	25	17	13	-	8
Positive:	25	33	-	67	33
Negative	-	-	13	-	-
Pumpkin					
Very Positive:	25	17	-	-	8
Positive:	25	17	25	-	17
Potato					
Very Positive:	-	-	-	33	8
Positive:	-	-	13	-	8
Pepper					
Very Positive:	50	33	-	67	33
Positive:	25	33	75	33	50
Green Bean					
Very Positive:	25	-	-	-	8
Positive:	50	66	-	-	17
Cucumber					
Very Positive:	50	-	-	33	25
Positive:	25	33	38	33	33
Cantaloupe					
Very Positive:	25	17	-	-	8
Positive:	50	50	25	67	50
Cabbage					
Very Positive:	25	-	-	33	17
Positive:	25	33	50	33	42
Broccoli					
Very Positive:	25	-	-	-	8
Positive:	25	-	-	33	17
Negative:	25	-	-	-	8

Source: Purchasing agent survey, see text above for interpretation of response meanings

[9] Best Firm is defined middle of pg. 23

Purchasing agents were asked to specify which crops they would recommend, based on their needs, and knowledge of the region. Some responded broadly, while many gave specific recommendations. Many of the specific recommendations mentioned by these agents have been incorporated into the text of this study. Using the best firm category, the most highly recommended product was peppers with 33 percent of firms responding very positively and 50 percent responding positively. Tomatoes were ranked second with 17 percent responding very positive and 58 percent positive. However, 75 percent of supermarkets indicated that, though they were interested in Southwest Virginia tomatoes, they would want the tomatoes to go through their repacking firms. The wholesalers and processors were very positive concerning tomatoes and expressed their belief that a local niche exists within the state for Virginia grown produce. Cucumbers also ranked highly with 25 percent very positive and 33 percent positive responses. Other favorably ranked products, in their order of importance, are cabbage, cantaloupe, squash, strawberry, and pumpkins.

Two crops that received mixed responses were sweet corn and broccoli. Several firms expressed great interest in these crops, while other firms doubted the region's capability to produce a product of comparable quality to that of the firms' current suppliers. Essentially, purchasing agents very familiar with the region thought that these crops were risky for farmers to grow and that other regions have better quality, more experience, and have built up favorable reputations, making it difficult for Southwest Virginia growers to compete.

Purchasing agents were also asked about the extent of their current purchasing in the region and their types of delivery systems. For the best firm category, only 8 percent reported extensive local purchasing, 67 percent limited purchasing, and 17 percent none (Table 6). For the larger chains, none reported extensive local purchasing, but 75 percent reported limited purchasing in the region. This set of responses indicates a willingness to consider local produce given that quality standards are met. In many cases, purchasing

agents report that, although their firm is not well-suited to dealing with small, local growers, they feel a moral obligation to purchase some local produce. Small, local firms reported the greatest purchasing of local produce.

For the best firm category, 50 percent reported purchasing at the Hillsville Farmers' Market, while none of the major chains purchased at Hillsville. The wholesalers at Hillsville are servicing small, local outlets and institutional buyers, which are the same types of outlets to which farmers sell directly. Hence, the Hillsville facility has coordinated local production, but has not increased greatly the market area being served. The wholesalers at Hillsville reported that much of their business consisted of breaking down and repacking loads for smaller outlets and institutions.

A key to the success of the shipping-point market will be the ability to ship to outlets that can absorb large amounts of produce at a limited number of sites. Large chains, large wholesalers, and processing firms fit this requirement (Table 6). Both the purchasing agent survey and the interviews with marketing specialists indicate that small regional chains with fewer than 20 stores have extensive relationships with growers who deliver directly to stores. This relationship may imply a poor fit with the shipping-point market. However, these relationships also imply that the facility will not offer competition to local growers servicing such facilities, which was a potential problem noted by several extension agents.

Purchasing agents were asked to identify the problems they have had purchasing produce from the Southwest Virginia region (Table 7). Consistently, with the exception of small, local outlets, severe problems were noted. Ninety-two percent of the "best firms" noted general poor quality, with 83 percent attributing this poor quality to a lack of proper cooling. The lack of adequate cooling equipment in the region strongly implies the need for a well-equipped shipping-point market in the study area, which would be capable of providing these cooling services to the local producers. Poor farmer reliability

Table 6. Firm purchasing and product delivery systems.

Firm Type	Extent of Purchasing in S.W. Virginia				Product Delivery System			
	Extensively from farmers	Limited from farmers	None from farmers	From Hillsville Farmers Market	Ship to Warehouse	Possible pick up	Ship to stores only	Ship to warehouse & stores
	percent							
Large	0	75	25	0	100	100	0	25
Small	100	0	0	50	NA	NA	100	17
Whole-saler	13	38	25	63 (SWFM[s] Firms)	100	NA	NA	NA
Proces-sor	0	67	33	100 but limited	100	33	NA	NA
Best	8	67	17	50 Utilize 33 (SWFM firms)	100	33	NA	NA

Source: purchasing agent survey

[s] Southwest Virginia Farmers' Market

and product availability were also stated as major problems by 67 percent and 33 percent of the best firms.

Study area growers are oriented to local markets with more flexible requirements and do not understand the need to meet exacting standards, according to purchasing agents. Farmers were criticized for growing the wrong varieties of certain products (i.e. Eastern cantaloupes) that would not meet consumer demand, nor would they last in the warehouse system. This criticism was even the case for cabbage, a traditional crop in the region. A purchasing agent for a large retailer expressed strong interest in cabbage, but stated that cabbage currently grown in the region is too large, and that he has been unable to purchase 20-22 count cabbage locally. *A reversal of this poor perception and an improvement of farmer understanding is critical to the establishment of the shipping-point market.*

Table 7. Problems identified when purchasing from growers in SW Virginia (percent).

Firm Types[10]	Availability	Reliability	Lack Cooling	Poor Quality	Don't fit System[11]
Large Chains	25	50	50	75	25
Small Independents	0	0	50	0	0
Wholesalers	13	63	88	88	13
Processors/ Preparation	66	66	100	100	0
Best Firms	33	67	83	92	0

Source: Purchasing agent survey

Determining maximum and minimum volumes that the facility would face was an initial goal of the purchasing agent survey. Many purchasing agents were reluctant to report actual yearly or weekly volumes. They also tended not to be able to define minimum volumes well. Minimum volumes stem from two basic causes: the cost of transporting small quantities, and the inefficiency of purchasing agents of large organizations dealing with many small farmers. For this facility to succeed, minimum volume requirements must be met, in order to reduce the per unit costs of transporting produce, thus achieving a cost advantage over competitors located outside the state. The key factor will be establishing relationships and linking with firms able to purchase large quantities. The results presented in Table 8 indicate that processors and repackers are more likely to have minimum quantity limits, while even large, individual chains will not be able to absorb the entire regional production.

The results from Table 8 leave unresolved the ability of the region's retailers to absorb increased production levels. While it is potentially profitable to ship large quantities of produce long distances, it would be more profitable to use markets

[10] A firm could identify as many factors as they thought applicable.
[11] Inability to deliver produce according to firm specifications, to the specified distribution center.

Table 8. Product volume requirements as reported by selected firms (weekly).

Crop/Firm	Maximum (Lbs)	Minimum (Lbs)
Tomato/ Large Chain	20,000	-
Tomato/ Small Chain	5,000	-
Tomato/Preparation firm	12,000	-
Tomato/ Repacker	200,000	50,000
Pepper/ Large Chain1	5,000	-
Pepper/ Large Chain2	9,000	2,500
Pepper/ Large Chain3	6,000	-
Pepper/ Preparation firm	1,500	-
Pepper/ Processor	-	150 Acres
Squash/ Chain	1,500	-

Source: purchasing agent survey.

within or close to the study area. The ability of the region's retailers to absorb increased production levels was addressed by estimating demand in the three market areas surrounding the study area. Large demands for produce were found to exist within a short distance of the study area, with yearly consumption in the largest market (Charlotte) of 49,956,000 pounds of tomatoes and 8,643,000 pounds of peppers (Table 9). Based on yield data for the region, the Charlotte market alone represents a tomato acreage of 1,000 acres and pepper acreage of 620 acres, which is far beyond the expectations of increased regional acreage.

Table 9. Retail regional demand for tomatoes and peppers.

Crop	Food Sales[a]	Charlotte Area	Nashville Area	Richmond Area
	$1,000		1,000 lbs	
Tomatoes	3.12	49,956	30,415	26,217,568
Pepper	0.52	8,643	5,262	4,535,769

Source: *Progressive Grocer* (1995) and purchasing agent survey.

a Calculated by dividing purchasing agents estimates of annual demand by yearly firm sales, and then multiplying that value by total sales for the region.

III. Production and Crop Selection

A. Present Production Patterns in the Study Region

The primary sources of agricultural income in the region are from cattle raising and tobacco cultivation. Regional income from livestock production accounts for approximately $127 million of a total farm income of $200 million, which amounts to 63 percent of local farm income, which is approximately the state average.

The region is suitable to cattle production because of the rugged nature of the terrain and the lack of adequate irrigation sources for more profitable farming activities. Considerable grazing acreage and forage crop land is located on or near the flat valley bottoms, in close proximity to sources of water. These valley bottoms provide an opportunity for expansion of horticultural production, as horticultural production has a much higher return per acre than beef cattle production[12].

The other predominate farm activity is Burley tobacco production. Tobacco income made up approximately 20 percent of total farm income in the nineteen county study area, and is by far the most profitable per acre farming activity in the region. Over 30 percent of the 12,831 farms reported in the 1992 census are tobacco farms, and these farms represent a total of 11,519 acres of production.

There are 240 farms in the region where a variety of horticultural crops that include fruits, vegetables, greenhouse and nursery crops are produced. A total of 1,587 acres on 159 farms are used for the production of traditional vegetables and melons. Irrigation, seen as one limiting factor to high quality vegetable production is used on fifty-two percent of the 159 farms totaling 442 acres (Table 12). Farms consisting of less than three acres or with sales of less than $1,000 of agricultural crops are not included in the agricultural census data. As a result, it is likely that the acreage planted to vegetables is

[12] Virginia Tech Horticultural Budgets

under-estimated. Many of these small growers serve small, retail outlets or their own retail on-farm markets.

Horticultural production in Southwest Virginia is currently centered in two main areas. To serve small outlets (including a downtown farmers' market) in the Roanoke urban area, Roanoke County has 144 acres in production (Table 12). In close proximity to the Hillsville Farmers' Market, in Carroll, Floyd, and Wythe counties, there is a total of 1,193 acres, which comprises the bulk of regional production (Table 11).

Some concentration of production is also seen in Scott, Washington and Smyth counties with a total acreage of 100 acres (Table 12). These counties are a considerable distance from the Hillsville Farmers' Market, which makes it costly to transport their produce to the nearest grading and packing facility. Currently the growers have poor access to an adequate market network, the long travel distance to Hillsville often causes damage to the product while in transit, and makes it difficult to remove the field heat in a timely manner. In the past, these areas have supported two vegetable cooperatives which are no longer in operation. The failure of these previous vegetable cooperatives stems from several of the reasons outlined in the section III. 3 of this study; lack of adequate irrigation, low quality produce, inadequate coordination between growers, small volumes, etc. This three county area also has many small grower operations serving local outlets such as roadside fruit stands and on-farm sales which are not well documented in secondary sources (county extension agents).

The horticultural crop with the greatest acreage in the study region is cabbage with 901 acres. Following cabbage are sweet corn, tomatoes, peppers, and snap beans with acreage of 187, 55, 37 and 26 acres, respectively (Table 13). Other horticultural crops listed in the agricultural census include broccoli, cantaloupes, cucumbers, peppers, pumpkin, squash, and watermelons.

Table 10. Farm production in Southwest Virginia (Virginia county ranking in parentheses).

County	No. of Farms	Acres Land	Harvest Crops[a]	Crop $ Income	Lvstock Income $	Farm Income $	County Rank	Corn Silage[a]	Alfalfa Hay[a]	Other Hay[a]	Burley Tobacco[a]	All Cattle & Calves(#)	Milk Cows(#)	Sheep Lambs(#)
Bland	339	81,768	10,249	500	6,108	6,608	69	1400(32)	900(37)	7,600 (42)	43 (12)	15,000 (40)	700 (42)	900 (18)
Buchanan	102	8,627	733	390	235	625	96			700 (86)	120 (7)	900 (87)		
Carroll	884	113,165	24,435	3,983	15,760	19,473	30	1800 (24)	1700 (30)	16,700 (26)		15,000 (40)	1800 (17)	
Craig	170	45,451	7,533	232	2,349	2,581	89			6,800 (59)		8,500 (57)		500 (30)
Dickens.	104	81,768	10,249	500	6,108	6,608	69			1,600 (32)	52 (10)	1,600 (77)		
Floyd	761	116,509	25,619	5,072	16,284	21,357	26	3000 (12)	1600 (16)	18,400 (16)		35,800 (12)	2100 (15)	600 (26)
Giles	332	73,097	8,063	485	3,568	4,053	82		900 (41)	6,800 (47)		13,300 (47)		700 (21)
Grayson	871	136,320	21,588	2,128	14,765	16,893	37	2300 (19)	1800 (22)	18,400 (14)	450 (6)	35,500 (13)	2200 (12)	900 (18)
Lee	1,287	129,296	20,275	8,484	6,881	15,365	43	700 (50)	1800 (28)	18,100 (16)	2290 (3)	29000		
Montgom.	537	98,914	20,482	1,452	13,716	15,168	45	3300 (9)	2800 (12)	14,600 (29)		27000	700 (42)	900 (18)
Pulaski	363	71,803	16,520	1,059	10,590	11,649	55	3000 (14)	1800 (22)	17,100 (25)		24,200 (29)	1500 (23)	2800 (9)
Roanoke	272	24,924	5,179	2,314	10,559	12,873	51		700 (45)	3,800 (55)		5,500 (63)		
Russell	1,103	160,973	20,095	700	12,531	19,531	32	700 (48)	2500 (16)	17,800 (18)	1820 (4)	45,500 (7)	800 (40)	3400 (6)
Scott	1,540	134,191	19,767	10,072	6,176	16,249	39	500 (52)	1800 (25)	15,200 (27)	2640 (2)	26,700 (25)	700 (42)	
Smyth	839	119,973	21,918	3,981	15,739	19,720	31	3100 (17)	2600 (17)	16,400 (24)	855 (5)	34,600 (17)	2400 (10)	700 (21)
Tazewell	494	138,531	17,270	787	12,764	13,551	49	1300 (28)	2700 (11)	14,500 (28)	86 (8)	32,600 (20)	1200 (31)	3300 (7)
Washing.	1,986	190,062	37,786	13,870	33,638	47,509	8	7100 (6)	4000 (5)	28,600 (5)	3130 (1)	64,700 (3)	5400 (5)	1500 (15)
Wise	122	13,247	2,142	272	661	934	95			1,800 (68)	33 (13)	2,000 (73)		
Wythe	725	131,366	33,940	1,271	24,377	25,647	20	8600 (3)	4500 (3)	2,700 (9)		42,100 (8)	5000 (6)	3700 (5)
Totals	12,831	1,869,985	323,843	57,552	212,809	276,394	966	36,800	32,100	227,600	11,545	403,500	24,500	19,900

Source: 1992 Agricultural Census.

[a] Acres

Table 11. Farm income by farm type in the study region.

	Number of Firms by Type					Market Value of Products Sold by Farm ($1,000)					
	Tobacco	Veg/melon	Fruits & nuts	Livestock	Hort. Specialties	Tobacco	Hay & Silage	Vegetables	Fruit & Nut	Cattle & Calves	Sheep & Lambs
Bland	13			266	2	308	179			4,016	43
Buchanan	50		3	31	1	326	27			190	
Carroll		23	58	646	8		448	2279	1070	11,997	25
Craig		1		137	14		140			1,792	32
Dickens.	20		2	63		132	29			271	3
Floyd	11	13	10	505	42	129	564	251	267	11,245	18
Giles			6	289	1		192		217	3,446	56
Grayson	173		3	560	14	1,517	233			9,652	54
Lee	764	3	1	5	2	7,761	389	69		6,205	
Montgom.		5	3	395	14	27	379	51		7,118	92
Pulaski		2	4	276	7		236		14	6,903	161
Roanoke		14	19	162	17		118	453	354	1,039	
Russell	513			500		6,604	350			10,799	159
Scott	961	3	3	432	9	9,081	388	49	3	4,809	65
Smyth	306	5	7	409	4	3,208	368	40		10,089	60
Tazewell	24	1	3	383	4	309	265	7		10,151	
Washing.	1,087	3	2	652	18	11,199	584			15,608	
Wise	13	2	6	67	2	69	51		22	312	
Wythe	2	3	6	557	3	89	620	213	157	11,588	198
Totals	3,937	78	136	6,335	162	40,759	5,560	3,412	2,104	127,230	966

Source: 1992 Agricultural Census

Table 12. Horticultural commodities harvested by county.

	Harvested		Irrigated	
County	**Farms**	**Acres**	**Farms**	**Acres**
Bland	*	*	*	*
Buchanan	*	*	*	*
Carroll	33	917	14	326
Craig	3	7	2	*
Dickenson	3	*	*	*
Floyd	21	144	2	*
Giles	*	*	*	*
Grayson	*	*	*	*
Lee	8	28	*	*
Montgomery	9	35	5	20
Pulaski	*	*	*	*
Roanoke	29	198	8	65
Russell	*	*	*	*
Scott	15	52	1	*
Smyth	7	19	3	13
Tazewell	4	8	*	*
Washington	16	29	13	14
Wise	3	18	*	*
Wythe	8	132	4	18
TOTALS	**159**	**1587**	**52**	**442**

Source: 1992 Agricultural Census

* Not reported because minimum acreage not achieved.

The cabbage crop is grown primarily in Carroll county and is field packed and marketed directly. *The Roanoke Times* (August 1995) reported that there were 500 acres of cabbage planted for the 1995 season. This decrease in cabbage acreage is indicative of the general decline of horticultural production in the region, and the fact that the Southwest Virginia Farmer's Market in Hillsville has not significantly improved the cabbage marketing situation.

Extension agents in the region were surveyed, and estimates of 1995 horticultural crop acreage are presented in Table 13. These estimates are not directly comparable to

the 1992 agricultural census, but do indicate that pepper and tomato production has been stimulated in the last couple of years in the vicinity of the Hillsville Farmers' Market.

This stimulus effect would indicate that the shipping-point market location should be focused in the counties farthest west. This is due to the distance of these counties from current grading and packaging facilities. It should also be noted that the organizational structure of the Hillsville facility has limited its ability to absorb locally grown produce. As a result, the Hillsville facility is only marketing produce to smaller outlets.[13] The proposed shipping-point market in the western counties should have ample grading and packing facilities, work closely with the producers to assure a high quality product, deal with a very limited number of products, assemble large quantities, and market directly to large supermarket chains.

Table 13. Horticultural Production Reported for Specific Commodities.

	Harvested		Irrigated		
Crop	**Farms**	**Acres**	**Farms**	**Acres**	**Counties producing**
Snap Beans	33	26	5	6	Ca, Fl, Le, Mo, Ro, Sc,
Broccoli	10	4	5	*	Ca, Fl, Mo
Cabbage	37	901	12	319	Ca, Ro, Sc,
Cantaloupes	7	18	6	18	Ro, Sm,
Cucumbers	19	11	6	*	Fl, Le, Mo, Ro,
Peppers	26	37	7	2	Ca, Fl, Mo, Ro,
Pumpkin	22	19	5	5	Fl, Mo, Ro, Sc, Wa,
Squash	8	2	1	*	Ro,
Sweet Corn	48	187	8	25	Fl, Le, Mo, Ro, Sc, Sm, Ta, Wa, Wy,
Tomatoes	46	55	15	10	Ca, Fl, Mo, Ro, Sc, Sm, Wa,
Watermelon	3	*	2	*	Ro.
TOTALS	**259**	**1260**	**72**	**385**	

1992 census data

B. Extension agent survey results

[13] This concept is described in the introduction and chapter V in greater detail.

