

## COMPETITIVE MARKET ANALYSIS–CHESTNUT PRODUCERS

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### ABSTRACT

The University of Missouri Center for Agroforestry (UMCA) is conducting research to identify and describe the chestnut (*Castanea* spp.) product market value chain. Through detailed market research and by organizing events that increase consumer awareness towards chestnuts, UMCA's goal is to broaden market opportunities for all individuals and businesses in the chestnut market.

In 2004, UMCA conducted a nationwide survey of individuals and businesses active in the U.S. chestnut market. Results confirm that the US chestnut industry is in its infancy. The majority of chestnut producers have been in business less than ten years and are just beginning to produce commercially. Volume of production is low (less than 1.5 million pounds). US chestnut producers are mainly part timers or hobbyists. Production operations are small and the crop harvested manually. The majority of respondents sell only fresh chestnuts and a few sell value added products.

Barriers to success in the chestnut business are the lack of information for producers, retailers and consumers, five to ten year time lag to get a return on investment, and shortage of available chestnut cultivars for commercial production. There are also problems related to pest and disease control and the market is uncertain. Specific policies such as subsidizing cheap imports, existent quarantines for cultivars from other countries and lack of chemicals registered for use with chestnuts can also be considered barriers to success.

Chestnut growers associations, universities, state, and federal agencies must join their efforts to fund and support chestnut research and development of the industry.

**Keywords:** *Castanea* spp., marketing, market survey, Porter Five Forces Model, value chain

### INTRODUCTION

This paper, focused on the US chestnut market, is one of a series of papers focused on developing a detailed understanding of specific agroforestry markets (Gold et al. 2004a; Gold et al. in press). Widespread adoption of agroforestry in North America is lagging. This is due, in part, to risk-averse producers' understandable reluctance to establish agroforestry practices in the absence of readily available market information. Market knowledge is a key ingredient in the success of profitable agroforestry enterprises that produce commercially valuable specialty products (Gold et al. 2004a).

Edible chestnuts (*Castanea* spp.) are an ancient tree crop undergoing a global renaissance (Gold et al. 2004b). Until the near extinction of the American chestnut forest from chestnut blight (1900-1950), American chestnuts were sold by the railroad car in the cities of the eastern US. With the death of the American chestnut forests this food was essentially lost from the American diet for a couple of generations (Wahl 2002). Today, chestnuts are experiencing a surge in consumer popularity in many European countries, Australia, New Zealand, and the US (Kelley and Behe 2002) and an increase in production in Asia (Bodet 2001; USDA 2005). World chestnut exports in 2003 were 106,000 metric tons. The US imported 4,551 metric tons in 2003 and 5,400 metric tons in 2004 (FAOSTAT 2005). In response to this trend, and to the fact that the US consumer has an increased interest in both new and healthy foods, efforts are in progress to revitalize chestnut production and consumption throughout the US. Over the past 20 years, scattered efforts were initiated throughout the USA to develop domestic chestnut production based on chestnut species and cultivars from Europe or Asia.

A study performed by the University of Nebraska Food Processing Center identified marketing opportunities for chestnuts and value-added chestnut products. The study assessed the interest of upscale restaurant chefs in value-added chestnut products but also looked at the ingredient and retail markets (Wahl 2002). Results indicated that product freshness and quality were very or extremely important. This creates a market niche for locally produced chestnuts delivering a fresh, high quality product. The study also indicated that growers in Midwestern US have an excellent market opportunity with value-added chestnut products, including shelled and frozen vacuum packed chestnut kernels (Wahl 2002).

Other recent studies on chestnut marketing, developed by the Midwest Nut Producers Council and Michigan State University searched for market opportunities for chestnuts and value-added chestnut products. The first study identified market potential in upscale restaurants in Michigan for both peeled and unpeeled chestnuts (Smith et al. 2002). The chefs participating in the study preferred peeled chestnuts and used them in a variety of dishes (Kelley and Behe 2002). Another study focused on assessing the opportunity of developing value-added chestnut products to increase grower profits. Professional chefs were involved in the study to develop product concepts and provided feedback on components and recipes. The new products (soups and chestnut flour products) are under evaluation by consumers at specialty/gourmet shops and students of the campus of Michigan State University (Smith et al. 2004).

Research efforts are currently underway at the University of Missouri Center of Agroforestry (UMCA) to develop improved varieties of northern pecan (*Carya illinoensis*), eastern black walnut (*Juglans nigra*), and Chinese chestnut (*Castanea mollissima*), two native and one exotic nut species. In the case of chestnut, it is necessary to redevelop the domestic market by reintroducing the chestnut as a food crop to a new generation of US consumers. A study was conducted to gauge consumer familiarity of with chestnuts, eastern black walnuts, and pecans to determine their interest in buying, consuming, and preparing these nuts and the key attributes that influence purchase decisions. The study also determined participants' interest in obtaining more information about the production, marketing, cooking, preparation, and nutritional information of nuts (Gold et al. 2004b). Results show that in contrast to pecan and black walnut, consumers were unfamiliar with chestnuts. Most had never tasted a chestnut, but did have interest in exploring them as a new food. Quality and nutrition-diet-health were consistently

listed as the most important attributes influencing purchase and consumption decisions for chestnuts and black walnuts but for pecans, locally grown was the most important attribute (Gold et al. 2004b).

Following initial research into the consumer perspective, UMCA researchers are seeking to gain an in depth understanding of the chestnut marketplace. The objective of this study is to look at the US chestnut industry from the producer's perspective and take into consideration all the forces that influence competition based on Porter's Five Forces Model (Porter 1980). By understanding the forces, the chestnut producer already in the market can find ways to react to these forces in their own interest and maintain or develop competitive advantages that will help them succeed in the industry. The study also provides valuable information to individuals looking to enter the marketplace, with chestnut production being either a potential alternative farm crop or an opportunity for people already in the orchard business to diversify into different markets.

## **METHODOLOGY**

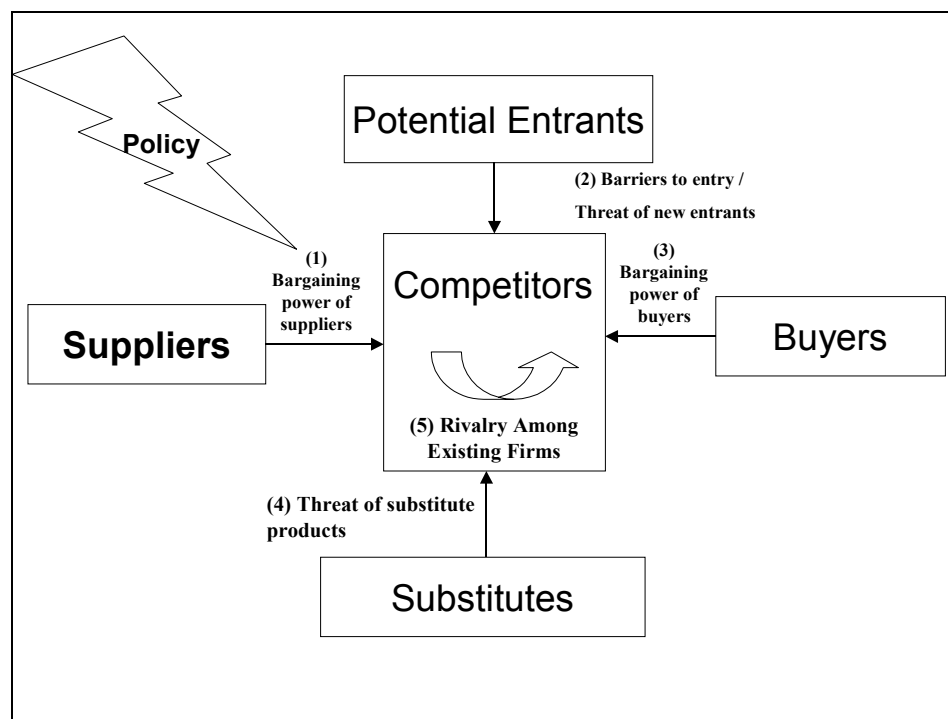
To analyze the chestnut market, a multiple-step research methodology was developed. First, chestnut producers all over US were identified using secondary information from the Internet, chestnut grower associations, and university colleagues. A database of producers (individuals and businesses) participating in the chestnut market was developed.