Extension agents in the nineteen counties comprising the study area were contacted, and informal meetings and field tours were conducted with selected extension agents. A written survey of all extension agents in the study area was conducted (June/July 1995). The objectives of these activities were to determine the most agronomically suitable crops, farmer production constraints , farmer marketing constraints, present and potential acreage, and present and potential producers.

1. Current and potential horticultural production

The extension agents reported a current total horticultural acreage of 1996.5 acres (Table 14). This acreage is significantly higher than the 1992 Agricultural Census figure of 1,587, especially considering that three extension offices did not provide numerical estimates, including the major producing county of Roanoke. This difference in acreage reported stems from the difference in the definition of farms, and can be seen by the fact that the census reported 159 farms with horticultural production while the extension agents reported 387. Extension agents reported 157, 111, 68, and 24 acres of peppers, pumpkin, tomatoes and cantaloupes respectively, which are significantly higher than 1992 agricultural census figures (Table 15).

As can be seen from the results below, the producers in the region can be characterized as small compared to the large vegetable producing regions of California, Texas and Florida. The average horticultural producer in the study area dedicates only 5 acres of land to horticultural production, according to extension agent data. This relatively small size is indicative of the growers relying on small local outlets and on-farm sales for the bulk of their marketing.

Table 14. Estimates of current and potential horticultural acreage.

County	# Producers	Acres	Potential Acres
Bland	0	0	50
Carroll	90	1500	2000
Craig	3	11	400-500
Dickenson	3	5	150
Floyd	40	66	500
Grayson	6	2.5	25-100
Lee	18	17	1000
Montgomery	72	83	*
Pulaski	40	80	unknown
Roanoke	NA	NA	NA
Russell	10	5	*
Scott	50	85	1000
Smyth	16	19	*
Tazewell	9	50	3000
Washington	27	67	*
Wise	3	6	50-85
Totals	387	2311.5	8175-8385

Source: Extension agent survey

* unspecified, potentially large acreage

Table 15. Extension agent estimates of current selected crop acreage.

Horticultural Crop	Acres
Peppers	157
Pumpkin	111
Tomatoes	68
Cantaloupes	24
Cabbage	500

Source: Extension agent survey

Consistent with the 1992 Agricultural Census, the extension agents also indicate that vegetable production is centered in two counties, Roanoke and Carroll. Presently 1,500 acres are planted in horticultural crops in Carroll county, and Smyth, Washington, and Scott counties have 171 total acres (Table 14). This three county region currently has poor market infrastructure, but was the site of past vegetable cooperatives.

Between 8,175 and 8,383 acres were identified by extension agents as potential acreage for horticultural production in the responding counties (Table 14). Several counties reported large amounts of potential acreage, including Scott and adjacent counties where there is strong local support for a new shipping-point market.

Although 81 percent of the extension agents indicated Hillsville Farmers' Market was the closest market for producers in their counties, 44 percent said it was too far to be considered as an outlet by their producers (Table 16). However, access to a market is not the only factor limiting horticultural production in the region. Most fruit and labor production is labor intensive. Currently, most producers rely on family labor. In order to expand production, the use of migrant labor would have to be considered. Additionally, growers lack large scale experience. Production focused on the small, local outlets for which most growers are producing, requires a different degree of management, than production for large outlets.

Forty-four percent of responding agents indicated that another major constraint to horticultural production is that farmers lack sufficient experience and technical skills to initiate or expand their operations. This lack of experience and skills stems from the fact that current production operations are oriented to local outlets which have different standards and volume demands than larger market outlets. This constraint points to the need for grower education, and an important role for the extension agents as part of any regional effort to stimulate horticultural production.

Table 16. Selected responses to extension agent survey questions.

Question	Percent Response	Observation
What is the nearest market	Hillsville Farmer's Market 81%	Smaller percentage response for local retail stores
What are the principal constraints to production	lack of marketing infra-structure as primary problem 44%	The eastern county extension agents near the Hillsville facility did not consider market infrastructure a problem
Current and future labor needs	to increase horticultural production, migrant labor would be needed 81%	Currently most growers use family labor with the exception of some larger growers who also use migrant labor for tobacco.
Major existing constraints	lack of experience and grower attitudes 44%	Growers currently have skills suitable for selling to local outlets but are not oriented towards larger markets
Advantage in agricultural production?	cool weather crops 31%	50% responded that they have no advantage

Source: Extension agent survey.

2. Extension Agent Horticultural Product Selection

Extension agents were asked to rank the horticultural crops that they thought were most suited for production in their counties. These rankings were compared with similar rankings by purchasing agents and local producers to assist in determining the optimal product mix to produce in the region. Selections were based on agronomic feasibility, farmer experience, farmer interest, and expected profit. Table 17 summarizes the extension agent selections. The crops were ranked, awarding five points to the crop listed number one by the agent, four points for the second choice, down to one point for the fifth and subsequent choices.

Table 17. Rankings of horticultural commodities by county extension agents.*

	tom	s.c	pum	pep	pot	s.f	can	bro	cuk	cau	asp	cab	g.b
Bland	3	1	5	2	5	5							4
Buchanan													
Carroll	5	5	4	3	5	5	1		2				
Craig	2	4	1		3	5							
Dickenson	1	4	4	4				4	4			1	
Floyd	1	5		4	2								3
Giles													
Grayson	5	1	2	3			4	5	5	5			5
Lee	5	2	5		3	1	4						
Montgomery	3	1		4	2	5	5	5	5		5		
Pulaski		2	1								2		
Roanoke	1	1	2	5	5	5		5	4	5		3	
Russell	1	5		2	3	4							
Scott	1	4	2	3			5						
Smyth	*			*		*	*						
Tazewell	5	4	3		5	5		2		1	5		
Washington	1		3	2		5	4		5				
Wise	5		1		4	2	5	3					
Wythe													
SW Horticult	2	3	3	2	5	2	2	1	3	1	2	5	
SW Total	**49**	**42**	**42**	**32**	**24**	**22**	**18**	**17**	**14**	**12**	**10**	**9**	**6**
Times Mentioned	16	14	13	12	11	12	9	7	7	4	4	3	3

* The total point rankings were achieved by assigning a value of five points to the product that was ranked most preferable by each extension agent, four points for their second choice, down to one point for all commodities ranked fifth or below.

Key tom - tomatoes pep - peppers bro - broccoli asp - asparagus
s.c - sweet corn pot - potato cuk - cucumber cab - cabbage
pum - pumpkins s.f - small fruit cau - cauliflower g.b - green beans

The top ranking for commodities were tomatoes (49), sweet corn (42), pumpkins (42), and peppers (32) (Table 17) . Several other commodities, not presented in Table 17, were mentioned, but only commodities ranked by at least three extension agents are included in the table.

This ranking of crops, in conjunction with farmer rankings, purchasing agent rankings, and horticultural expert opinion, was used to select the crops for which market window analysis was conducted. Tomatoes ranking first is not surprising as it is highly profitable and extensively marketed through local outlets, as are sweet corn and pumpkins which tied for second. Although cabbage is the most widely produced horticultural crop and is agronomically well suited to the region, its lower ranking stems from low and decreasing profits. Peppers, ranked third by extension agents, are generally less profitable than tomatoes, but easier to market in the larger marketing channels. It is also a crop for which local farmers have considerable production experience.

3. Critical issues in horticultural product selection

There are several critical issues that need to be considered in selecting crops to be recommended for production by farmers for distribution through the shipping-point market. A number of these issues were raised and explained by extension agents through personal contact and by comments made on the formal survey. These are issues that cannot be presented in a quantifiable way and are discussed in the following sections.

Traditional vs. non-traditional crops

Non-traditional horticultural crops for the region including flowers, ornamentals, high-valued exotics, and herbs were evaluated. Extension agents reported that farmers

are extremely adverse to planting crops that have not been traditionally grown in the region. Primary reasons for farmer aversion to non-traditional crops is marketing risk and a lack of knowledge concerning production. Purchasing agents showed the same skepticism as the extension agents, expressing a lack of interest in non-traditional crops from the region. Crops considered as traditional horticultural commodities in the region include tomatoes, peppers, squash, pumpkins, and cabbage. These products are presently being produced for local markets, and farmers have extensive knowledge and experience concerning their production. Extension agents were also concerned that there have been extremely limited trials of non-traditional crops in the region, which are needed to estimate quality, yield and cost of production in order to make accurate recommendations.

Several extension agents empasize the importance of conducting field trials with local producers and optimal variety selection as two essential requirements for the success of nontraditional horticultural production in the region. Other agents emphasize the importance of establishing a marketing network for nontraditional crops. An example of the importance of establishing proper marketing channels was reported for an informal group of twenty farmers in the study area. These producers had been growing flowers for the dry flower market, but were forced to break-up due to poor productivity and a lack of adequate market outlets.

Many non-traditional specialty crops are potentially more profitable than traditional products on a per acre basis, and should eventually be considered for marketing and distribution through the shipping-point market facility. However, the consensus among extension agents is that such crops are not viable for the establishment of the shipping-point market, which needs high product volumes and quality to break into better markets and to establish a positive reputation. After the facility is established and a grower base is developed, agricultural trials can be conducted on non-traditional commodities in order to evaluate their profitability and feasibility for distribution through the shipping-point facility.

Cool Weather Crops

Nearly one-third of the extension agents said that their counties had an advantage over other regions in the production of cool weather crops (such as cabbage, broccoli, and cauliflower). Several horticulturists have explained that the higher altitudes found in the Appalachian region result in cool summer nights which are ideal for growing these products. During the warm summer months when many of the hot, southern producing states change from cool weather crops to hot weather crops, this region has a market-window to supply cool crops. Historic price data indicate that there is an increase in prices for both broccoli and cauliflower at the end of the summer. The issue that must be addressed is the agricultural feasibility of these cool crops, none of which is currently grown successfully at a commercial scale in the region except cabbage. There have been positive results of producing broccoli and cauliflower at the Virginia Tech experimental station, but there is a lack of horticultural trials in farmer fields.

Due to a previous failure to produce and market broccoli in Halifax County, there is a regional reluctance to consider this crop. Before farmers will seriously consider broccoli, local field trials will have to be conducted.

Production of horticultural products complementary to production of existing crops

Since horticultural production is not expected to be the primary income source in the region, the crop selection needs to be considered so that it will fit with the production of primary crops, particularly tobacco. By selecting the proper crops, new machinery would not need to be purchased and labor can be not only shared, but used more efficiently. Tomatoes and peppers are two crops that can make use of existing equipment as well as migrant labor used for tobacco production.

Tobacco is very labor intensive during critical phases of the production process, particularly planting, transplanting, and harvesting. A horticultural crop should be considered to complement the periods when tobacco labor is less intensive so that the workers can be shared between horticultural production. In the case of migrant labor, where a team of migrants has to be contracted for the entire growing season, complementary production allows for the most efficient use of their labor.

Irrigation

Extension agents and horticulture experts report that it is critical for horticultural production in the region to have irrigation facilities. In spite of the importance of irrigation, most county agents reported farmer reluctance to invest in the necessary equipment. It was reported that a vegetable cooperative in Smyth county specializing in the production of peppers failed due to a lack of irrigation.[14] This cooperative operated profitably for a number of years, but failed after repeated drought years reduced yields and resulted in a poor quality product and a loss of quality markets.

Due to the importance of quality and reliability required by the purchasers in better markets, irrigation of the majority of the crop acreage is critical to the success of the shipping-point market. Several purchasing agents stated that they would not even consider purchasing produce from the shipping-point market if the region did not have substantial acreage under irrigation.

Farmer education and attitudes

[14] Personal communication

Extension agents reported that farmers need to be educated both in terms of horticultural production methods and awareness of the requirements of the better marketing outlets. There must be close communication and coordination between the shipping-point market management and the producers. Farmer skill and education is an issue that must be addressed to make the establishment of a shipping point market feasible. *The cooperation of the county extension agents in training and educating the growers is essential for the success of the project.*

C. Farmer survey results

The farmer survey was conducted with the cooperation of the county extension offices. Each office was asked to provide a mailing list with the addresses of current or potential horticultural producers in their counties. The number of names on the mailing lists varied from two in some of the counties, principally those where mining is the predominate economic activity, to over 60 from some of the larger, agriculturally oriented-counties. Because of this difference in the number of names received by counties, comparisons of interest across counties should not be made solely on the number of responses received. Also many of the names provided as potentially interested growers were arbitrarily given, and therefore the failure of these producers to respond should not be mistaken for a general lack of interest in the region.

A total of 524 surveys were sent out to producers in the study region, and 76 responses were received. The number of responses to certain questions varied because not all respondents answered every question. Many questions were not applicable to every grower, and some producers simply declined to answer certain questions.

The survey has provided a representative estimate of the present horticultural production in the region, the crops that growers would prefer to produce if a shipping-

point market existed in the region, and some of the key issues and critical factors that must be resolved in order to make the project feasible and profitable.

1. Current horticultural production and experience

There is experience in the production of a wide variety of horticultural produce in the study region (Table 18). Tomatoes and peppers were the most frequently mentioned products. These more frequently mentioned commodities indicate that less training and education would be needed to start up production in the region, and that the growers would be more likely to accept the idea of producing these products.

Table 18. Experience in local horticultural production.

Horticultural Product	No. of Producers
Tomatoes	14
Peppers	12
Sweet corn	7
Potatoes	6
Green beans	5
Pumpkins	5
Small fruits	5
Christmas trees	4
Garlic/onions	3
Cucumbers	2
Melons/cantaloupes	2
Watermelon	1
Cabbage	1
Broccoli	1
Squash	1

Source: Grower Survey

2. Horticultural product selection

Forty-four growers interested in producing horticultural commodities ranked the crops that they would prefer to produce if a proper marketing infrastructure existed in the region (Table 19). Tomatoes, peppers, and pumpkins were ranked highest according to the total point values assigned to their choices.

Table 19. Local growers preferred horticultural products.

Commodity	No. of Times Selected	Points*	Ranking
Tomatoes	22	82	1
Peppers	22	77	2
Pumpkins	18	52	3
Sweet corn	13	48	4
Green beans	14	42	5
Cucumbers	11	30	6
Cantaloupes/melons	8	30	7
Berries	8	25	8
Cabbage	5	23	9
Potatoes	7	19	10
Squash	5	18	11
Strawberries	4	18	12
Garlic	3	10	13
Christmas trees	3	8	14
Asparagus	2	8	15

* Five points were rewarded to a crop ranked as most preferable by a grower, four points for the second most preferable choice and so on. The total points were summed to give the final ranking of most preferable products.

3. Key issues in horticultural production

A number of the key issues were revealed in the grower survey. These issues provide important insight into barriers that must be overcome and steps that must be taken in order to increase the probability the shipping-point market will be a success. As noted throughout this report, a potential market exists if the producers can supply a

Table 20. Responses to grower survey.

Survey Question	No. of Farmers	Farmer Response Categories	Percentage Responses

Location of respondents	76	Carroll Scott/Washington	49 14
Primary farm activity of respondents	76	Cattle Vegetable/fruits Tobacco Other	37 34 14 14
Experience in horticultural	76	Yes	51
Producers with irrigation	39	Yes	38
Current source(s) of farm labor	55	Family Local Migrant	76 44 22
If horticultural production were expanded, sources of additional labor needed	44	Migrants Local None	43 41 34
Experience with migrant labor	55	yes	33
Housing available for migrant labor	55	yes	18
If you were to initiate or expand hort. production, current use(s) of future hort. land	39	Pasture Grass Tobacco Corn	54 54 8 15
Would expanding hort. prod. decrease other farm production?	39	Yes	46
What farm production would you have to give up	18	Cattle Hay Tobacco	44 28 28
Nearest off farm market to sell fresh produce	54	SWVFM in Hillsville other	80 20
Primary market for horticultural produce	36	Local Outlets Hillsville outside region	94 22 3
Is the lack of a shipping-point market a constraint	58	yes	31
Interest in using a shipping-point market if existed in the region	59	Yes	56
Acreage that would be planted if market facility existed	25	1 - 5 6 - 10 11 - 20 > 50	56 20 8 16
Total acreage committed Average size committed Most frequent response	25 25 25	430 - 466 18 2 acres	
Willing to commit hort. production to be marketed through a marketing cooperative	56	Yes No Unsure	52 37 11

Note: Responses may not sum to 100% because only the most frequent responses are being reported, or may sum greater than 100% because multiple answers were given for some questions.

product that meets the purchasing agents' requirements. Farmer responses to selected survey questions are presented in Table 20. Their responses identify issues that must be resolved in order for producers to meet the purchasing requirements.

The majority of the respondents to the survey were cattle and horticultural producers. Of the horticultural producers who responded, the majority were from Carroll county and only one reported being a cabbage grower.

Irrigation

Of those producers who responded, only 38 percent indicated that they have some type of irrigation system on their farm. Due to the large volume and high quality requirements demanded by the fresh produce purchasing entities, additional growers must be willing to invest in irrigation equipment in order to assure sufficient high-quality production to meet these requirements.

Horticultural acreage

Another important result of this survey is the small acreage of the current producers. Seventy-six percent of the respondents reported that the family was a principal source of labor on their farms. This high use of family labor is indicative of the small size of the horticultural farms in the region. Another factor that substantiates this conclusion is that 94 percent of the producers responded that their primary market is local outlets. Local outlets such as fruit stands, local retail stores and pick-your-own operations generally move small volumes of produce and can become saturated with just a few small local producers.

The horticultural producers who responded to the survey are the small producers who are currently supplying and have saturated the local markets. Only one producer responded that he was marketing produce outside of the region. Another indication of their small size is that 56 percent of the producers responded that, if a shipping-point facility existed, they would be willing to initiate or expand their horticultural production. These facts together verify the belief that the lack of a marketing infrastructure in the region has prevented interested growers from expanding their operations and producing on a large enough scale to ship produce out of the region. The 25 growers who responded to the question about expanding production indicated that together they would plant approximately 430 additional acres if a facility existed to market their produce. This acreage is a significant amount, but a single producer said he would plant an additional 200 acres, and this one response is nearly equal that of the other 25 respondents.

Migrant Labor

If production were to be expanded in the region, additional sources of labor would have to be found. Nearly all of the county extension agents reported that migrant labor would need to be brought into the region in order to satisfy the increased demand for workers, while only 43 percent of the growers anticipated that migrant labor would be needed. Thirty-four percent of the growers reported that no additional labor would be needed if they expanded production. Again, this fact indicates the small acreage of land that producers intend to cultivate. While most experts and extension agents agree that migrant labor would be needed to expand production, 82 percent of the respondents said that they do not have suitable housing to accommodate migrant workers. This lack of housing is a critical factor that must be resolved before horticultural production can expand on a large scale in the region.

Future production

The survey indicates that a typical grower would only be cultivating between two and three acres of produce. Fifty-six percent of those who responded reported that they would produce less than five acres of horticultural crops, and 76 percent reported that they would produce less than 10 acres. This fact again substantiates the need for a large number of producers in order to make the shipping-point market profitable, and emphasizes the importance of proper organization and coordination of the growers in order to assure success. Additional growers interested in participating in the shipping-point market project, and willing to collaborate with other local growers in the production of a high quality, homogeneous product, must be found and organized in order to assure the viability of the shipping-point facility.