Second, a questionnaire-based survey was developed. The questions were designed to collect general information about the market participants and information specific to each of the Porter's five forces (Porter 1980).

The Five Forces Model looks at five areas of competition that market participants face. These areas include: barriers to entry, bargaining power of suppliers, bargaining power of buyers, threat of substitute products, and rivalry among existing firms (Figure 1). The influence of governmental policies on the market was added to the Porter model. By understanding the competitive forces within the chestnut industry, market opportunities and threats can be identified and successful strategies can be developed.

Questionnaires were mailed to all individuals identified in step one. Using a snowball approach, a question in each survey asked for names and contact information of other participants in the market. The newly identified individuals and businesses were added to the database and questionnaires were mailed to them.

Using SPSS, descriptive analysis was performed to analyze the data.



**Figure 1.** Porter's Five Forces Model of competitive market forces (Porter 1980).

## RESULTS AND DISCUSSION

This paper will present results of the market analysis from the producer's perspective. For chestnut producers, out of 250 surveys mailed nationwide, 90 surveys were returned and analyzed (36% response rate).

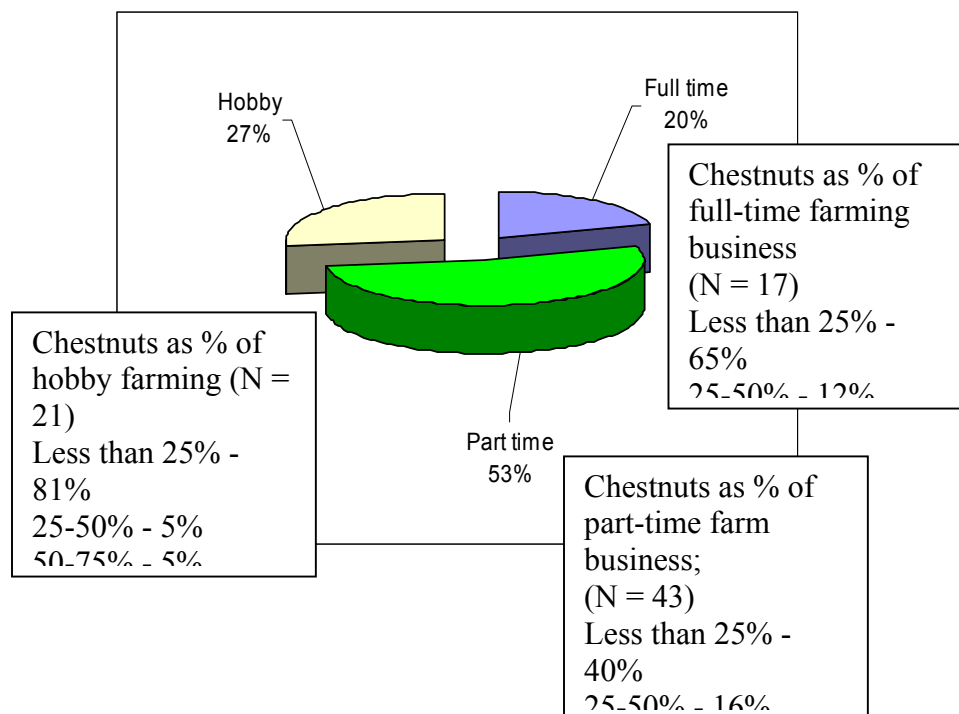
### General information about survey respondents and the industry