Approximately one half of the growers who responded reported that they would have to sacrifice some current on-farm production in order to expand or diversify into horticultural production. Cattle and hay production were stated as the two farm activities that would likely be given up or reduced. Historically, vegetable production has brought higher per acre returns on investment than have either cattle or hay production. Only eight percent of those willing to consider horticultural production said that they would have to sacrifice tobacco production in order to do so. This response somewhat alleviates the expressed concern of several horticultural experts who believe that, as long as tobacco prices remain high, local producers will be reluctant to diversify into horticultural production on a large scale. The survey indicates that most potential growers are capable of simultaneously producing both products.

In summary, the survey seems to justify the belief of the extension agents that interested growers do exist, but that they have currently saturated their local markets and need the presence of proper marketing infrastructure to expand their operations outside the region. While this belief may be true, the issues of coordinating large numbers of

small producers, the lack of irrigation equipment, the lack of experience and housing for migrant workers, and the unwillingness to invest in proper machinery and equipment must be resolved in order to increase the probability of success of the shipping-point facility.

IV. Horticultural Product Profitability Analysis

A. Horticultural product selection for financial analysis

The horticultural products selected for market-window and profitability analysis are based on the surveys and interviews. For the surveys and interviews, an exhaustive list of horticultural commodities was used initially, and products were removed from the list as they were classified unfeasible by one of the three principal surveyed groups: purchasing agents, extension agents, or producers.

Produce purchasing agents serving the region were asked to indicate which specific crops they were interested in purchasing based on their knowledge of the region and the general demands of their operations. Extension agents were asked for ranked recommendations of horticultural crops that were high potential and well suited to the region. Farmers were asked to rank the crops they were interested in growing. Finally, regional horticultural experts were asked to make their recommendations.

Crops were eliminated from consideration during an iterative process based primarily on a lack of interest from purchasing agents, resistance to growing by farmers, and indications from horticultural experts that the crops were risky or not well suited to the region. Once the reputation of the shipping-point market is established, some of those crops initially dropped might again be considered.

An exhaustive list of horticultural product types initially considered included herbs and spices, fresh and dry flowers, fruit, Christmas trees, ornamental plants,

organically grown produce, integrated pest management products (IPM), specialty vegetables, and vegetable crops traditionally grown in the region. Ultimately, 10 horticultural crops were selected for further financial analysis (Table 21).

The results indicated that the more exotic horticultural crop types described above were generally not suitable for the establishment of the shipping-point market. The growers expressed very little interest in planting non-traditional products or organic and IPM-produced crops. It was also noted that there is little formal means to actually label crops as organic or IPM-produced, and these types of products are very labor intensive, time consuming, and technically more difficult to produce than traditional crops. County extension agents also expressed the belief that it would be most efficient to take advantage of the knowledge, experience, and machinery already available in the region to produce traditional crops. Both extension agents and local producers expressed the belief that their fellow growers would resist any initiative to grow non-traditional commodities in the region. This coincided with the purchasing agents who were also skeptical of the quality of unknown, non-traditional commodities being produced in the region.

Commodities such as herbs and spices sell in such small amounts that one or two large producers can supply an entire chain with these products. This need for small amounts is also true of other specialty vegetables that sell relatively small quantities. For products of these types supermarket chains have pre-established, reliable suppliers.

Fresh and dried flowers are very light. This light weight allows large volumes to be shipped into the region at low costs, making entry into such markets difficult. It was also found that due to marketing infrastructure and organization already in existence for large fruit, there is not a need for a shipping-point market to stimulate this industry.

The horticultural crops selected for financial analysis and the basis for their selection are presented in Table 21. For six of the ten crops selected, the basis for selection was extensive agreement between the conducted surveys and horticultural experts. These crops included tomatoes, green peppers, pumpkins, cucumbers, cabbage,

and green beans. For four of the selected crops, unanimous agreement for its selection across all three groups was not achieved, but particularly strong recommendations from selected surveys and individuals, caused it to be included for further analysis. These crops include sweet corn, strawberries, broccoli, and asparagus.

Table 21. Crops selected for profitability analysis.

Crop	Reason Selected	Comments
Asparagus	Very high horticultural expert recommendations	Little experience in the region but well suited to climate conditions
Cucumbers	Ranked highly in all surveys	High quality standards
Fall Bunched Broccoli	Recommended highly by horticultural experts and a few agents and buyers	Favorable climate, high quality standards , past broccoli co-op failure warrants caution, little regional reputation,
Green Beans	Ranked high in all surveys	Experienced growers, an early season revenue generator
Green Bell Peppers	Ranked high in all surveys	Already established reputation for pepper production, also marketable directly to the large supermarket chains
Green Cabbage	Extension agents and purchasers' rankings	Traditional crop with highly experienced growers, early season cool weather crop, unprofitable recently
Pumpkins	Extension agents and farmers' rankings	Traditional crop, late season revenue source, purchasers require high uniformity, costly to transport
Strawberries	Ranked highly by a few extension agents and horticultural experts, purchasing agents interested	Early season revenue source, cool weather crop, positive horticultural trials, not grown on a large scale in region, delicate post harvest handling
Sweet Corn	High desirability by purchasers and well ranked by extension agents	Experienced growers in the region, less labor intensive, also highly perishable, susceptible to disease, very high quality standards required for large markets
Vine Ripened Tomatoes	Ranked high in all surveys	Traditional crop with experienced producers in the region, very high quality standards, often marketed to chains through repacking firms, costly to produce, requires intensive labor

Asparagus is the only crop selected that can be characterized as a specialty item. Its selection was derived from strong horticultural expert recommendations based on successful field trials and the high perishability of the product. The high perishability gives the local producers an advantage over California growers in reducing the time it

takes from harvest to being placed on a regional supermarket shelf. It is also an early season revenue producer which may be critical to the optimal utilization of the facility.

B. Selected horticultural product budget data

Horticultural budget data was compiled and analyzed from a series of different sources for use in the market window and profitability analysis. The purpose of compiling this data was to obtain reliable yield estimates and cost of production data for the above selected horticultural commodities. These data will be used in the financial analysis section below to establish the profitability of the selected crops and determine the feasibility and optimal crops for the shipping-point market.

The major source of budget data used in the Southwestern Virginia region is the *45 Selected Costs and Returns Budgets for Horticultural Food Crops* (1994) produced by Virginia Tech and Virginia Cooperative Extension. These budgets were to be updated with yield data from additional out-of-state experiment stations located in similar geographic regions in Tennessee and North Carolina. An attempt was also made to collect cost of production data from regional producers to verify the budget data.

Due to the limited horticultural production in the region and the scarcity of large, long-term producers, very little cost of production and yield data that has been compiled by local producers exist in the region. The data that do exist contain technical deficiencies that limit their usefulness. Small producers often fail to account for all their costs such as their own labor time, tractor time, and depreciation. They also fail to distinguish between different quality grades when calculating yield data. Due to these factors, farmer budget data and yields were judged to be insufficiently reliable to be incorporated into the budgets used.

There was a general consensus between county extension agents and horticultural experts that the most reliable set of existing budget data is the above mentioned Virginia Tech horticultural budgets (1994). These budgets are appropriate to the region because most of the data were compiled from the Virginia Tech experimental station in Blacksburg. Blacksburg is located in Montgomery County, which is part of the ninth congressional district and a good representation of the Southwestern region. Virginia Tech horticulturists stressed that the budget data, which were constructed for the entire state of Virginia, are actually best suited for the Southwestern region because of the geographic and climatic similarities between Blacksburg and the Southwestern Virginia counties.

Due to the applicability of the Tech budgets to the region, the lack of appropriate data from local producers, and the similarities between the Virginia Tech budgets and those of North Carolina, the Virginia Tech budgets were predominantly used as the source of cost of production and yield data for the analysis in this report.

The budget data utilized includes cost of transportation and field packing/grading. However, the profitability analysis in this section must be termed preliminary as the packing/grading costs in the budgets are for farmer fields . In phase II of the study, realistic estimates of facility processing costs will be incorporated. Additionally, no costs have been included for migrant housing or provisions. These costs vary greatly depending on the type of housing, such as on-farm trailer versus hotel room, and the form of feeding the workers. Therefore, the expected profits presented should be reduced by the cost of providing room and board for the migrant workers.

The key figures from the budgets used for financial analysis of the selected crops are presented Table 22. The budgets for these selected crops are presented in full detail in Appendix IV.

Table 22. Summary of horticultural budgets.

	Green Beans	Fall Bunch Broccoli	Irr. H.D. Green Bell Peppers	Fresh Cucumbers	String Weave Tomatoes
Unit	bushel	box	box	bushel	box
Yield	250	500	800	300	2,000
Hrs Labor	147	100	200	227	510
Cost $/Acre	$2,624	$3,219	$4,549	$3,679	$10,203
Unit Cost	$10.50	$6.44	$5.69	$12.26	$5.10

	Sweet Corn	Pumpkins	Asparagus	Green Cabbage	Strawberries
Unit	dozen	each	pound	crate	quart
Yield/Ac	1,400	2,400	8,712	800	6,200
Hrs Labor	234	280	178	278	115
Cost $/Acre	$3,629	$3,456	$1,845	$4,772	$7,480
Unit Cost	$2.59	$1.44	$.09	$5.96	$1.01

C. Market-window analysis

Preliminary profitability for the selected crops, is determined by using secondary price data for 1992-1994 from terminal markets encompassing the region. The price data are from the terminal markets in Atlanta, Georgia; Baltimore, Maryland; Cincinnati, Ohio; and Columbia, South Carolina. Terminal market average prices are used as a proxy for the prices paid to farmers at the large distribution points located closer to the study region.

The proposed shipping-point facility must be able to service terminal markets. Terminal markets will provide an outlet for sales when production surpasses demand by the supermarket purchasers. Terminal markets may also be utilized frequently in the

initial years while the shipping-point facility develops the market as a reliable supplier and establishes a favorable reputation. Although the volume of produce being moved through terminal markets is decreasing, they remain important for establishing prices around the country. An increasing number of purchasing agents are using on-line computer services to obtain terminal market prices to be used in bargaining with suppliers.

The budget data utilized includes cost of transportation and field packing/grading. However, the profitability analysis in this section must be termed preliminary as the packing/grading costs in the budgets are for farmer fields . In phase II of the study, realistic estimates of facility processing costs will be incorporated.

Interpretation of prices from terminal markets is complex. Prices at terminal markets are given in broad ranges and produce prices at the same terminal market vary substantially depending on the source of the produce.[15] Where prices were given in ranges, the average price was used for calculating the market-window analysis. For use in the market window analysis, three specific prices were calculated: they are:

- the high price averaged across all terminal markets,
- the average price across all terminal markets, and
- the low price averaged across all terminal markets.

These prices reflect high, average, and low quality produce within a given product category. For example the prices of large "Number 1" tomatoes include all of the above prices, but do not apply to different levels of product classification (such as "Number 2" tomatoes). It must be stressed that these are price-defined quality differences, as terminal market data do not indicate physical factors

[15] Based on expert opinion, an 18% commission was deducted from terminal market price to derive the prices that farmers receive for supplying the produce.

contributing to the price variations within specific categories. Two types of analysis were conducted to determine product profitably:

- expected profit per acre at each price level for the entire feasible marketing period, and
- expected profit per acre at each price level for the optimal marketing period.

The information is presented in Tables 23-25 and graphically in figures 2-11.

Tomatoes rank as the most profitable crop during the last three years for which price data was available. Table 23.A, indicates that an average profit per acre for top quality tomatoes that could have been expected at any time during the feasible harvesting period (July 10-October 1), was $12,589. Contrasting Table 23.B with Table 23.A, if top quality tomatoes were sold at the precise moment when the market prices peaked (August 21-30), a per acre profit of $15,015 would have been obtained.

To interpret Tables 23-25 the following example is provided. Using cabbage (Tables 24.A and 24.B) as an example, the average profit per acre that could have been expected, for the highest quality product, averaging the entire feasible harvesting time was $1,022. This compares to a $500 and $4,678 loss per acre, if the product was considered average or low quality respectively, by terminal market standards. If cabbage were sold at the peak market period (June 1-7), the average expected per acre profit (or loss), for highest, average and low quality produce are respectively, $2,448, $334, -$4,674.

Table 23. A) Crop profitability ranked by high price for feasible harvest dates.

Crop	High	Average	Low	Feasible Period
Tomato	$12,589	$5,459	($804)	July 10-Oct. 1
Asparagus	$6,516	$4,675	$3,233	April 15-June 15
Cucumber	$4,782	($824)	($2,691)	July 25-Oct. 1
Bell Peppers	$3,908	$1,535	($14.67)	July 15-Oct. 1
Strawberry	$3,383	$2,048	$163	May 15-June 15
Pumpkin	$2,448	$1,464	($3,353)	Sept. 1-Oct. 30
Broccoli	$2,110	$898	($3,123)	Sept. 1-Nov. 1
Green Bean	$1,219	($155)	($1,203)	June 15-Oct. 1
Cabbage	$1,022	($500)	($4,678)	May 10 - Oct. 30
S. Corn	$556	($564)	($1,541)	June 20-Oct. 1

Table 23.B) Crop profitability ranked by high price for optimal harvest date.

Crop	High	Average	Low	Best Harvest Date
Tomato	$15,015	$7,344	($360)	August 21-30
Asparagus	$8,649	$5,383	$3,750	June 7-15
Bell Peppers	$5,944	$2,802	$696	July 15-30
Cucumber	$5,744	($209)	($3,653)	July 21-30
Pumpkin	$4,416	$3,432	($3,368)	Oct. 21-30
Strawberry	$3,891	$2,541	$502	June 1-15
Broccoli	$3,340	$1,737	($3,118)	Sept. 14-21
Cabbage	$2,448	$334	($4,674)	June 1-7
S. Corn	$2,093	($185)	($1,519)	July 7-14
Green Bean	$2,090	$362	($678)	June 15-30

Table 24. A) Selected crop profitability ranked by average price for feasible periods of production.

Crop	High	Average	Low	Feasible Period
Tomato	$12,589	$5,459	($804)	July 10-Oct. 1
Asparagus	$6,516	$4,675	$3,233	April 15-June 15
Strawberry	$3,383	$2,048	$163	May 15-June 15
Bell Peppers	$3,908	$1,535	($14.67)	July 15-Oct. 1
Pumpkin	$2,448	$1,464	($3,353)	Sept. 1-Oct. 30
Broccoli	$2,110	$898	($3,123)	Sept. 1-Nov. 1
G. Bean	$1,219	($155)	($1,203)	June 15-Oct. 1
Cabbage	$1,022	($500)	($4,678)	May 10 - Oct. 30
S. Corn	$556	($564)	($1,541)	June 20-Oct. 1
Cucumber	$4,782	($824)	($2,691)	July 25-Oct. 1

Table 24.B) Best period of production (ranked by high average).

	High	Average	Low	Feasible Period
Tomato	$15,015	$7,344	($360)	August 21-30
Asparagus	$8,649	$5,383	$3,750	June 7-15
Pumpkin	$4,416	$3,432	($3,368)	Oct. 21-30
Bell Peppers	$5,944	$2,802	$696	July 15-30
Strawberry	$3,891	$2,541	$502	June 1-15
Broccoli	$3,340	$1,737	($3,118)	Sept. 14-21
Green Bean	$2,090	$362	($678)	June 15-30
Cabbage	$2,448	$334	($4,674)	June 1-7
S. Corn	$2,093	($185)	($1,519)	July 7-14
Cucumber	$5,744	($209)	($3,653)	July 21-30

* See text for details concerning price categories

Table 25.A) Selected crop profitability ranked by low price for feasible period of production.

Crop	High	Average	Low	Feasible Period
Asparagus	$6,516	$4,675	$3,233	April 15-June 15
Strawberry	$3,383	$2,048	$163	May 15-June 15
Bell Peppers	$3,908	$1,535	($14.67)	July 15-Oct. 1
Tomato	$12,589	$5,459	($804)	July 10-Oct. 1
G. Bean	$1,219	($155)	($1,203)	June 15-Oct. 1
S. Corn	$556	($564)	($1,541)	June 20-Oct. 1
Cucumber	$4,782	($824)	($2,691)	July 25-Oct. 1
Broccoli	$2,110	$898	($3,123)	Sept. 1-Nov. 1
Pumpkin	$2,448	$1,464	($3,353)	Sept. 1-Oct. 30
Cabbage	$1,022	($500)	($4,678)	May 10 - Oct. 30

Table 25.B) Selected crop profitability ranked by low price for best period of production.

Crop	High	Average	Low	Feasible Period
Asparagus	$8,649	$5,383	$3,750	June 7-15
Bell Peppers	$5,944	$2,802	$696	July 15-30
Strawberry	$3,891	$2,541	$502	June 1-15
Tomato	$15,015	$7,344	($360)	August 21-30
G. Bean	$2,090	$362	($678)	June 15-30
S. Corn	$2,093	($185)	($1,519)	July 7-14
Broccoli	$3,340	$1,737	($3,118)	Sept. 14-21
Pumpkin	$4,416	$3,432	($3,368)	Oct. 21-30
Cucumber	$5,744	($209)	($3,653)	July 21-30
Cabbage	$2,448	$334	($4,674)	June 1-7

* See text for details concerning price categories

Figure 2. Market window analysis for tomatoes.

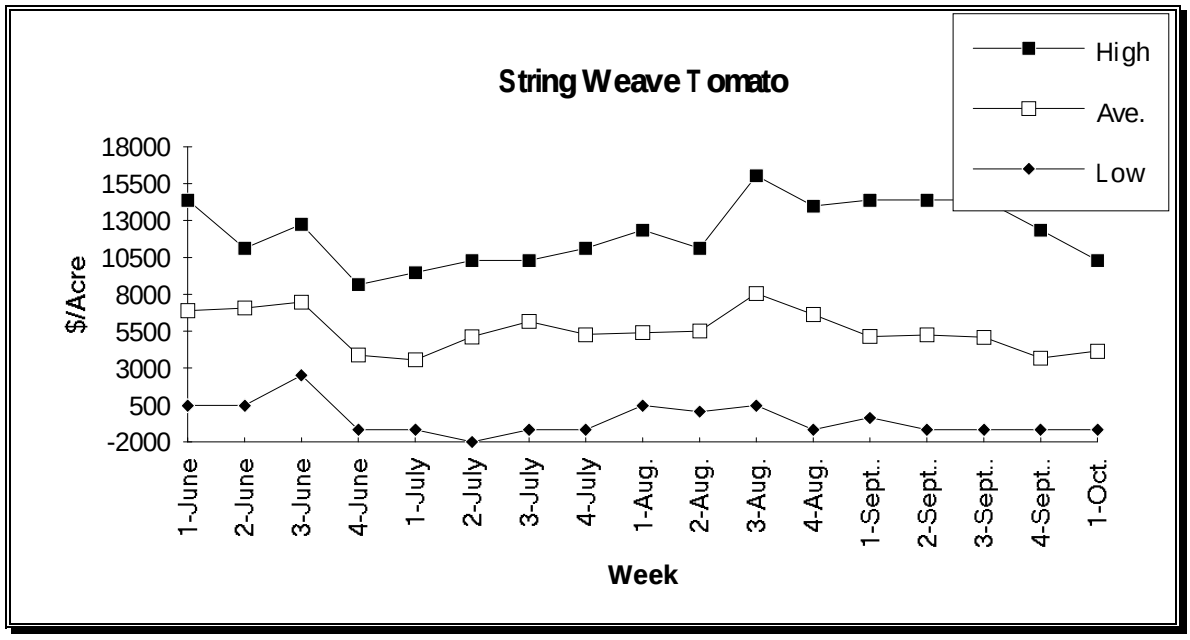


Figure 3. Market window analysis for peppers.