#### *Involvement in the chestnut business*

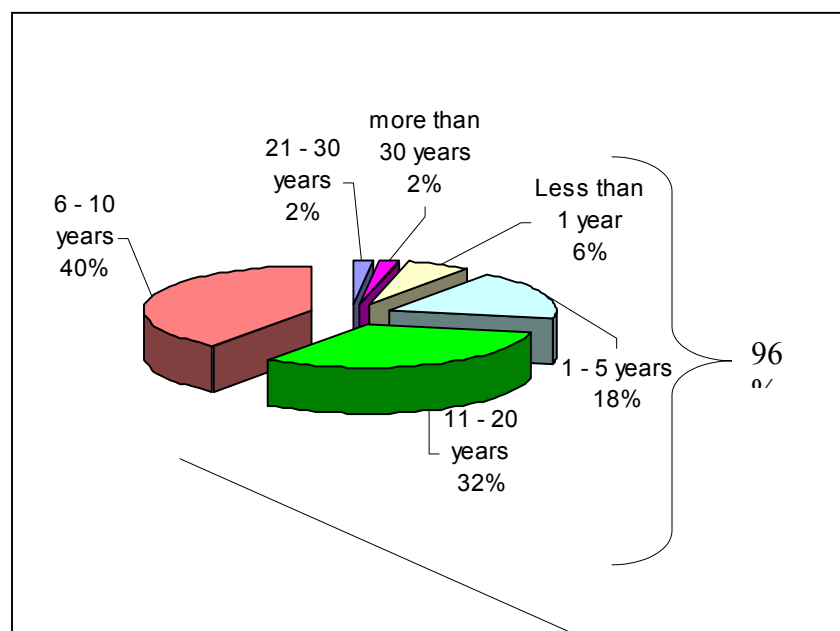
Based on survey responses, the industry is dominated by small-scale producers with minor commercial involvement in the chestnut business (Figure 2). Out of all respondents, only 20% are fulltime farmers and only a quarter of the fulltime farmers consider chestnuts more than 50% of their farming operation. The majority (53%) are part-time farmers and more than half of this group deal with other crops or activities more than with chestnuts. Twenty-seven percent are hobbyists. As hobbyists, there is little focus on commercial production and profit and more interest in tinkering, experimentation and pleasure.

#### *Longevity in business*

The U.S. chestnut industry is very young. The vast majority of producers (96%) have been in the market less than 20 years and 64% less than 10 years (Figure 3). Therefore, orchards are new, most of them just entering commercial production (92% of respondents have trees under age 20 and more than half under age 10). Commercial chestnut production begins sometime between 5 and 10 years after establishment, depending on location, management and other factors.



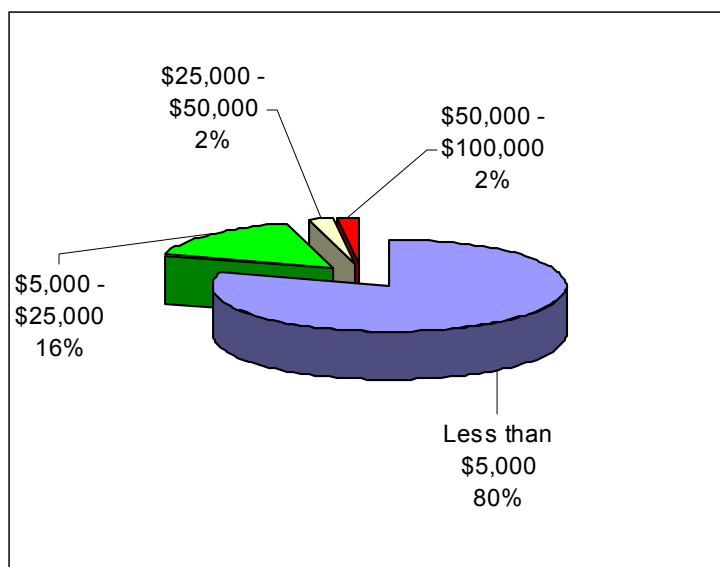
**Figure 2.** Involvement of producers in the chestnut business.



**Figure 3.** Longevity in business.

*Income generated by chestnuts*

Both the part-time and young orchard characteristics of the businesses influence the revenue generated by chestnuts in the industry, currently very low. An overwhelming majority of producers who responded to the survey (96%) earn less than \$25,000 annually from chestnut sales (Figure 4). An additional reason for the small revenues is that the majority of production is limited to fresh nuts that sell for relatively low prices.



**Figure 4.** Income generated by chestnuts.

*The production operation*

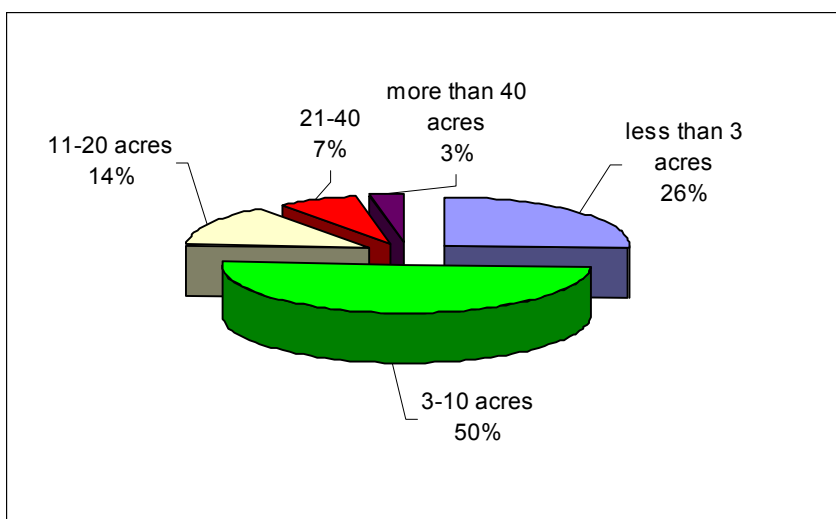
The size of production operation mentioned most often was between 3 and 10 acres (50%) followed by less than 3 acres (26%) (Figure 5). The most common density of trees is 51-100 trees/acre (52% of respondents). This is another sign that the orchards are relatively new. Research indicates that a maximum of 50 trees/acre is the optimal density for mature trees (Hunt et al. 2001).

There is interest in ecological oriented production among the respondents. Forty-six percent of respondents produce chestnuts using conventional practices, 42% do not use pesticides and 12% certified their production as organic.

Respondents indicated that they grow chestnuts from both seedlings and grafted cultivars. Seedlings derived from Colossal, Nevada, and unspecified Chinese cultivars are the most common type grown by respondents. Out of all cultivars that can be purchased in US, Colossal is by far the favorite. The unanimous preference for Colossal indicates a lack of familiarity with and limited supply of other cultivars.

Chestnut production is harvested manually by the majority of respondents (89%) while 16% use machines to harvest the chestnuts. Most of the respondents did not consider the investment in a

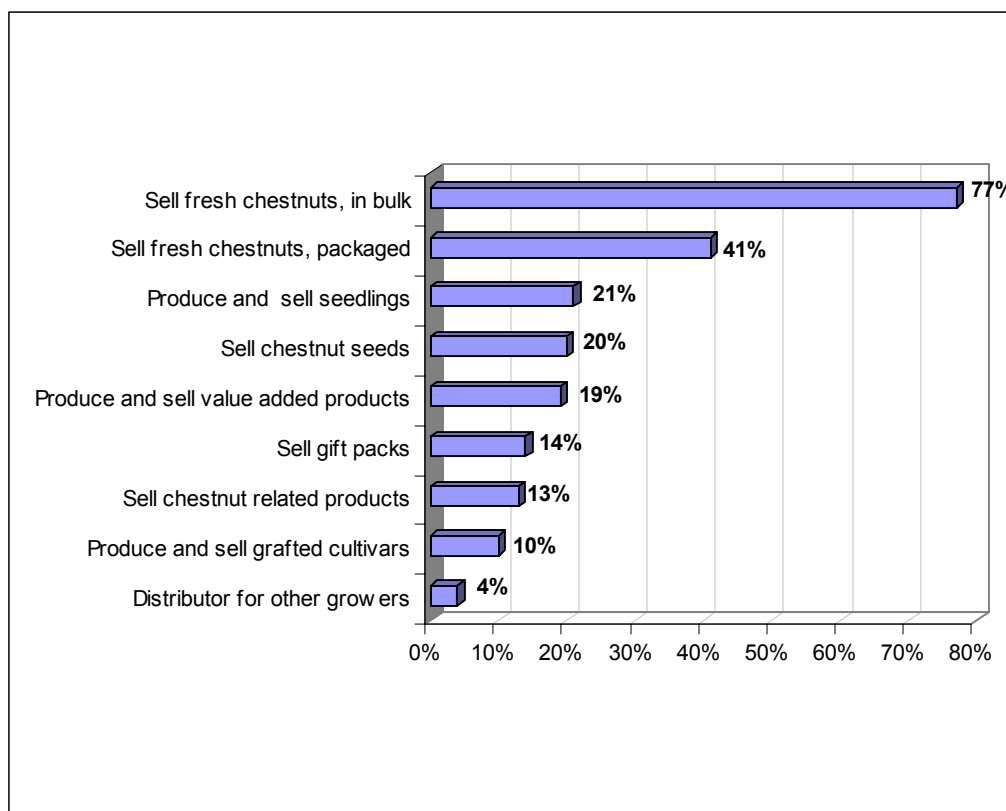
harvesting machine as imperative because their chestnut production is not large enough to require mechanization. Some use machines adapted from equipment used for another nut crop (e.g. walnuts).