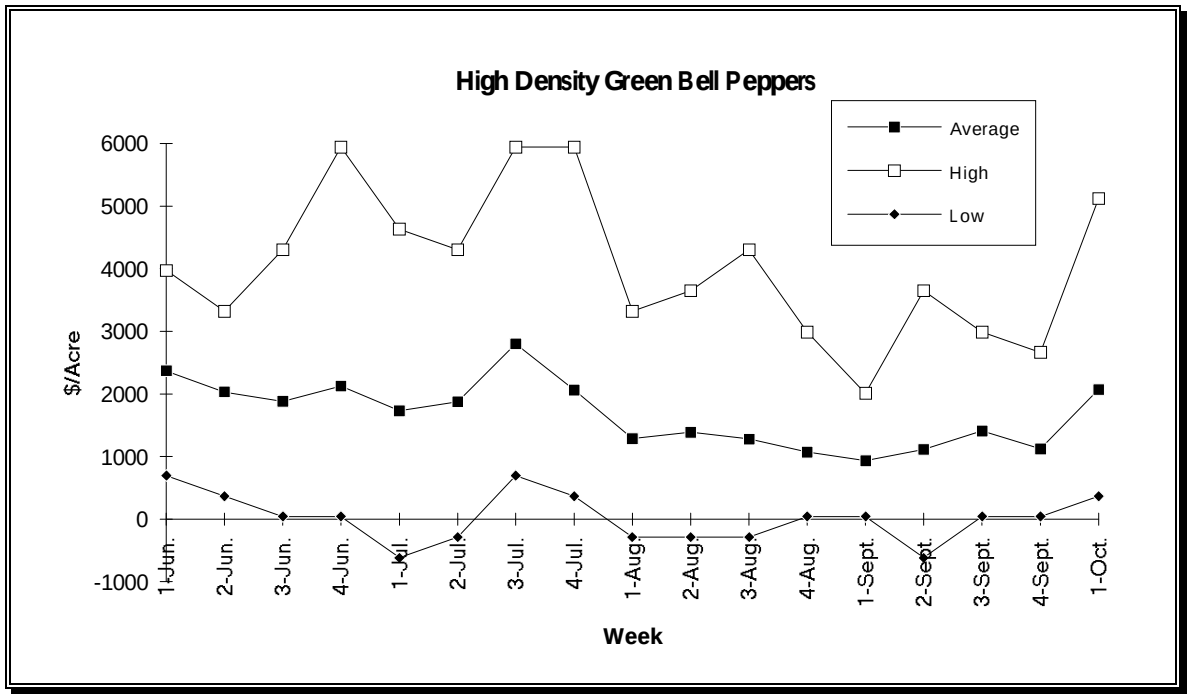


Figure 4. Market window analysis for pumpkins.

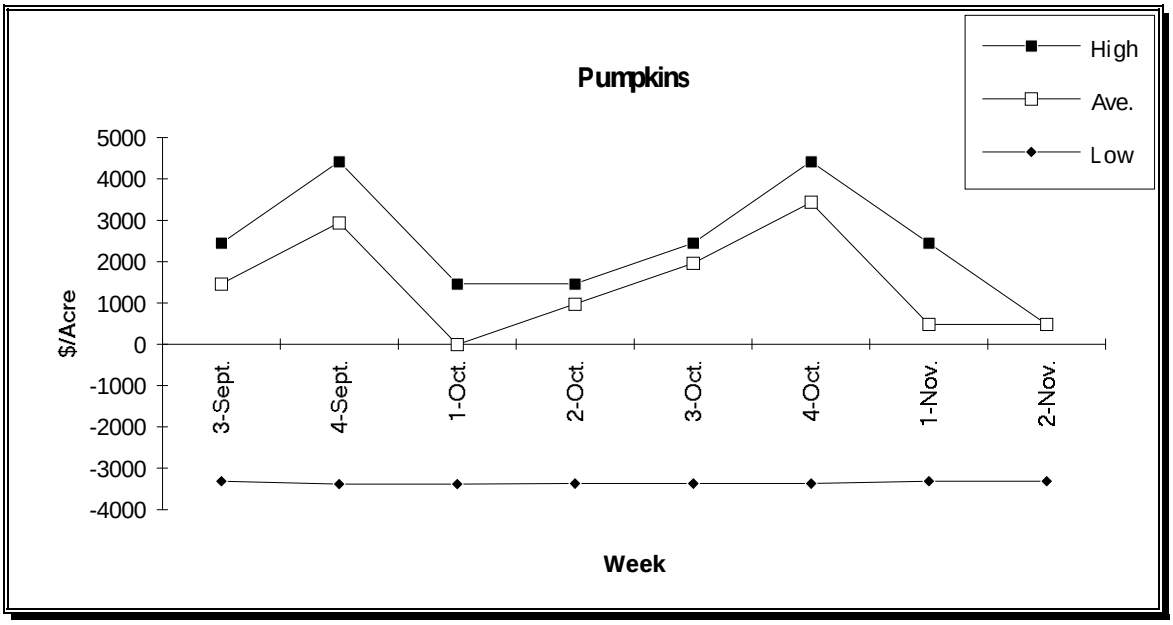


Figure 5. Market window analysis for strawberries.

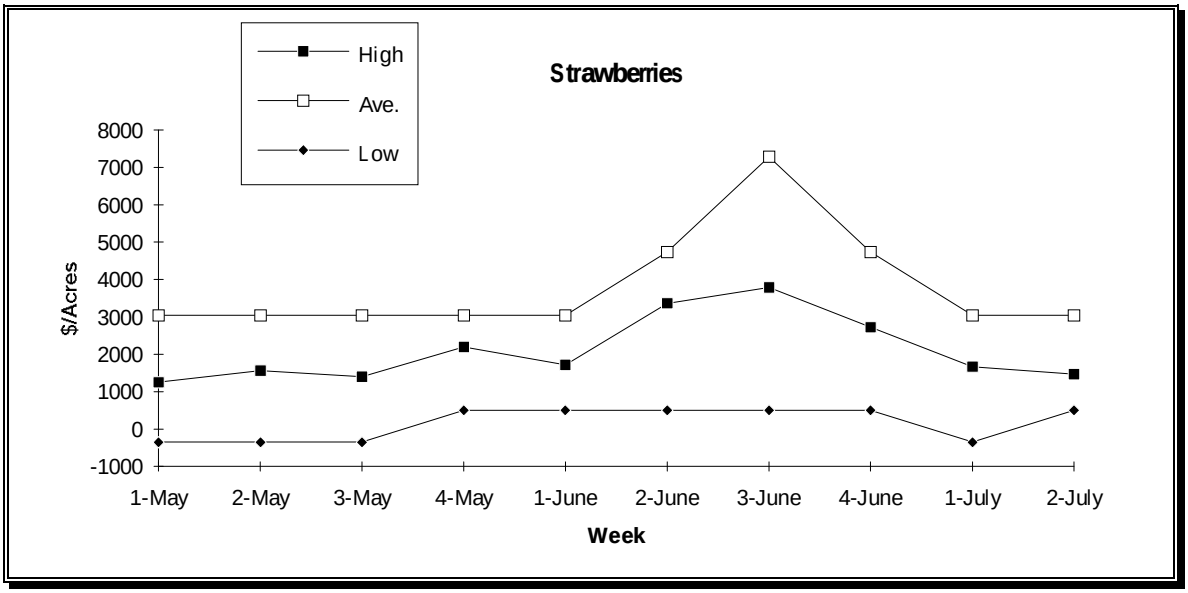


Figure 6. Market window analysis for cabbage.

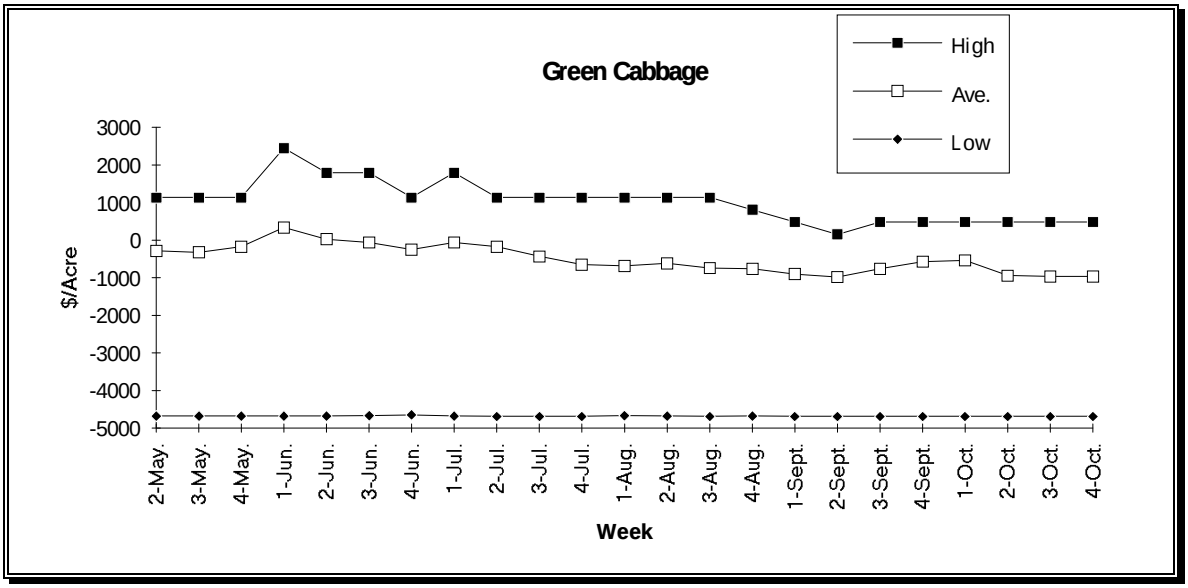


Figure 7. Market window analysis for cucumbers.

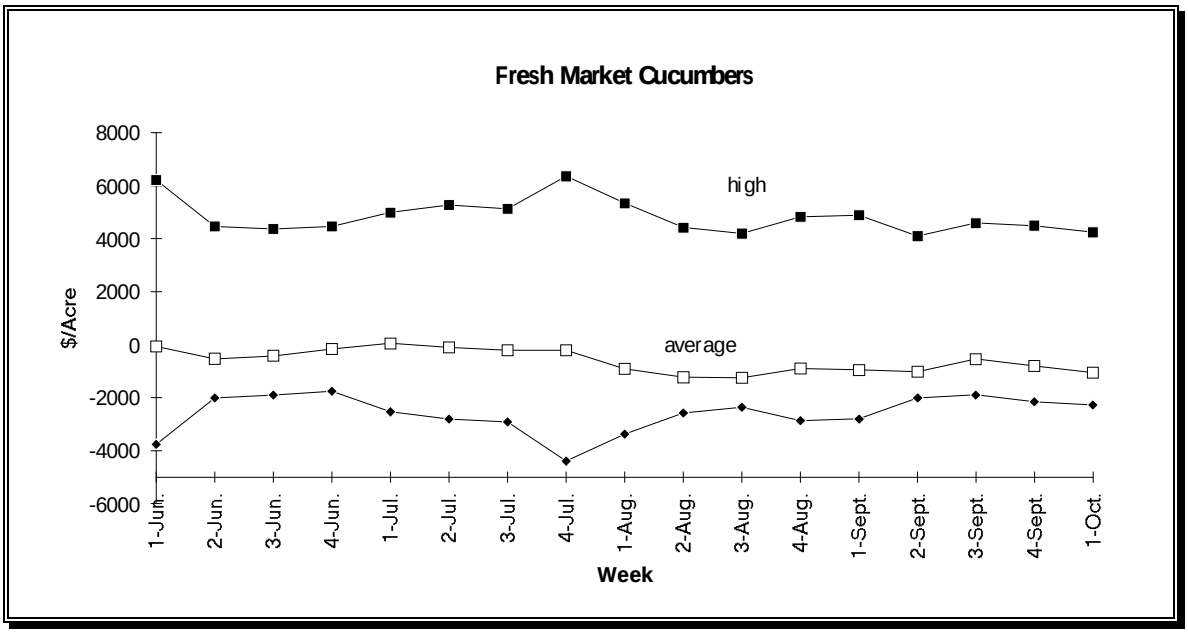


Figure 8. Market window analysis for green beans.

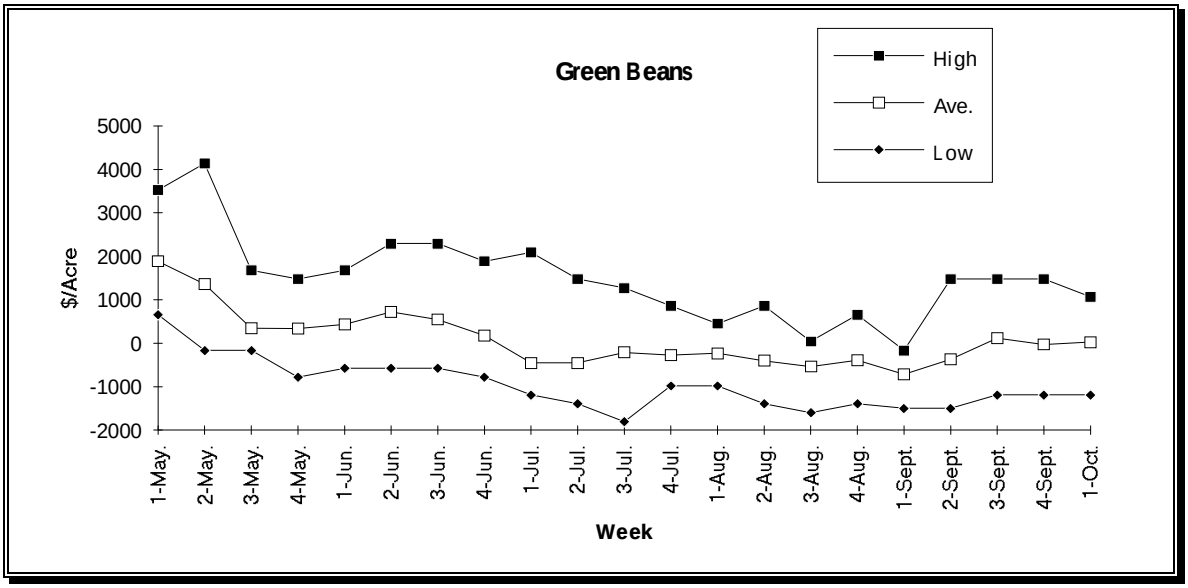


Figure 9. Market window analysis for asparagus.

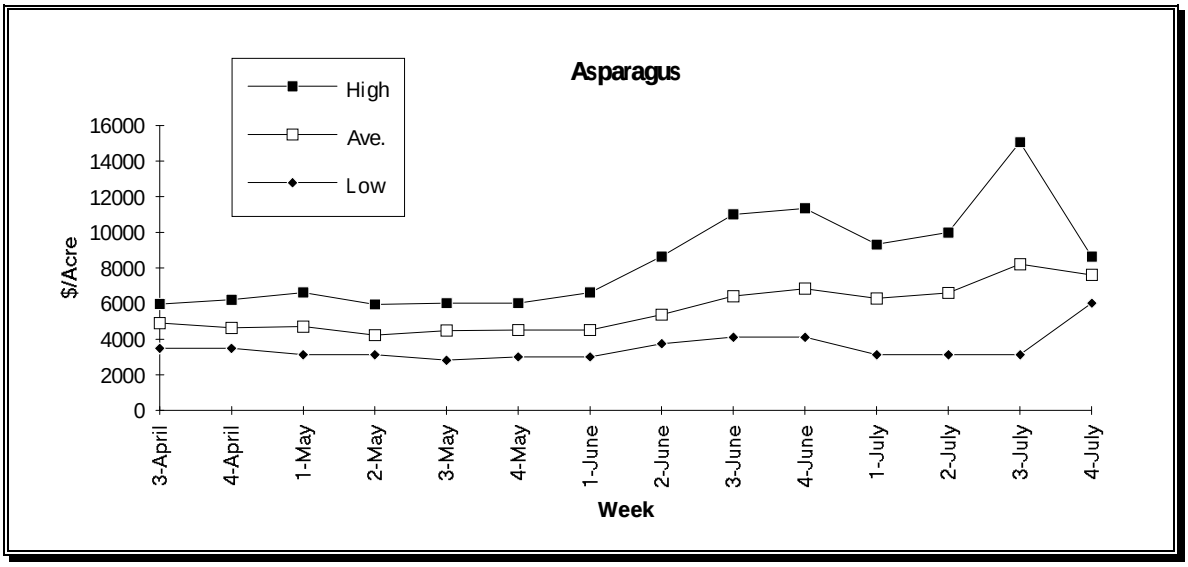


Figure10. Market window analysis for broccoli.

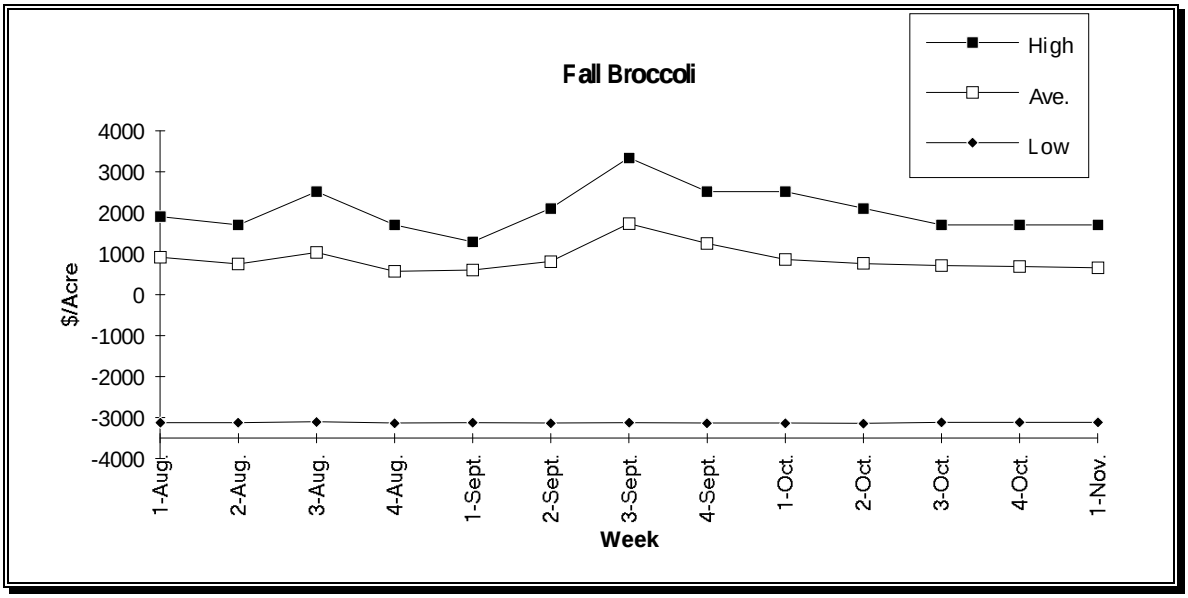
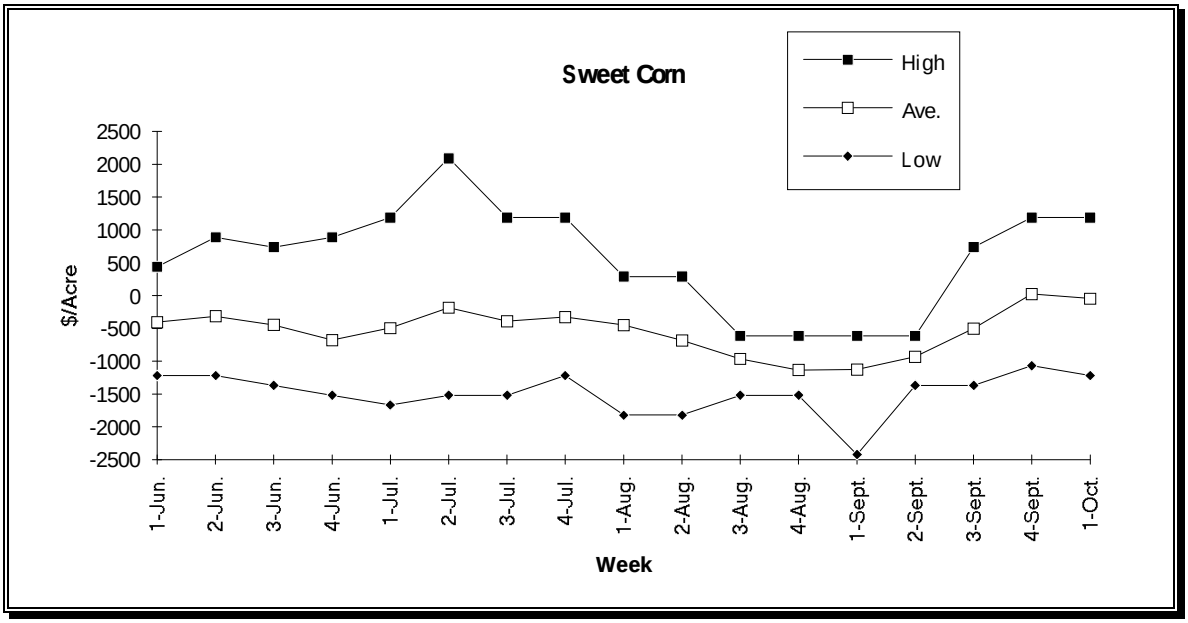


Figure 11. Market window analysis for sweet corn.