**Figure 5:** Size of production operation.

#### *Products sold*

Most of the respondents produce and sell fresh chestnuts in bulk (77%) or packaged (41%). Some producers act as small nurseries and produce seedlings (21%), grafted cultivars (10%) or chestnuts for seed (20%). Nineteen percent of respondents sell value added products like chestnut flour, dried chestnut kernels, frozen chestnuts, chestnut honey, soup mix and jam, jellies or preserves while 13% sell chestnut related products (e.g., roaster, mug, cap, knife) (Figure 6). Survey results indicate that the value-added dimension of the chestnut business is in its incipient stage. In Asia and Europe, chestnuts are peeled and sold roasted, ready to eat as a snack or candied and sold as marron glacé. Chestnuts are frozen, dried, and canned for later consumption, or sold as soup mix, jam, jellies, preserves, puree and flour. Based on research of products produced and sold in Europe and Asia we offered many options of value-added products in the survey. Very few respondents were selling the value-added options presented. Results show that production is low and that producers had no difficulties selling all production after harvest. For this reason, they do not feel pushed to diversify into new products. As consumer demand for convenient, easy to eat and cook chestnuts increases, some producers may develop supplementary activities in addition to selling fresh chestnuts. For example, in Australia, peeled, frozen chestnuts are growing rapidly in popularity (J. Casey, pers. comm. 2004). Additional processors may surface in the value chain as the diversity of products find their way to the market. Wider adoption of value-added products would add additional value to fresh chestnuts and prolong shelf life. Together with an increase in consumer awareness towards chestnuts, value-added products would help increase chestnut consumption beyond winter holidays to a healthy year-round food.



**Figure 6.** Activities performed by chestnut producers.

### Information about the market

What we have learned about the industry, i.e., that it is small, young, and predominantly focused on the fresh produce market, will be reflected in all answers to questions related to the market. Current responses show that in the newly developing stage of the industry, the emphasis is more on production with less focus on the long-term future of the industry.

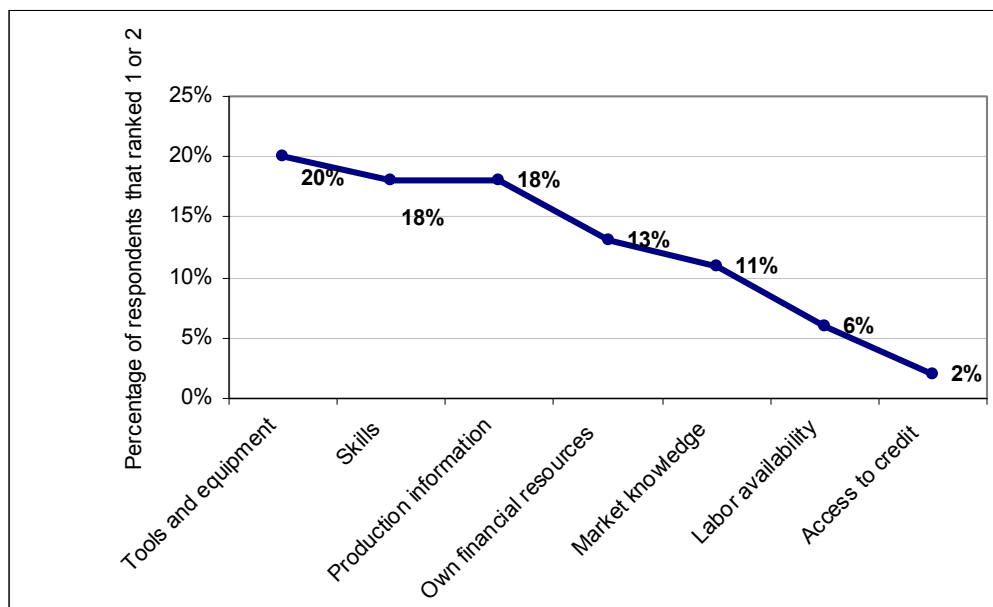
#### *Industry attractiveness*

The cost to establish a 10 hectare chestnut grove is about \$38,900 (Trapnell et al. 1999). To enter the chestnut business, one can self finance the start-up costs without requiring loans or partnerships and establish at least a small scale operation. The negative aspect of starting a chestnut business is that there is a time lag from initial investment to first return or profit. Of the respondents, 41% obtained a return (had a first sale) in less than five years, and 21% of respondents obtained the first return in six to ten years, while 35% have yet to obtain a return. A large majority of respondents (76%) are not yet profitable. Ten percent of respondents became profitable (revenues exceeded expenses) in six to ten years, 7% in less than five years, and another 7% in 11 to 18 years. The factor that most influences the lack of profit is the size of the business (83% of the respondents that are still unprofitable have less than \$5,000 in annual sales from the chestnut business).

Production and marketing information and skills are critical resources to enter the market. However, the responses to the survey confirmed the focus of respondents on production more than marketing and the short-term rather than long-term. Tools and equipment, production skills



and production information were valued higher than financial resources and market knowledge and marketing skills while labor availability and access to credit were valued least (Figure 7). Based on survey responses, individuals are attracted to the chestnut business by the potential for profit due to low initial investment and perceived market potential, or by love and interest in chestnuts and chestnut trees. At the same time, lack of knowledge, information, available cultivars, equipment, and support, uncertainty of markets and demand, and long time to obtain a return on investment are factors that deter people from starting a chestnut production business.



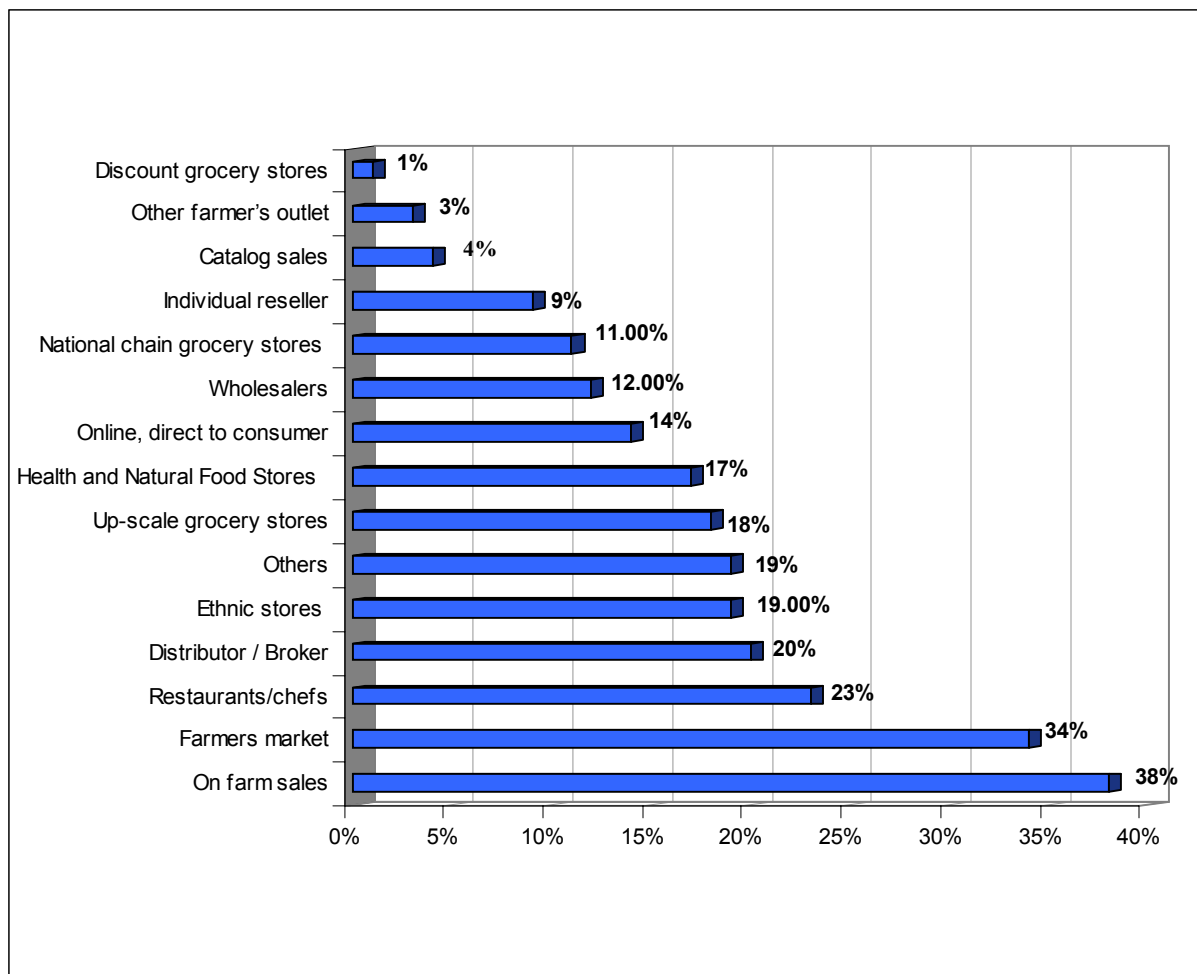
**Figure 7.** Critical resources needed for a chestnut production business.