1. Evaluation of product profitability

The profitability analysis reveals the potential success of the proposed shipping-point facility and explains the current low profits for horticultural products reported by farmers. At the high quality terminal market prices, all selected crops are very profitable. These are the prices that could be obtained by a well-functioning shipping-point market, given the growers' ability to produce top quality produce. At low quality prices, all crops are unprofitable or only marginally profitable. Currently, most growers in the region are producing a product which falls into the average or low quality level and hence are not very profitable.

The selection of optimal crops to be marketed through the shipping-point market facility cannot be based solely on the quantitative results obtained from the profitability analysis. Further selection depends on a myriad of factors beyond profitability. Many of these additional factors that must be considered have been outlined in the extension agent, farmer, and purchasing agent surveys and include: grower experience, agricultural suitability to the region, potential for producing large volumes, the ability to manage labor, irrigation, initial investment by growers, purchasing agent interest, etc.

A preliminary ranking of selected potential crops is presented in Table 26. The highest rated crop is tomatoes with a net profitability of $12,589/acre for high quality produce. The downside to tomato production is the greatly reduced price for anything rated less than "Number 1" quality, which requires considerable farmer attention to achieve. The large amount of labor that vine-ripened string tomatoes require, in effect means hiring additional labor. Tomatoes may also be more difficult to market to the large supermarket chains. The chains tend to purchase tomatoes through repacking firms which pay growers lower prices. The market-window analysis reveals that tomatoes at high and average quality are profitable for the entire growing season with a rise in price toward the end of the season.

Green bell peppers are ranked second. They are less profitable than tomatoes at $3,908 per acre for high quality at peak market demand; they are however, also less risky.

Large chains and distributors are aware of the regional quality of several varieties of peppers, and expressed a willingness to purchase directly from the producers rather than through repacking firms. Market-window analysis reveals profit for peppers throughout the feasible production period with peak prices in mid July and late October.

Pumpkins not only ranked high in all surveys, they also are found to be profitable with a return of $2,448 per acre. Pumpkins are an atypical crop, because of high demand for only a small portion of the year, and highly subject to high quality standards at the level of large purchasing organizations. They are not a primary crop with which to base a shipping-point market because of the seasonal demand, but given a relationship with large purchasing agents (based on other products), they could be very profitable and keep the facility utilized late into the growing season. Market-window analysis reveals that peak demand is just before Halloween for high and average quality pumpkins. Low quality pumpkins are not profitable.

Strawberries yield a return of $3,383 per acre. They are difficult to produce, highly sensitive to quality standards, and need immediate cooling (Peirce 1987). The region does not currently have a reputation for high quality strawberries. A benefit to strawberry production would be early utilization of the facility. The market-window analysis reveals that highest prices are found latest in the feasible production period. The increase in strawberry prices occurs because of the early spring ripening of the perennial crop and a decrease in supply in the later months.

Green cabbage, currently the most widely produced horticultural product in the region, is moderately profitable at high quality levels during peak market demand ($2,448 per acre). It is however, very unprofitable at lower quality levels, and certain months of the year (a problem the region is currently experiencing). Cucumbers are a highly profitable crop for high quality levels, but again are risky since they are unprofitable at low quality levels. Similarly, broccoli and sweet corn are highly profitable at high quality levels, but extremely unprofitable at low quality levels. Furthermore, the major

producing states have a very good reputation that would be hard to compete with, and sweet corn is difficult to produce at high quality levels. Green beans are only moderately profitable at high and average prices.

Table 26. Crop Evaluation and Selection Basis.

Rank/Crop	Selection Basis and Comments
1. Vine Ripe Tomato	Highest profit (for all examined prices), main problems will be quality and marketing to chains through repacking firms
2. Green Bell Pepper	Medium profitability with low risk, broad local knowledge and high willingness by large chains to purchase directly
3. Pumpkin	High profit but risky for low quality, not a core crop to run the facility but complementary with core crops to keep the facility in use late in the season
4. Strawberry	High profit but risky due to limited local knowledge, could become a key early season crop for facility utilization
5. Green Cabbage	Low profit but broad regional experience means the potential for increasing crop value, also allows for early facility utilization
6. Cucumber	Highly profitable for high quality, but very unprofitable for low and medium quality.
7. Green Bean	Medium profitability for high price, could also allow early facility utilization
8. Asparagus	High profit crop with limited local knowledge and reputation, initially difficult to convince farmers to grow and purchasers to buy
9. Broccoli	Good profitability for quality product but high losses for low quality product, purchasing agents were mixed on acceptance
10. Sweet Corn	Moderate profit for high quality but very risky to produce

Asparagus is a highly profitable product at all quality levels. It is an early season crop which would allow for early utilization of the facility. Although ranked high on a strictly quantitative basis, the region has no reputation for asparagus and it was not mentioned by the farmers and purchasing agents. Asparagus should not initially be a central crop around which to establish the facility, because of its unknown demand, but it is a crop with high profit potential that should be considered after a well-functioning market is established.

V. Shipping Point Market Organizational Issues

A. Assistance needed to establish the shipping-point market

Large scale horticultural production in Southwest Virginia broadly falls into a situation that economists term a "market failure." This is where a profitable private market activity is deterred by market constraints that individual firms cannot overcome. For large-scale horticultural production in Southwest Virginia, there are underlying factors that lead to market failure.

The region is characterized by small farm size due to hilly terrain and existing agricultural patterns. Typical growers in the region generally do not exceed 15 acres of production. This small production size results in high costs per unit of gathering information concerning market requirements and standards. Furthermore, markets are becoming increasingly complex with detailed knowledge of requirements becoming more critical all the time. The small size of the farms and the limited acreage that individual farmers can produce, prevent growers from investing time and resources toward gathering the information that is needed to learn the market requirements that would bring higher prices.

Another inhibiting factor related to the small size of producers is the high cost of purchasing adequate grading and packing machinery for individual growers. Small growers sharing equipment would make the purchase of the equipment less costly. However, this sharing entails the additional costs of communication, travel and coordination of the activities of a large number of growers, which may outweigh any financial benefits from sharing the equipment.

In the study area, individual producers, or even a small group of producers, do not have sufficient acreage with irrigation to produce the volume of product required to be a

regular supplier of the large produce purchasing firms. To meet both volume requirements for purchasers, and to achieve economies of scale, a considerable number of growers need to be engaged in production to serve the shipping-point market. Coordinating such a large group of independent growers would entail high transaction costs, such as costs of communication, distribution and disseminating information. This cost of coordination would be necessary because all growers must produce selected crops with uniform high standards for harvest at the same dates, in order to service large purchasers.

The smaller acreage per grower makes private sector investment in working with growers expensive and risky. In Southwest Virginia, a private firm that engages contract growers or maintains a close relationship with its growers, would need to expend greater resources to coordinate the growers in order assure the production of the minimum required volumes. Risk is also increased for investing firms as small growers, due to their lower investment, are more likely to switch crops based on short term market swings. This swing has historically occurred in the region and partially accounts for past vegetable cooperative failures in Smyth and Halifax counties.

This situation places regions like Southwest Virginia at a competitive disadvantage with larger production areas. However, this competitive disadvantage is not based on the fundamentals of cost of production or location, as the profitability analysis demonstrates. It is the combination of the factors mentioned above that makes achieving large volumes of produce for the individual grower nearly impossible.

This situation of a market failure constraint, but with underlying profit potential, establishes the need for outside government intervention. If a sufficient number of growers can be organized and coordinated in a manner that permits them to produce a homogeneous product that meets all market requirements, the region's growers will be able to compete with the large out-of-state firms that currently supply the region with fresh produce. The role of government assistance in the successful establishment of the

shipping-point market, will be to provide the means for overcoming the regional barriers to organizing the numerous small growers into an individual, cohesive unit, capable of meeting market requirements.

Government support in education will also be crucial to the establishment of the shipping-point market. Many growers in the region are following similar production and marketing techniques that the generations before them practiced and there is an opportunity to enhance their skills in these areas. Further, a detailed feasibility study will greatly assist growers in their decision to engage in new horticultural production activities.

In summary, there is a role for a one time infusion of financial support by the government, that will help the region's growers to overcome the current barriers that prevent them from competing with out-of-state producers. This one time investment should be used to overcome the lack of the marketing infrastructure in the region, the costs of organizing, coordinating, and training a large number of disperse growers, and the costs of obtaining the necessary information on potential markets, market requirements and standards necessary to becoming a consistent supplier.

B. Potential organizational structure of shipping-point market

There are various possible organizational structures that the shipping-point market can assume in order to serve the needs of the local growers. The key to the success of the market, is to determined which structure would be best at assisting the growers to organize themselves into a cohesive group, capable of complying with the purchasing agents' requirements and standards. The actual physical nature of the shipping-point market should not vary based on the chosen organizational structure. The role of the physical plant is to provide a series of services consisting of storage, grading, packing,

cooling, and distribution of the final product. The physical structure will be based on general economic engineering models for facilities of this nature.

The other role of the shipping-point market, beyond its physical role mentioned above, is to act as a centrally located base of operations, that takes on the duties of organizing and coordinating the large number of participating producers. This is the role we will examine below. The physical nature of the plant is a relatively fixed operation and should not deviate much with different forms of ownership. However, different organizational structures can vary greatly, and determining the optimal structure, that could best organize, educate, and coordinate the producers, is the principal determinant in the success of the shipping-point market project.

The two main institutional arrangements are, ownership by a private firm, and ownership by an association of local producers. Below we will compare and contrast the strengths and weaknesses of both options. The main objective that should be looked at when deciding between the two organizational structures is to determine which one will bring the greatest benefits to the producers and therefore the region.

1. Private firm ownership issues

A single private firm, purchasing produce directly from growers and packaging and marketing through the shipping-point facility to larger retailers, would have the greatest incentive to be efficient. Hence, it would be in a position where in order to make a profit, it would have to produce a high quality product that is competitive with the product being produced from the larger producing states.

There are a number of potential drawbacks to the single firm organizational structure. A private firm might find itself as the sole large-scale produce purchaser in the region. As sole purchaser, the single firm could exercise monopsonistic power reducing the grower's price. This type of monopsonistic power is especially common in markets

that deal with perishable produce. An example of this monopsonistic behavior may be occurring in Carroll County, where the cabbage growers have a single principle purchaser, who they claim is exercising monopsony power (*Roanoke Times* August 27, 1995).

To minimize the possibility of market power, multiple firms could be attracted to rent space at the shipping-point market facility. However, renting to multiple firms may result in firms that are individually too small to be competitive in the large markets, as has occurred at the Hillsville Farmers Market, where small wholesalers at the facility only serve smaller regional outlets. Multiple firms competing amongst themselves for local produce may assure a higher price for the local producers, but they will be under no obligation to purchase locally and create an incentive for local growers to improve their production techniques. As in the case of the Hillsville Farmers' Market, the majority of the produce that arrives to the docks at Hillsville, has been shipped in from outside the state, and very little new production has been stimulated since the construction of the market.

Another issue with private firm ownership is the cost of coordinating individual growers to produce a homogeneous product. As noted above, this coordination constraint has limited the scope for private firm entry. A private firm may demand the establishment of the shipping-point market and an initial demonstration of producer capability before it would be willing to invest in the physical structure of a shipping-point market. The greatest challenge to coordinating the local producers may be in the initial stages of the project. During the initial stage, a large number of disperse growers will have to be assembled, educated, organized, and trained to produce a high quality, homogeneous product. It may be difficult, if not unrealistic, for a private firm, with goals and objectives different from those of the local producers, to efficiently organize the growers in a manner that is best suited for the benefit of the growers.

While overcoming this difficulty of organizing the growers and the conflicting objectives in the initial stages of the project, it may be feasible for a firm to come in and take over the operation once the producers have organized themselves, proved they are capable of producing a high quality product, and established a favorable reputation for themselves in the market place.

2. Grower owned systems

A second type of organizational structure would be one in which growers are involved in the ownership and decision making of the shipping-point market. A benefit of this type of structure is that it would allow the producers to capture a greater percentage of the profits (Harstin 1994). Another benefit to this structure is that growers, due to their dual role as owners and product marketers, would have greater incentive to coordinate production to reduce transaction costs and meet markets requirements.

A drawback to self-ownership is that there have been several previous failures of cooperatives in the study region. The farmer survey indicated a mixed response to the use of cooperatives, with 52 percent of interested producers expressing willingness to market through a cooperative. Regional experts noted a variety of reasons for the failure of cooperatives, including internal conflicts regarding fair treatment, lack of managerial expertise, lack of farmer commitment, and coordination of many individuals with different goals and objectives.

Incorporating a large number of individuals into a democratic decision-making process tends to be costly, time consuming, and often inefficient. Logistical difficulties may be created when decisions have to be made quickly. Incorporating producers in decisions not directly related to their field of expertise, such as marketing, distribution and other activities related to operating a shipping-point facility, often leads to sub-optimal solutions.

To minimize the effects of these problems, strong cooperative management and a strategy-oriented role for the board of directors is necessary (Harstin1994). Examples of functioning vegetable cooperatives effectively serving as shipping-point markets exist in Cumberland County, Kentucky and on Virginia's Eastern Shore. These cooperatives could be used as model for similar operations in Southwest Virginia.

3. Government owned organizational structure

During the initial three years of this project, the shipping-point facility may have to be fully subsidized by government funding. The government funding will be used to overcome the existing barriers to initiating the operation, including: the costs of gathering information, organizing the growers, and purchasing the physical market infrastructure.

After the initial constraints have been removed, the shipping-point market must prove to be a profitable, self sustaining operation, that can continue to function under its own volition. At this point, there will be no further role for the government to play, and the market will have to be sold or transferred, to a private investor or group of investors.

4. Comments on organizational structure

The establishment of an effective grower organization is the key requirement for any potential structure to be successful. The role of this organization should be to reduce transaction costs and provide credible commitments to establish the reputation and profitability of the shipping-point market. Regions such as Southwest Virginia need to develop new and effective models of joint cooperation between growers and private shipping firms in order to participate in the profitable vegetable markets.

C. Key management functions

Regardless of the ultimate organizational structure, there are several management functions that need to be filled. It is critical that these functions be stressed during the initial phase of the project in order to establish the basis for a sustainable, efficiently-operated shipping-point market in the future.

Horticultural product selection

Management must select the horticultural product mix to be sold through the shipping-point market. Farmer input is crucial to this decision, but the shipping-point market cannot simply market all the crops farmers desire to produce. Management must make the final selection of crops as it would be in a position to coordinate market demand with grower capabilities, interests and capacities. Once management has selected its product mix, a large number of producers must sign a contract agreeing to plant these commodities, to follow a strict set of agricultural procedures, and to market the final product through the shipping-point facility.

Educational /informational role

Grower skills and awareness of market requirements must be addressed. Initially this education and training will require the joint efforts of the shipping-point market management and cooperative extension agents. The development of detailed production guides ("packages") for selected crops is critical. All technical information necessary to ensure that growers are able to meet required market standards should be specified in easy, step-by-step procedures within these production guides.

Production coordination

In order to more closely estimate volumes to be produced for distribution by the market, a pre-planting contract should be signed between growers and management. This contract should specify the minimum, and if necessary, a maximum acreage, the grower will market through the facility. This information will permit management to estimate volumes for distribution, to market to appropriate organizations, and to assure meeting its commitments. Meeting commitments is crucial to establish a favorable reputation and the ability to command higher prices in the future.

Quality control

One of the predominate roles of management, as well as one of the most controversial, will be that of quality control. Large purchasing agents have a number of possible suppliers and are very demanding. Quality is defined by the purchasers and the shipping-point produce must meet these standards.

A shipment of low quality produce can ruin the reputation of a supplier. Purchasing agents repeatedly stressed that they did not want to have to carefully inspect produce, but preferred to rely on the supply firm's reputation. The major reason for this emphasis on reputation is the difficulty and cost of inspecting large volumes of produce. With the trend toward larger and more competitive markets, supplier reputation is becoming increasingly important.

The establishment of reputation takes time and considerable effort, and the initial returns are generally low. Only after a good reputation is acquired can higher returns to quality be expected. Creating a reputation for quality makes the establishment of the shipping-point market more difficult, but growers must realize they will face a rising price curve if they can produce high quality.

Management will have to ensure quality levels. It must not attempt to market any substandard produce as "number 1" quality. Therefore, it must enforce stringent quality standards on the producers, refusing to accept any produce that does not meet purchasing agent standards. Due to these stringent standards, growers may produce large amounts of "Number 2" quality product during the initial years of operation. It is important that the shipping-point market grade the produce accordingly, and when possible, try to market the "Number 2" quality products to processors who may have less stringent color and size requirements. Insisting on a quality standard often causes conflicts between management and producers leading to disenchanted producers withdrawing all production. Part of the educational effort must be to ensure that farmers understand that larger markets have different standards than the local outlets to which they are accustomed.

Produce Marketing

Marketing will be a major role of management. Marketing will involve contacting potential purchasers and bargaining for the best price. This activity is distinct and separate from the other managerial activities envisioned. Marketing requires great skill, and is critical that during the establishment phase a qualified broker is used. This person should be familiar with the fresh produce business and with large regional purchasing agents. Several purchasing agents noted that for establishing a reputation for handling quality produce for the shipping-point market, the employment of a known, experienced, broker would be helpful.

Ideally the manager and broker would be the same person. Initially for establishing the shipping-point market, it will be necessary to employ a production manager and an experienced produce broker. The working relationship between the two positions will have to be very close and well-defined. The responsibility of the

individuals in the two positions will be to coordinate decision-making based on production level and market demand information.

VI. Production and Marketing Scenario Issues

In phase two of the study, greater detail will be presented concerning optimal shipping-point market production and marketing scenarios. In this chapter, the major scenarios, and the key issues concerning these scenarios will be presented.

A. Product selection and diversification

One of the key issues that the shipping-point market decision makers must resolve is the choice and number of products to be marketed. Due to volume requirements, the facility will be forced to focus its efforts on a limited number of primary products. Based on the purchasing agent interviews, the shipping-point market would obtain the similar, discouraging results that individual farmers are currently achieving, if it attempts to move small volumes of diverse products. If a wide variety of products were marketed, the volumes needed to meet market requirements would not be met. Bargaining power would also be reduced. The costs of grading, packing and transport would also increase on a per unit basis.

Although specialization has its advantages, there are also benefits to diversification. Primarily, diversification could reduce risk. Marketing a diverse number of products would tend to stabilize earnings. An important type of diversification is to plant various crops in such a manner that the shipping-point market is utilized to the greatest extent possible. Planting early, midsummer and late season crops will allow the facility to generate revenue over a long period of time, which allows the facility to spread

out the cost of its operation. This has the benefit of permitting the manager and broker to work on establishing new markets based on early-season crop reputation.

The benefits of diversifying crop production and operating during longer periods of time must be weighed against the losses from trying to plant and harvest less profitable produce in the volumes sufficient to market to buyers. The degree of diversification is something the shipping-point facility management must decide, based on the commitment of farmers to produce adequate supplies.

Another important consideration is that buyers prefer to purchase certain complementary crops from a single source in order to lower transportation costs, reduce transaction costs, and limit the number of trucks arriving at their docks. A typical purchaser, for example, will choose a supplier who can provide both cauliflower and broccoli at the same time, or several varieties of pepper, rather than having to search for distinct suppliers for each specific commodity. Often the large producers grow low profit commodities such as greens, in order to complement their major cash crops. It is more cost efficient for purchasers to buy from a single source rather than to seek out other sources.

Technical considerations

Grading, packaging and cooling have become extremely sophisticated in the last few years. Large growers use modern technology that consists of color detecting lasers, specific gravity measurement, ripeness scales that provide shelf-life estimates, sweetness meters, etc.(Nonnecke 1989). The latest equipment is also extremely expensive. It would take very large volumes of produce to justify purchasing most of the latest equipment.

When purchasing more conventional grading and cooling equipment, identifying specific groups of produce that the equipment can be used for must be considered. For example, the same machinery can grade and wash both tomatoes and peppers, while

broccoli and sweet corn both require crushed ice machines. Taking into consideration the types of equipment needed when determining the product selection will be very important in order to make optimal use of the funding available.

B. Value added

The concept of "value added" refers to an increase in the price of a commodity from additional processing or alteration. Value-added activities would include grading, packaging, and processing. It will be critical to determine the optimal degree of value that should be added to selected crops at the shipping-point market. Initially, the rewards to value-added activities, beyond meeting minimum standards may be low, but as a reputation is established, returns to such activities will potentially increase.

1. Extent of grading technology

Purchasing agents emphasized the importance of high quality produce, and a product having a long shelf-life. The longer a product can stay fresh and in a marketable condition on the shelf of a supermarket, the greater its value to the retail purchasers. These two facts point out the importance of a high-quality grading system. The manager of the Hillsville Farmer's Market claims that the inability of the local growers to meet the high quality standards, and to remove the lower quality produce, is a major constraint to breaking into the larger markets. Due to the importance of grading produce, it is recommended that the highest quality grading equipment be purchased within any budget restrictions. This purchasing decision will assist the region in competing with the technologically advanced competition, and will guarantee the greatest probability of meeting the purchasing agent standards.

The other major consideration in purchasing grading equipment is the versatility of the machinery to grade various products. When choosing a product mix to market, it is important to take into consideration the capability of grading machinery, as well as packaging and cooling equipment, in order to obtain all the necessary equipment within any budget restrictions.

2. Extent of product preparation

Product preparation can be broadly defined to include everything from placing an identification label on a tomato to canning corn or making spaghetti sauce. By focusing on fresh produce, the shipping-point market will minimize the initial start-up costs, research costs, management costs, and will minimize risk by concentrating on skills that presently exist in the region.

While marketing fresh produce requires a minimum of preparation, there are still several potentially profitable value-adding activities that should be considered, particularly as the shipping-point market becomes established. Value can be added by prepackaging vegetables that are cut and cleaned to be ready for cooking. Other potential products include vegetables prepared for stir fry, plastic-wrapped tomatoes, and prepackaged salads. There was a consensus among purchasing agents that the consumer buying trend is moving toward the quick and easy-to-prepare prepackaged vegetables. Although initially the investment in equipment and infrastructure is restrictive, activities of this nature should be considered in the future.

One key factor is that purchasing agents want to keep their purchases and deliveries to a minimum, preferring to deal with single brokers who can meet all of their produce needs. For example, a purchaser will want to purchase his lettuce and prepackaged salad from the same place, or his broccoli and stir fry broccoli packs from the same supplier. Having to deal with additional suppliers complicates the purchasing

process for the buyers. This complementary product issue is an important fact to consider when deciding on what to produce and the machinery needed to prepare it.

3. Extent of Product Packaging

The major issue in product packaging is determining the benefits relative to the costs of higher quality, more costly packaging. As stressed previously, initial returns to high quality packaging may be low, but will contribute to reputation, and ultimately, to product value. Packaging may vary from sending large volume wooden crates full of produce, to individually packaging sets of four tomatoes in styrofoam and cellophane wrap.

The use of new boxes is highly preferable and in many cases obligatory, and purchasers are increasingly willing to pay to have much of the time-consuming packing, such as sticking labels on produce or wrapping sweet corn in plastic containers, done outside of their stores by the suppliers.

Local producers often attempt to lower costs by reusing old boxes and crates. In this case, the purchasing agent acts as a consumer, and frequently will purchase the most attractively wrapped produce over the less presentable packaging. Quite often boxes are shipped directly to retail outlets and loaded directly onto the shelves during business hours as consumers are making their purchases. Store managers do not want the consumer to see their stockers filling the shelves with produce taken out of an old, used, dirty boxes. They want a box that personifies freshness. It is essential that the shipping-point facility use new boxes with quality labeling in order to convince both the produce purchaser and the consumer of the high quality product inside.

Another benefit of investing in high quality packaging is that the boxes act both as an advertising tool and as a product identifier. An attractive box with the name or marketing logo of the firm, and in this case identifying it as locally grown Virginia

produce, will help to both establish a reputation for the shipping-point facility and to convince the consumer and purchasing agent of its freshness.

Supermarket chains are moving away from repackaging produce at their warehouses and are willing to pay to have the produce arrive to their docks in specified packaging, ready to be reloaded on company trucks, and distributed to their retail outlets. It is important to know exactly what each chain desires and to make modifications accordingly. Purchasing agents expressed a willingness to pay the supplier for additional costs incurred in meeting their specific standards. Poor packaging has contributed to the present failure of local purchasers to buy Virginia produce. Most supermarket chains are no longer equipped with personnel and machinery needed to repackage produce and, therefore, refuse to accept any products that do not arrive on their docks in the specified containers.

Advertising

Another issue related to packaging is the placing of PU and UPC product identification labels and the Virginia's Finest label directly on the produce, as well as prefabricated advertisements that can be placed on the display racks in retail outlets advertising the products. Some examples of these labels and signs include the labels that appear on individual apples identifying the variety as Red Delicious or Granny Smith, or watermelons that are identified as coming from Texas or Florida, or Idaho potatoes and Vidalia onions. Nearly all purchasing agents interviewed agree that their consumers have a preference for Virginia grown produce. Virginia state produce can be inspected and awarded a Virginia's Finest label. The consumer demand for this Virginia produce brings a higher price to the suppliers.

The issue of sending advertising along with the produce has been used very effectively by some, but not all suppliers. Nearly all broccoli is accompanied with "California Grown" signs advertising the product. Also, "Virginia's Finest" has become a common sight on supermarket shelves. Hand written signs have proven a much less effective way for retailers to move a product. Investing in some small, but eye-catching advertising to be sent for use by the retail outlets in marketing the produce, can be a very effective way of creating a demand for the product and establishing a reputation with the purchasing agents.

C. Time period of facility utilization

The principle issues that need to be decided with respect to the time period of facility utilization include, the benefits of a year-round operation versus the lower cost of a seasonal operation. A tradeoff might have to be made between the initial high cost of constructing a permanent structure for year round operations, versus the lower cost of renting a shell building seasonally, and the negative consequences of a seasonal operation.

The negative aspects to running a year-round operation are that the shipping-point will incur year-round operating expenses such as utilities, communication, rent, and salaries, while revenue is generated only during the harvest season. There are also several benefits accompanying a year-round operation. The non-growing season is the optimal time for management to reevaluate their activities, coordinate with extension offices and horticultural experts on preparing the coming year's production package, educate and train the farmers, take care of maintenance, and establish contacts and contracts with purchasing agents for the following growing season.

These are all essential activities that need to be carried out in order to run the operation more productively, and are very difficult to do during the busier growing season

when management is occupied selling produce, coordinating with producers, bargaining with purchasers, and coordinating labor and transportation, as well as the every day grading, packing and cooling functions of the facility. The best way to create more cash flow that can be used to sustain the operation year-round is by staggering planting and harvest times so as to use the facility during the entire spring to fall season. This season long operation can be accomplished by growing an early-season commodity such as cabbage or strawberries, a mid-summer high-volume product such as tomatoes or peppers, and a late season commodity such as a fall cool crop like pumpkins. By extending the use of the shipping point facility over a longer period of time, a cash flow will be generated that can be used to cover some of the off-season costs.

Exact volume requirements and farmer interest will be the deciding factors on whether to keep the facility operational year-round and management on the payroll during the off-season. If sufficient income can be generated to cover the costs of a year-round operation, it would be beneficial, because as outlined, the key organizational, coordination, and planning activities take place during the winter months.

The other issue is choosing between a permanently-owned structure and a rented warehouse or shell-building. Renting a temporary space has the benefit of being relatively inexpensive and affordable, especially in the first years of operation when grower interest is still unknown. The ability to relocate to another area is an additional benefit of renting a temporary space. If it is determined that grower interest is greater in a location farther away than the county possessing the rented building, then transportation costs can be minimized by relocating closer to the grower base. For relocation, it would be much cheaper to change from one leased building to another, compared to leaving a permanent headquarters for another site.

There are essential pieces of equipment that are needed to run the shipping-point market. This equipment includes the grading, packing and cooling equipment, as well as office space, loading docks, communication equipment, meeting rooms and a reception

area. Most purchasing agents pointed out that they visit their suppliers work sites. They like to inspect the cleanliness and quality of the equipment and the facilities where their produce originates. Due to these visits and inspections from purchasing agents, it is also important to have an esthetic outside appearance of the shipping-point market.

A self-owned structure can be designed to meet the supplier's specifications; it demonstrates permanence to both the purchasers and producers; it is a year-round base where planning and coordinating can take place; and any investment put into the facility will not be lost as it would be in a rented warehouse.

When choosing between the two options, the benefits of the permanent self-owned structure must be weighed against the additional costs of establishing this type of structure. For the first few years of operation, a less costly facility should be rented with the long-term objective of establishing a reputation, and purchasing a permanent building for the continued future operations of the shipping-point market facility.

D. Dual use of the facility in the off-season

This issue of using the facility for additional functions, beyond marketing local produce, is directly related to the benefits of maintaining a year-round operation. If alternative uses of the shipping-point facility can be developed that will generate an income for the facility, it will become possible to offer lower-cost services to the producers.

Two possibilities have been discussed that may help keep the shipping-point market operational year round. Using the facility as a repacking house in the off-season is a possibility. A repacking house would consist of purchasing tomatoes from winter producing states and re-packaging them into quantities and varieties desired by the retailers. Several repacking facilities exist in Virginia, so that it will not be easy to break into the market as a winter supplier, but once a reputation is established with local

purchasers, continuing to supply them through the off-season may be preferable to the purchasers and a source of additional income for the shipping-point facility.

The other possibility, is to take advantage of the shipping-point broker and warehouse space to continue off-season operations as a wholesaler or produce broker. This operation as wholesaler or broker would consist of purchasing large quantities of fresh produce at the terminal markets or directly from producers, and redistributing them to local retail outlets, institutions, and possibly the supermarket chains. Again, once a reputation is established and a working relationship exists with any of the larger purchasers, it may be possible to continue to supply them during the winter and generate additional income for the off-season operations of the shipping-point facility.

While these two possibilities as repacking house and wholesaler exist, they are both operations far removed from those of producing and marketing horticultural produce. The more the shipping-point facility management tries to expand its operations and diversify from its main objective of helping local producers to market their products, the greater the probability of encountering financial problems. Again, these activities might be something to consider when the market facility is fully operational and relationships have been established with produce purchasers.

VII. Recommendations for Future Research

A thorough analysis of the optimal location for the shipping-point market or markets should be undertaken. One tool that could be used is Geographical Information Systems (GIS) analysis. The physical factors that the GIS analysis allows are consideration of the production potential of the study area, and transportation costs. It will also permit quantitative analysis of the results of location decisions on grower costs.

The methodology needed to carry out this optimal location determination involves using data on political boundaries, water availability, climatic conditions, land type,

geological constraints, numbers and size of farms, roads by class, transportation costs, elevation, slopes, land use characteristics, and farmer interest.

A second area of further research involves preparing budgets for the post-harvest handling costs of all the predetermined commodities. These budgets will include the costs of purchasing and operating all the required equipment necessary for grading, cleaning, packing, cooling, and shipping the products to market. Budgets will also be prepared to incorporate the costs of operating a facility which include the costs of rent, labor, communication, utilities, and operating expenses.

A third area of additional research is to prepare an optimal organizational work plan which will include a description of the most efficient organizational structures, as well as job descriptions and discussions of the roles for the growers, board of directors, management, brokers, and laborers. Also included in this organizational work plan will be standards for coordinating and training the producers, rules for establishing pre-planning contracts between facility and producers, rules for purchasing and selling produce, criteria for determining optimal product mix, criteria for paying producers and criteria for the reinvestment of earnings.

Horticultural trials should be carried out with interested growers with the assistance of county extension agents in order to determine the best production technologies and optimal varieties for the region. These trials should be conducted for all crops under consideration and should have as a goal to determine if quality standards can be met and if the yields obtained are adequate to achieve a profit.

Extension agents should be provided the necessary training they may need in order to effectively assist local growers in the proper horticultural production techniques. This training will involve contracting an experienced horticulturist who will assist in the preparation of the horticultural "packages," which will be presented to the interested growers. After a "package" is created, the county extension agents must be trained to thoroughly understand the procedures involved in production and to properly educate the

growers in these procedures. The important role that the extension offices will play may involve restructuring the county extension agents' work schedules in order to make sure that they have time and resources available to assist the growers.

Phase two involves concentrating on some of the critical factors that have only been briefly examined during Phase one. Where Phase one. involved identifying the critical factors that need to be addressed in establishing a shipping-point market in the region, Phase one will specifically look at these factors in more detail, and offer certain recommendations for overcoming the existing barriers to success.

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APPENDIX 1.

PURCHASING AGENT CHECKLIST SURVEY FORM[16]

Name:_____ Company Name_____
Interviewer_____ Date_____

1 Are you currently planning to or have you in the recent past (last year) purchased locally grown horticultural products? Yes ( ) No ( )
If yes: A. What horticultural products have you purchased?

Tomatoes ( ) Varieties_____
Peppers ( ) Varieties_____
Squash ( ) Varieties_____
Beans ( ) Varieties_____
Cauliflower ( ) Cucumbers ( ) Cabbage ( )
Other Vegetables_____

Strawberries ( ) Raspberries ( ) Cantaloupes ( )
Other Small Fruits_____

Cut Flowers_____
Potted Plants_____
Spices/herbs_____
Other Specialty Products_____

B. How are local products brought into your marketing system?

Delivered by farmers to stores_____
Delivered by farmers to a warehouse_____
Purchased from a wholesaler_____
Purchased through the Hillsville Mkt_____
Other_____

[16] The survey form was edited for length.

If not: A. What are the major reasons you have not purchased local horticultural products?

Availability ( ) _____
Surplus at available time ( )_____
Product Quality ( )_____
Product Packaging ( )_____
Reliability ( )_____
Management Constraints ( )_____
Other ( )_____

2) Which horticultural products, given they meet acceptable standards, would you be most interested in purchasing (ask criteria for products specified in question 1a)?

Crop	**Volume Needs (for season)**	**Quality Needs**	**Packaging Needs**	**Other**

Tomatoes( )_____

Varieties Ranked: Roma ( ) Yellow ( ) Beef Steak ( ) Other _____

Peppers( ) _____

Varieties Ranked: Green Bell ( ) Colored Bell ( ) Other _____

Squash ( ) _____

Varieties Ranked: Acorn ( ) Yellow ( ) Spaghetti ( )Other_____

Broccoli ( ) _____

Cucumbers ( ) _____

Cauliflower ( ) _____

Cantaloupes ( ) _____

Watermelon ( )_____

Strawberries ( ) _____

Raspberries ( ) _____

Herbs and Spices ( ) _____

Cut Flowers ( ) _____

Potted Plants ( ) _____

3) How would you like delivery to be handled with a local supplier?

Pickup by your organization_____

Delivery (Location) _____

Advance time needed_____

Other_____

4) In order for a new marketing facility to establish a relationship with your organization what factors do you consider?

Operation Size_____

Facility Quality_____

Other_____

5) What local trend(s) do you see in the consumption of horticultural products?

Product	Increasing	Decreasing
_____	_____	_____

6) Integrated Pest Management practices (IPM) reduces but do not eliminate the use of chemicals in agricultural production (unlike organic methods). Do you think that IPM produced products could be marketed in the S.W. Virginia at a higher price than traditionally grown products? Yes___ No___ Reasons:

7) Do you have any other comments or ideas about assisting local farmers to increase horticultural production?

Appendix 2. Grower Survey

Name _____ County _____

Telephone Number_____ Mailing Address _____

Farm Location _____ Number of Acres _____

1) Which of the following do you produce and market commercially on your farm?

___cattle ___corn ___other grains
___vegetables ___small fruits ___hay production
___apples ___tobacco ___peaches
___other horticultural commodities_____

2) What is your **main** source of farm income? (Check one)

__cattle ___corn ___dairy
__tobacco ___vegetables ___small fruit
__fruits ___other (please list)_____

3) Have you ever produced any horticultural commodities in the past?

___Yes ___No

If yes,

What? _____

When?_____

How much acreage was cultivated? _____

Where was your produce sold? _____

4) Where is the nearest market outlet to your farm where vegetable produce can be sold? (other than roadside or pick your own)

_____

_____

_____

5) Is the lack of a "shipping-point market", where produce can be stored, cooled, graded, packed and marketed, stopping you from producing horticultural commodities?

___Yes ___No

6) If a shipping-point market facility existed in Southwestern Virginia, would you be interested in producing vegetables?

___Yes ___No

7) If yes, how much land might you plant in vegetables? _____acres.

8) What is the current use of the land you would use for vegetable production?

___pasture land
___corn
___tobacco
___grass
___new land

9) Would you have to give up any current production to put that land into vegetables?

___Yes ___No

If yes, what would you give up? _____

10) If you were to start producing vegetables or small-fruits, which commodities would you like to produce.

Please rank the commodities you would like to produce. Start with the commodity you most prefer, then list other choices.

1._____
2._____
3._____
4._____
5._____

11) Do you have farm equipment available that can be used for vegetable production?

___Yes ___No

If yes, what equipment do you have? _____

_____

12) Would you have land with irrigation equipment available for vegetable production?

___Yes ___No

If no, would you be willing to purchase irrigation equipment?

___Yes ___No

13) Do you have a green house on your property?

___Yes ___No

If Yes, how many? _____

What is it used for? _____

_____

_____

What months is it occupied? _____

14) Have you ever used products or services provided by farmer cooperatives, or have you ever been a member of a farmer Cooperative?

___Yes ___No

If so, which ones?_____

_____

_____

_____

15) What type of farm labor do you presently use?

___Family
___local
___migrant
___H2A

16) If you were to expand vegetable production, would you have to contract more farm workers?

___Yes ___No

If yes, what kind of labor would you need to contract?

___Local
___Migrant
___H2A

17) Do you have any experience with obtaining or managing migrant labor?

___Yes ___No

18) Do you own any living quarters for migrant workers?

___Yes ___No

19) Would you be willing to become a member and support a horticultural cooperative with other growers in the region, and commit a certain portion of your production to the cooperative?

___Yes No___

*** Would you like to receive a visit from the survey group to answer further questions about the project?

___Yes ___No

Appendix 3. Extension Agent Survey Form

Please fill out and return:

Name of extension agent: _____ County: _____

Address: _____ Phone: _____

E-Mail: _____

1) What are the principal crops in your county and the peak planting and harvesting dates for these as well as other labor intensive and time consuming activities.:

	Crop	**Peak Planting Date**	**Peak Harvest Date**
1)			
2)			
3)			
4)			
5)			
6)			
7)			
8)			
9)			

2) Please list any current commercial vegetable or small fruit production that exists in the county. Where are these marketed? How many farms and acres are producing fruits or vegetables?

	Veg. or Fruit	Approx. # of Farmers	Approx. # of acres
1)			
2)			
3)			
4)			
5)			
6)			

3) Rank any horticultural commodities that in your opinion may have potential for profitability in your county based on current small scale production, personal experience, family gardens, experimental plots, climatic conditions, etc. (Give a 1 to most feasible crop, 2 to second most feasible, etc.)

____tomatoes	____cauliflower	Others(list)
____sweet corn	____cantaloupes	_____
____potatoes	____cabbage	_____
____peppers	____broccoli	_____
____small fruits	____lettuce	_____
____squash	____spinach	_____
____collard greens	____cucumbers	_____
____turnips & greens	____flowers	_____
____asparagus	____pumpkins	_____

4) What data do you have available for establishing cost of production budgets for horticultural commodities in your county? (i.e. costs of machinery, inputs, labor, etc.)

5) Is horticultural research being carried out in your county? (what is being done?)

6) Where is the nearest market where vegetables can be sold?

What is the distance from your county?

7) Where is the nearest shipping-point market to your county? (used for storing, cooling, grading & packaging produce)

-Is the lack of such a facility a constraint to producing vegetables in your county?

8) What marketing and distribution networks currently exist in your county?

How are cattle marketed?

9) How much potential acreage is available in your county for vegetable production?

Can you identify specific farmers with an interest in producing horticultural commodities?

10) What are the major sources of farm labor in your county: family, local, migrant, H2A?

What type of labor would be needed if vegetables were to planted?

11) What is the number and location of existing tobacco warehouses in the county?

-During what dates are these used?

-Are there other shell buildings in your county that could potentially be used as temporary storage and packing facilities? Please explain.

12) What are the primary constraints to initiating or expanding vegetable and small fruit production in your county.

14) What are the primary farmer organizations in your county? (i.e. cooperatives, associations, etc.)

15) What are your personal thoughts on the potential of producing horticultural commodities in your county? (What will be needed?)

-do any conditions exist in your county that provide an advantage over other regions of the state in the production of any vegetable or fruit?

APPENDIX IV (ASPARAGUS BUDGET)[17]

** EXPECTED INCOME **				: MANAGEMENT INFORMATION **
	Price/LB.			: Expected yield: 1/4 lb./plant starting yr 3, @$1/lb. return; 1/2 lb./plant
QUANITY/				: Yr 4-15. Obtain seed or tissue culture plantlets of the N.J. breeding program
LB.	$0.75	$1.00	$1.50	: hybrids: Jersey Centennial, Jersey Giant, Greewich or numbered selections from
				: the breeding program. These hybrids are resistant to soil borne diseases
6534	$4,901	$6,534	$9,801	: such as fusarium crown rot and due to their hybrid vigor, may yield double or
8712	$6,534	$8,712	$13,068	: triple the old Washington strains.
10890	$8,168	$10,890	$16,335	: Spacing of 5' x 1' is recommended. Fertilizer: Estab. 1200#s, of 5-10-10;
				: Annually - 100#s N, 100#s P, 150#s K - Maintain ph 6.8-7.0.
				: Herbicide apply Pre-spear dormant. First Acre Irrigation - solid set sprinkler
				: Establishment cost $3,323 - Annual cost $680/ac.

INPUTS	1	2	3	4	5 . . . 15	PRICE	TOTAL
PLANTS-TISSUE CULTURE	8712	0	0	0	0	$0.17 /PLANT	$1,481
NEW JERSEY HYBRIDS							
(HOME GROWN PLANTS, FROST SENSITIVE SEEDLINGS AT PLANTING)							
PLANTING(MACHINERY COST)	20	0	0	0	0	$1.00	$20.00
PREPARE SITE - CULTIVATION	20	0	0	0	0	$1.00	$20.00
LIME	2	0	2	0	2	0.4 $20.00 /TON	$200.00
INSECTICIDE:							
THIODAN 50 WP	3	3	3	3	3	3 $6.90 /LB	$310.50
HERBICIDE:							
PRINCEP 80 WP	3	3	3	3	3	3 $3.70 /LB	$166.50
FERTILIZER:							
N	60	75	100	100	100	100 $0.25 /LB	$358.75
P	120	100	100	100	100	100 $0.24 /LB	$364.80
K	120	150	150	150	150	150 $0.14 /LB	$310.80
IRRIGATION ($/yr.)	$680	$680	$680	$680	$680	$520 $1.00 /AC	$8,600
LABOR:							
PLANTING	50	0	0	0	0	0 $5.00 /HR	$250.00
FERT. & PEST-APPLICATION	8	8	8	8	8	8 $5.00 /HR	$600.00
MANAGEMENT @ HARVEST	0	0	20	20	20	20 $5.00 /HR	$1,300
YEARLY COSTS	2623.44	$815.55	961.8	921.8	961.8	769.8 COST PER LB.*	$0.09
ACCUMULATED INT. @ 12%	$314.81	$450.46	$489.25	$263.95	$57.71	$46.19	
ACCUMULATED COSTS	$2,938	$4,204	$5,655	$4,663	$1,020	$816	
RETURNS($1/LB)	0	0	2178	4356	4356	4356	
NET RETURNS	($2,938)	($4,204)	($3,477)	($307)	$3,336	$3,540 NET RETURNS/LB *	$0.41
						AVERAGE RETURN PER YEAR	$1,854

** The expected income chart is only for comparison of various yields & costs after year 5
* Calculated by using year 6 costs and returns.

[17] Source for all presented bugets: Virginia Tech Cooperative Extension (1994)

APPENDIX IV (CUCUMBERS BUDGET)

** EXPECTED INCOME **

QUANTITY(BU)	PRICE/BU $5.00	$8.00	$11.00
250	$1,250	$2,000	$2,750
300	$1,500	$2,400	$3,300
350	$1,750	$2,800	$3,850

** MANAGEMENT INFORMATION **

TANK MIX ALANAP AND PREFAR AND USE ON UNMULCHED MIDDLES.
INCORPORATE BY IRRIGATION. BEFORE CUTTING PLANT HOLES IN MULCH FILM

TO PREVENT GUMMY STEM BLIGHT AND BACTERIAL WILT
BEGIN FUNGICIDE-INSECTICIDE SPRAYS IMMEDIATELY AFTER EMERGENCE.

ONE HIVE OF BEES PER ACRE NEAR CUCUMBERS NECESSARY FOR
CONSISTENT YIELDS.
LARGE AMOUNTS OF HARVEST LABOR REQUIRED!!!
IRRIGATION SYSTEM IS DRIP IRRIGATION WITH THROW-AWAY PRE-PUNCH TUBING
FIRST ACRE IRRIGATION COST IS $2,162. BUDGETS AVAILABLE UPON REQUEST

===VARIABLE COSTS:		UNITS	QUANTITY	PRICE	COSTS
SEEDING COSTS:	RYE COVER CROP	BU.	2	$9.00 /BU	$18.00 (*)
SEEDS	DASHER II F1	LB	2	$58.00 /LB	$116.00
	SLICE MASTER, TURBO F1				
FERTILIZER: N		LB.	130	$0.25 /LB	$32.50
P		LB.	130	$0.24 /LB	$31.20
K		LB.	130	$0.14 /LB	$18.20
LIME		TONS	0.5	$20.00 /TON	$10.00
SPRAY MATERIALS:					
HERBICIDES	PREFAR 4E	GAL	0.3	$37.99 /GAL	$11.40
	ALANAP	GAL	0.3	$27.18 /GAL	$8.15
INSECTICIDES	POUNCE-ASANA-AMBUSH(6)	GAL	1	$123.90 /GAL	$123.90
FUNGICIDES	BRAVO 720	GAL	0.38	$62.00 /GAL	$23.25
CROP SUPPLIES:	BOXES (1 1/9 BUSHEL)	CARTON	300	$1.35 /CRT	$405.00 (*)
	PLASTIC MULCH (4' X 2000')	ROLLS	4	$50.00 /ROLL	$200.00
IRRIGATION:		ACRE	$2,162	26.32%	$569.00 (*)
MARKETING:					
HAULING, GRADING & COOLING *		BOX	300	$1.50 /CRT	$450.00 (*)
MACHINERY & EQUIP. (FUEL, OIL,REPAIRS)		$$	$111.16	$1.00	$111.16
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)		$$	$686	7.50%	$51.43 (*)
OPERATING COSTS					$2,179.19
OUT OF POCKET COST PER CRT **					$7.26
=== FIXED COST:					
LABOR		HRS.	227	$5.00	$1,135.00
TOTAL FIXED MACHINE COSTS		$$	$301.02	$1.00	$301.02
TOTAL FIXED BUILDING COSTS		$$	$0.00	0.00%	$0.00
(DEP.,INT.,INS. & TAXES)					
LAND CHARGE		$$	$800.00	8.00%	$64.00
TOTAL COSTS					$3,679.21
TOTAL COSTS PER CRT					$12.26

** BASED ON 300 BUSHEL PRODUCTION ACRE

APPENDIX IV (FALL BUNCHING BROCCOLI BUDGET)

** EXPECTED INCOME **

QUANTITY (BOXES)	PRICE/BOX $5.00	$7.00	$9.00
300	$1,500	$2,100	$2,700
500	$2,500	$3,500	$4,500
700	$3,500	$4,900	$6,300

** MANAGEMENT INFORMATION **

SOIL REQUIREMENTS: 6.5ph - HIGH LEVELS OF P & K.
DIRECT FIELD SEED - JULY 15 IN MOUNTAINS - TO AUG 15 SOUTHSIDE. SPACE 6" X 12", 2 X 48" OR PAIRED ROWS ON 40" - 48" CENTERS. (42,000 PLTS/AC.) - NOT RECOMMEDED WITHOUT IRRIGATION !!!!
SIDEDRESS TWICE WITH AMMONIUM NITRATE OR 15-0-14.
HARVEST BEGINS IN SEPT. WHEN HEADS HAVE GROWN TO THREE INCHES IN DIAMETER. HARVEST IN EARLY MORNING TO REDUCE FIELD HEAT. CUT HEADS 9"-10" IN LENGTH. TRIM TO NOT MORE THAN 8.5" OR LESS THAN SIX INCHES. GRADE INTO TWO TO THREE STALK BUNCHES. PLACE IN BOX WITH ABOUT TWENTY POUNDS OF SLURRY ICE. (A MARKET REQUIREMENT) TRUCK OR STORE IN REFRIGERATED FACILITY. IRRIGATION SYSTEM IS A SOLID SET SPRINKLER SYSTEM OR DRIP IRRIGATION SYSTEM. DRIP PREFERRED. FIRST ACRE IRRIGATION COST IS $2,294. SEE DRIP IRRIGATION BUDGET #41.

===VARIABLE COSTS:	UNITS	QUANTITY	PRICE	COSTS
SEEDING COSTS: RYE COVER CROP	BU.	2	$9.00 /BU	$18.00 (*)
SEEDS: PACKMAN OR SULTAN (EARLY-50%)	LB.	1	$160.00 /LB	$160.00
ARCADIA, PINNACLE OR BRIGADIER, (LATE MATURITY-50%)				
FERTILIZER: N	LB.	100	$0.25 /LB	$25.00
P	LB.	200	$0.24 /LB	$48.00
K	LB.	200	$0.14 /LB	$28.00
LIME	TONS	0.5	$20.00 /TON	$10.00
Spray HERBICIDES TREFLAN(PPI)	PTS.	1.5	$4.08 /PT	$6.12
Costs DACTHAL 75W (POST PLANT)	LB.	8	$6.50 /LB	$52.00
INSECTICIDES POUNCE, AMBUSH, OR ASANA(6)	GAL.	0.37	$123.90 /GAL	$45.84
DIAZINON 4EC	GAL	0.75	$39.95 /GAL	$29.96
SIDEDRESS: AMMONIUM NITRATE OR 15-0-14	LB.	300	$0.25 /LB	$75.00
50#s ACTUAL N SIDEDRESS (2)				
CROP SUPPLIES: BOXES (WAX)	BOXES	500	$1.10 /BOX	$550.00 (*)
HARVEST KNIVES	EA	4	$4.00 /KN	$16.00
ICE CHARGE	BOX	500	$0.07 /BOX	$35.00
MARKETING:				
HAULING, GRADING & COOLING *	BOXES	500	$1.50 /BOX	$750.00 (*)
IRRIGATION:	ACRE	$2,294	20.46%	$469.29 (*)
MACHINERY & EQUIP. (FUEL, OIL,REPAIRS)	$$	$88.84	$1.00	$88.84
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)	$$	$585	7.50%	$43.86 (*)
OPERATING COSTS				$2,450.91
OUT OF POCKET COST/BOX **				$4.90
=== FIXED COST:				
LABOR	HRS.	100	$5.00	$500.00
TOTAL FIXED MACHINE COSTS	$$	$204.97	$1.00	$204.97
TOTAL FIXED BUILDING COSTS	$$	$0.00	0.00%	$0.00
(DEP.,INT.,INS. & TAXES)				
LAND CHARGE	$$	$800.00	8.00%	$64.00
TOTAL COSTS				$3,219.89
TOTAL COSTS PER BOX **				$6.44

** BASED ON 500 BOX PRODUCTION PER ACRE

APPENDIX IV (GREEN BEANS BUDGET)

**** EXPECTED INCOME ****

QUANTITY(BU)	PRICE/BU $7.00	$12.00	$17.00
210	$1,470	$2,520	$3,570
250	$1,750	$3,000	$4,250
290	$2,030	$3,480	$4,930

**** MANAGEMENT INFORMATION ****

TEST NEW, HIGH YIELDING STRINGLESS VARIETIES WITH HIGH FLAVOR SUCH AS ROMA, DERBY OR TEMA. THESE NEW VARIETIES ARE WELL RECEIVED BY THE CONSUMER IN LIEU OF OLDER DISEASE SUSCEPTIBLE VARIETIES.

IRRIGATION SYSTEM IS A SOLID SET SPINKLER SYSTEM (Budget #42)
IRRIGATION BUDGETS AVAILABLE UPON REQUEST
FIRST ACRE IRRIGATION COST IS $3,324

===VARIABLE COSTS:		UNITS	QUANTITY	PRICE	COSTS
SEEDING COSTS:	RYE COVER CROP	BU.	2	$9.00 /BU	$18.00 (*)
SEEDS	BUSH BLUE LAKE 47 -- ROMA DERBY -- TEMA	LB	60	$1.75 /LB	$105.00
FERTILIZER: N		LB.	60	$0.25 /LB	$15.00
P		LB.	120	$0.24 /LB	$28.80
K		LB.	120	$0.14 /LB	$16.80
LIME		TONS	0.5	$20.00 /TON	$10.00
SPRAY MATERIALS:					
HERBICIDES	DUAL 8E	GAL	0.25	$68.00 /GAL	$17.00
INSECTICIDES	ORTHENE	LB	4	$11.95 /LB	$47.80
FUNGICIDES	BRAVO 720	GAL	0.38	$62.00 /GAL	$23.25
CROP SUPPLIES:	1 BU WIRE BOUND WOODEN CRATE	CRATE	250	$1.25 /CRATE	$312.50 (*)
IRRIGATION:		ACRE	$3,324	20.46%	$680.00 (*)
MARKETING:					
HAULING, GRADING & COOLING *		CRATE	250	$0.90 /CRATE	$225.00 (*)
MACHINERY & EQUIP. (FUEL, OIL,REPAIRS)		$$	$82.87	$1.00	$82.87
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)		$$	$347	7.50%	$25.99 (*)
OPERATING COSTS					$1,608.01
OUT OF POCKET COST PER CRATE **					$6.43
=== FIXED COST:					
LABOR		HRS.	147	$5.00	$735.00
TOTAL FIXED MACHINE COSTS		$$	$217.51	$1.00	$217.51
TOTAL FIXED BUILDING COSTS (DEP.,INT.,INS. & TAXES)		$$	$0.00	0.00%	$0.00
LAND CHARGE		$$	$800.00	8.00%	$64.00
TOTAL COSTS					$2,624.52
TOTAL COSTS PER CRATE **					$10.50

** BASED ON 250 CRATE PRODUCTION ACRE

APPENDIX IV (FRESH MARKET GREEN BELL PEPPERS IRRIGATED HIGH DENSITY PLANTING) **1 ACRES**

**** EXPECTED INCOME ****

	PRICE/BUSHEL		
QUANTITY(BUSHEL)	4.00	7.00	10.00
400.00	1,600.00	2,800.00	4,000.00
800.00	3,200.00	5,600.00	8,000.00
1,200.00	4,800.00	8,400.00	12,000.00

**** MANAGEMENT INFORMATION ****

FIELD TEST THIS DOUBLE-ROW SYSTEM USING 1' IN-ROW BETWEEN PLANTS: ROWS 18" APART ON TWIN-ROWS; 3-1/2' AISLE BETWEEN TWIN-ROWS CENTER TO CENTER, FOR 17,424 PLANTS/AC -- RECOMMENDED ONLY WITH IRRIGATION!!

DOUBLE-ROW NEEDS TOP MANAGEMENT AND 1 INCREASED WATER AND FERTILIZER REQUIREMENTS. 50# OF N AND K WHEN THE PEPPERS ARE PEA SIZE AND 30# AT THE TIME OF FIRST PICKING. DRIP IRRIGATION SYSTEM IS RECOMMENDED

1ST ACRE IRRIGATION COST $2,294. DRIP IRRIGATION, (SEE BUDGET #41)

===VARIABLE COSTS:		UNITS	QUANTITY	PRICE	COSTS
SEEDING COSTS:	RYE COVER CROP	BU.	2.00	9.00/BU	18.00(*)
PLANTS	KEYSTONE RESISTANT GIANT (NO. 3 STRAIN) KING ARTHUR, MERLIN F1, NORTHSTAR OROBELLE (GREEN OR YELLOW)	PLT	17,424.00	0.02/PLT	348.48
FERTILIZER:	N	LB.	130.00	0.25 /LB	32.50
	P	LB.	150.00	0.24 /LB	36.00
	K	LB.	150.00	0.14 /LB	21.00
LIME		TONS	1.00	20.00 /TON	20.00
SPRAY MATERIALS:					
HERBICIDES	DEVRINOL DF	LB	3.00	8.24 /LB	24.72
INSECTICIDES	ORTHENE (7)	LB	7.00	11.95 /LB	83.65
CROP SUPPLIES:	BOXES	BOXES	800.00	1.10 /BOX	880.00(*)
IRRIGATION:		ACRE	2,673.00	0.20	546.82(*)
MARKETING:					
HAULING, GRADING & COOLING *		BOXES	800.00	1.20 /BOX	960.00(*)
MACHINERY & EQUIP. (FUEL, OIL,REPAIRS)		$$	112.78	1.00	112.78
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)		$$	679.13	0.08	50.93(*)
	OPERATING COSTS				3,134.89
	OUT OF POCKET COST/BOX **				3.92
=== FIXED COST:					
LABOR		HRS.	200.00	5.00	1,000.00
TOTAL FIXED MACHINE COSTS		$$	350.18	1.00	350.18
TOTAL FIXED BUILDING COSTS (DEP.,INT.,INS. & TAXES)		$$	0.00	0.00	0.00
LAND CHARGE		$$	800.00	0.08	64.00
	TOTAL COSTS				4,549.07
	TOTAL COSTS PER BOX **				5.69

** BASED ON 800.00 BOX PRODUCTION - VARIOUS COSTS OF PRODUCTION ARE BELOW.

APPENDIX IV (GREEN CABBAGE BUDGET)

** EXPECTED INCOME **				: ** MANAGEMENT INFORMATION **
	PRICE/CRATE			: SUCCESSFUL ON OVER 2,000 ACRES ANNUALLY IN CARROLL CO.,VA.
	$3.00	$6.00	$9.00	: FOR DISEASE CONTROL, ROTATE LAND INTO CABBAGE ONLY ONCE EVERY 4 YEARS.
QUANTITY (CRATES)				: SOD (Hay or Pasture) IS EXCELLENT ROTATIONAL CROP.
600	$1,800	$3,600	$5,400	: SET 29,000 PLANTS DURING APRIL 15 TO JULY 30 USING 3-ROW BED SYSTEM
800	$2,400	$4,800	$7,200	: HARVEST JULY 4th TO OCTOBER 30th.
1000	$3,000	$6,000	$9,000	: MARKET IN CRATES(IF USING BAGS REDUCE PRICE).
				: AVERAGE CRATE WEIGHT- 50#. AVERAGE HEAD WEIGHT- 2.5#.
				: AVERAGE HEADS PER CRATE - 19 to 21.
				: IRRIGATION SYSTEM IS A SOLID SET SPRINKLER SYSTEM (Budget #42)
				: FIRST ACRE IRRIGATION COST IS $3,324. BUDGETS AVAILABLE UPON REQUEST

===VARIABLE COSTS:		UNITS	QUANTITY	PRICE	COSTS	
SEEDING COSTS:	RYE COVER CROP	BU.	2	$9.00 /BU	$18.00	(*)
PLANTS	GOURMET - RIO VERDE	PLT	32000	$0.01 /PLT	$320.00	
	A & C #5 PLUS					
FERTILIZER: N		LB.	200	$0.25 /LB	$50.00	
P		LB.	300	$0.24 /LB	$72.00	
K		LB.	300	$0.14 /LB	$42.00	
LIME		TONS	0.5	$20.00 /TON	$10.00	
SPRAY MATERIALS:						
HERBICIDES	DEVRINOL OR TREFLAN	LB	3.5	$8.25 /LB	$28.88	
	GOAL	GAL.	0.25	$76.00 /GAL	$19.00	
INSECTICIDES	ASANA - 10 SPRAYINGS	GAL	0.62	$123.90 /GAL	$76.82	
	DI-SYSTON 15G	LB.	10	$1.70 /LB	$17.00	
FUNGICIDE	BRAVO 720 (2)	GAL.	0.38	$62.00 /GAL	$23.25	
CROP SUPPLIES:	CRATES	CRTES	800	$1.35 /CRATE	$1,080.00	(*)
IRRIGATION:		ACRE	$3,324	20.46%	$680.00	(*)
MARKETING:						
HAULING AND GRADING *		CRTES	800	$0.60 /CRATE	$480.00	(*)
MACHINERY & EQUIP. (FUEL, OIL,REPAIRS)		$$	$113.32	$1.00	$113.32	
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)		$$	$772	7.50%	$57.92	(*)
	OPERATING COSTS				$3,088.18	
	OUT OF POCKET COST PER CRATE **				$3.86	
=== FIXED COST:						
LABOR		HRS.	278	$5.00	$1,390.00	
TOTAL FIXED MACHINE COSTS		$$	$229.48	$1.00	$229.48	
TOTAL FIXED BUILDING COSTS		$$	$0.00	0.00%	$0.00	
(DEP.,INT.,INS. & TAXES)						
LAND CHARGE		$$	$800.00	8.00%	$64.00	
	TOTAL COSTS				$4,771.66	
	TOTAL COSTS PER CRATE **				$5.96	

** BASED ON 800 CRATE PRODUCTION PER ACRE

APPENDIX IV (PUMPKIN BUDGET)

**** EXPECTED INCOME ****

QUANTITY(PUMPKIN) 15-20 lbs. each	PRICE/PUMPKIN $1.50	$3.00	$4.50
2050	$3,075	$6,150	$9,225
2400	$3,600	$7,200	$10,800
2750	$4,125	$8,250	$12,375

Spookie 4# size - $.50 each

**** MANAGEMENT INFORMATION ****

LOCATE A MARKET BEFORE YOU PLANT !!!!!
4'X 8' SPACING. INVESTIGATE 3'X 7' SPACING.
ROTATE FIELDS TO REDUCE DISEASES AND INSECT DAMAGE TO VINES AND FRUITS.
IRRIGATION RECOMMENDED. APPLY FUNGICIDES WEEKLY AS A PROTECTANT.

IRRIGATION SYSTEM IS A SOLID SET SPRINKLER SYSTEM (Budget #42).
FIRST ACRE IRRIGATION COST IS $3,324. BUDGETS AVAILABLE UPON REQUEST.
NEED 130 FROST FREE DAYS FOR PRIZEWINNER. VARITIES -JACK BE LITTLE,
BASEBALL SIZE; SPOOKIE, SOFTBALL SIZE; HOWDEN, PANKOW, BASKETBALL SIZE;
YOUNGS BEAUTY, VOLLEYBALL SIZE; PRIZEWINNER F1, MONSTEROUS BEACH BALL SIZE.
IF IN NORTH, WEST OR SOUTHWEST START PRIZEWINNER IN GREENHOUSE

===VARIABLE COSTS:	UNITS	QUANTITY	PRICE	COSTS
SEEDING COSTS: RYE COVER CROP	BU.	2	$9.00 /BU	$18.00 (*)
SEEDS SEE MANAGMENT INFORMATION	LB	2	$16.00 /LB	$32.00
FERTILIZER: N	LB.	100	$0.25 /LB	$25.00
P	LB.	100	$0.24 /LB	$24.00
K	LB.	150	$0.14 /LB	$21.00
LIME	TONS	0.5	$20.00 /TON	$10.00
SPRAY MATERIALS:				
HERBICIDES PREFAR 4E	GAL.	1.25	$37.99 /GAL	$47.49
INSECTICIDES THIODAN 50WP	LB	1.5	$6.90 /LB	$10.35
FUNGICIDES RIDOMIL/BRAVO 81WP	LBS.	8.00	$17.79 /LB	$142.32
BAYLETON	OZ.	2	$4.22 /OZ	$8.44
CROP SUPPLIES:				
IRRIGATION:	ACRE	$3,324	20.46%	$680.00 (*)
MARKETING:				
HAULING AND GRADING *	LOADS	6	$75.00 /LD	$450.00 (*)
MACHINERY & EQUIP. (FUEL, OIL,REPAIRS)	$$	$101.00	$1.00	$101.00
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)	$$	$422	7.50%	$31.62 (*)
OPERATING COSTS				$1,601.22
OUT OF POCKET COST/PUMPKIN				$0.67
=== FIXED COST:				
LABOR	HRS.	280	$5.00	$1,400.00
TOTAL FIXED MACHINE COSTS	$$	$379.25	$1.00	$379.25
TOTAL FIXED BUILDING COSTS	$$	$0.00	0.00%	$0.00
(DEP.,INT.,INS. & TAXES)				
LAND CHARGE	$$	$800.00	8.00%	$64.00
TOTAL COSTS				$3,444.47
TOTAL COSTS PER PUMPKIN **				$1.44

** BASED ON 2400 PUMPKIN PRODUCTION PER ACRE

APPENDIX IV (STRAWBERRIES ESTABLISHMENT BUDGET)

MANAGEMENT INFORMATION					
EXPECTED LIFE :	FOUR YEARS. - A DEPENDABLE SOURCE OF WATER IS OF PRIMARY IMPORTANCE AS IRRIGATION IS A MUST FOR DEPENDABLE AND COMPETITIVE STRAWBERRY PRODUCTION!!!				
SITE PREPARATION :	ON PREVIOUS NON-ROW CROP SITES GROW FIELD OR SWEET CORN WITH HERBICIDES FOR TWO YEARS BEFORE STRAWBERRIES ARE PLANTED TO REDUCE ANNUAL AND PERENNIAL WEEDS.				
FERTILIZER :	SIDEDRESS TWICE WITH TWENTY-FIVE POUNDS OF NITROGEN.				
HERBICIDES:	APPLY DACTHAL AT PLANTING, 2-4-D & SINBAR AT RENOVATION. DEVRINOL AT DORMANT STAGE, PLUS HOE - HOE - HOE				
===VARIABLE COSTS:		UNITS	QUANTITY	PRICE	COSTS
PLANTS	REDCHIEF - GUARDIAN - DELITE ALLSTAR - EARLIGLOW LATEGLOW	PLT	6000	$0.08 /PLT	$480.00
FERTILIZER: N		LB.	150	$0.25 /LB	$37.50
P		LB.	100	$0.24 /LB	$24.00
K		LB.	100	$0.14 /LB	$14.00
LIME		TONS	2	$20.00 /TON	$40.00
SPRAY MATERIALS:					
HERBICIDES	DEVRINOL	LB	8	$8.24 /LB	$65.92
	DACTHAL 75W	LB	12	$6.50 /LB	$78.00
	POAST, FUSILADE	GAL.	1	$63.48 /GAL	$63.48
	SINBAR	LB.	0.5	$25.99 /LB	$13.00
	2-4-D AMINE	QT.	1.5	$3.87 /QT	$5.81
CROP SUPPLIES:					
MARKETING:					
MACHINERY & EQUIP. (FUEL, OIL,REPAIRS)		$$	$41.64	$1.00	$41.64
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)		$$	$863	7.50%	$64.75 (*)
		OPERATING COSTS			$928.09
		OUT OF POCKET COST PER YEAR			$232.02
=== FIXED COST:					
LABOR		HRS.	115	$5.00	$575.00
TOTAL FIXED MACHINE COSTS		$$	$102.60	$1.00	$102.60
TOTAL FIXED BUILDING COSTS (DEP.,INT.,INS. & TAXES)		$$	$0.00	0.00%	$0.00
LAND CHARGE		$$	$0.00	0.00%	$0.00
		TOTAL COSTS			$1,605.69
		TOTAL COSTS PER YEAR			$401.42

APPENDIX IV (SWEET CORN BUDGET)

**** EXPECTED INCOME ****

QUANTITY(DOZEN)	PRICE/DOZEN $1.25	$1.75	$2.25
1190	$1,488	$2,083	$2,678
1400	$1,750	$2,450	$3,150
1610	$2,013	$2,818	$3,623

**** MANAGEMENT INFORMATION ****

PLANT ONE-THIRD CROP EVERY TWO WEEKS AT 10" X 3' SPACING.
LEAVE SPRAY ROW OUT AFTER EVERY 6 ROWS FOR AIR SPRAYER.
EAR WORM CONTROL - TRACTOR-OPERATED AIR SPRAYER WITH ROW CROP HEADS OR HIGH CLEARANCE DILUTE SPRAYER REQUIRED !!!
YIELD - ONE EAR PER PLANT.
HYDROCOOLING EQUIPMENT (34deg) NECESSARY FOR HIGH-VOLUME SHIPMENTS TO LARGE CHAIN BUYERS, WHO REQUIRE SH2 SUPER SWEETS.
USE SE VARIETIES FOR LOCAL MARKETS, HAS HIGH CONSUMER ACCEPTANCE.
IRRIGATION SYSTEM IS A SOLID SET SPRINKLER SYSTEM (budget #42)
FIRST ACRE IRRIGATION COST IS $3,324. BUDGETS AVAILABLE UPON REQUEST
DO NOT SEED IN COLD WET SOILS. ISOLATE SH2 SUPER SWEETS 200' FROM OTHER CORN.

===VARIABLE COSTS:		UNITS	QUANTITY	PRICE	COSTS
SEEDING COSTS:	RYE COVER CROP	BU.	2	$9.00 /BU	$18.00 (*)
SEEDS	ARGENT SE, SILVERADO SE, BREEDERS CHOICE SE, INCREDIBLE SE, SENECA STARSHINE SE	LB	15	$5.00 /LB	$75.00
FERTILIZER: N		LB.	150	$0.25 /LB	$37.50
P		LB.	100	$0.24 /LB	$24.00
K		LB.	100	$0.14 /LB	$14.00
LIME		TONS	0.5	$20.00 /TON	$10.00
SPRAY MATERIALS:					
	LORSBAN 15G	LB	7.0	$2.00 /LB	$14.00
HERBICIDES	DUEL	LB	1.5	$11.98 /GAL	$17.97
INSECTICIDES	POUNCE - ASANA - AMBUSH (SPRAY 3 TIMES A WEEK AFTER SILK)	GAL	1	$123.90 /GAL	$123.90
FUNGICIDES					$0.00
CROP SUPPLIES:	CRATES (4 DOZEN EACH)	CRATES	350	$1.35 /CRATE	$472.50 (*)
IRRIGATION:		ACRE	$3,324	20.46%	$680.00 (*)
MARKETING:					
HAULING, GRADING & COOLING *		CRATES	350	$1.50 /CRATE	$525.00 (*)
MACHINERY & EQUIP. (FUEL, OIL, REPAIRS)		$$	$85.05	$1.00	$85.05
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)		$$	$401	7.50%	$30.11 (*)
	OPERATING COSTS				$2,127.03
	OUT OF POCKET COST/DOZEN **				$1.52
=== FIXED COST:					
LABOR		HRS.	234	$5.00	$1,170.00
TOTAL FIXED MACHINE COSTS		$$	$268.12	$1.00	$268.12
TOTAL FIXED BUILDING COSTS (DEP., INT., INS. & TAXES)		$$	$0.00	0.00%	$0.00
LAND CHARGE		$$	$800.00	8.00%	$64.00
	TOTAL COSTS				$3,629.15
	TOTAL COSTS PER DOZEN **				$2.59

** BASED ON 1400 DOZEN PRODUCTION PER ACRE

APPENDIX IV (VINE-RIPENED TOMATOES BUDGET)

STRINGWEAVE TOMATOES

** EXPECTED INCOME **

QUANTITY(BOX-25#)	PRICE/BOX(25#) $4.00	$6.00	$8.00
2000	$8,000	$12,000	$16,000
2500	$10,000	$15,000	$20,000
3000	$12,000	$18,000	$24,000

** MANAGEMENT INFORMATION **

- USE A 2' X 5' SPACING.
- FERTILIZER: BROADCAST: ONE-HALF AT PLANTING
  - SIDEDRESS: ONE-FOURTH AT FIRST COLOR
  - ONE-FOURTH APPLIED FOUR WEEKS LATER.
- STRINGWEAVE: ADD FIRST STRINGS TO STAKES AS PLANT FALLS OVER.
  - USE ADDITIONAL STRINGS AS NEEDED.
- PROTECTIVE FUNGICIDE SPRAYS MUST BE USED EACH WEEK.
- HARVEST FOR "BREAKER" MARKETS THREE TO FOUR TIMES EACH WEEK.
- TRICKLE IRRIGATION RECOMMENDED!!!
- IRRIGATION SYSTEM IS DRIP IRRIGATION WITH THROW-AWAY PRE-PUNCHED TUBING
- FIRST ACRE IRRIGATION COST IS $2,162. BUDGETS AVAILABLE UPON REQUEST.

===VARIABLE COSTS:		UNITS	QUANTITY	PRICE	COSTS
SEEDING COSTS:	RYE COVER CROP	BU.	2	$9.00 /BU	$18.00 (*)
PLANTS	MTN. SPRING, MTN. DELIGHT MTN. FRESH MTN. SURPREME	PLT	4000	$0.05 /PLT	$200.00
FERTILIZER: N		LB.	200	$0.25 /LB	$50.00
P		LB.	200	$0.24 /LB	$48.00
K		LB.	200	$0.14 /LB	$28.00
LIME		TONS	0.5	$20.00 /TON	$10.00
HERBICIDES	SENCOR	LB	1	$28.95 /LB	$28.95
	DEVRINOL,PPI	LB	4	$8.24 /LB	$32.96
INSECTICIDES	THIODAN 50W	LB	6	$6.90 /LB	$41.40
FUNGICIDES	BRAVO 720	GAL	2.5	$62.00 /GAL	$155.00
	RIDOMIL/BRAVO 81W (3)	LB	7	$17.79 /LB	$124.53
CROP SUPPLIES:	BOXES	BOXES	2500	$0.85 /BOX	$2,125.00 (*)
STICKS (2" X 2" X 5'-1450 STICKS/5 YRS)		STKS	290	$0.50 /EA	$145.00
BINDER TWINE		LB	100	$0.60 /LB	$60.00
PLASTIC MULCH (4' X 2000')		ROLLS	4	$50.00 /ROLL	$200.00
MARKETING:					
HAULING, GRADING & COOLING *		BOXES	2500	$1.30 /BOX	$3,250.00 (*)
IRRIGATION:		ACRE	$2,162	26.32%	$569.00 (*)
MACHINERY & EQUIP. (FUEL, OIL,REPAIRS)		$$	$103.43	$1.00	$103.43
OPERATING INTEREST (ON ABOVE COSTS EXCEPT *)		$$	$1,027	7.50%	$77.05 (*)
OPERATING COSTS					$7,266.32
OUT OF POCKET COST/BOX **					$2.91
=== FIXED COST:					
LABOR		HRS.	510	$5.00	$2,550.00
TOTAL FIXED MACHINE COSTS		$$	$322.83	$1.00	$322.83
TOTAL FIXED BUILDING COSTS (DEP.,INT.,INS. & TAXES)		$$	$0.00	0.00%	$0.00
LAND CHARGE		$$	$800.00	8.00%	$64.00
TOTAL COSTS					$10,203.15
TOTAL COSTS PER BOX **					$4.08

** BASED ON 2500 BOX PRODUCTION PER ACRE (VIRGINIA TECH BUDEGTES), Adjusted to 2,000 boxes per acre based NC Data