### *Suppliers*

There are few major suppliers of grafted chestnuts in the industry. One particular nursery was mentioned as primary supplier by 31% of respondents and other two nurseries were mentioned by 7% and 6%, respectively. The rest of the respondents mentioned other sources of supply. An alternative to buying seedlings and cultivars is to produce them. Fifty-four percent of respondents produce their own seedlings and cultivars, 64% purchase grafted cultivars, 41% purchase seedlings, and 18% purchase seedlings and do their own grafting. Results indicate that the supply of chestnuts is limited but chestnut producers can grow and graft their own trees. A niche opportunity exists for a few highly motivated chestnut producers to transform a cost center into a profit center by developing a nursery and selling seedlings and cultivars to other growers.

### *Buyers*

Outlets that sell fresh chestnuts were identified. Many respondents (38%) sell chestnuts on-farm, direct-to-consumer. Thirty-four percent of respondents sell to farmers markets. Twenty-three percent sell fresh chestnuts to restaurants. Less than 20% sell either to retail locations, for example: ethnic stores (19%), up-scale grocery stores (18%), health and natural food stores (17%), national chain grocery stores (11%), or wholesalers (12%) (Figure 8). The small number of producer sales to grocery stores is expected considering the nature of the industry. There is not enough production to satisfy the demands of quantity and continuity required by major grocery chains. Small-scale producers sell their products on-farm and online while larger-scale producers have started to sell to other outlets.



**Figure 8.** Outlets that sell fresh chestnuts.

Looking at the average prices (Figure 9), the highest prices are paid by restaurants, followed by customers that buy on-line, health and natural food stores, farmers markets, and on-farm. The lowest prices are offered by discount grocery stores, distributors, and wholesalers.

For most of the outlets, the range of prices is very large. Producers sell from \$0.75 to \$6 at farmers markets, \$1.50 to \$6 on-farm, or from \$2 to \$7 at restaurants (Figure 9). In most cases, the higher the involvement (full-time versus part-time and high percentage of chestnuts in the farming operation versus low), the more effort to obtain better prices. Producers that grow chestnuts from cultivars, grow organic chestnuts and sell under a brand name obtained higher prices than producers who sell generic seedling chestnuts grown conventionally.

A premium price is obtained for organic production. The average prices for almost all of the market outlets are higher for producers that sell only organic compared with the prices obtained by producers that sell pesticide free and conventionally grown chestnuts (Figure 10). Additionally, those that produce organic chestnuts sell more to up-scale grocery stores, health and natural food stores, national chain grocery stores and online, direct-to-consumer.

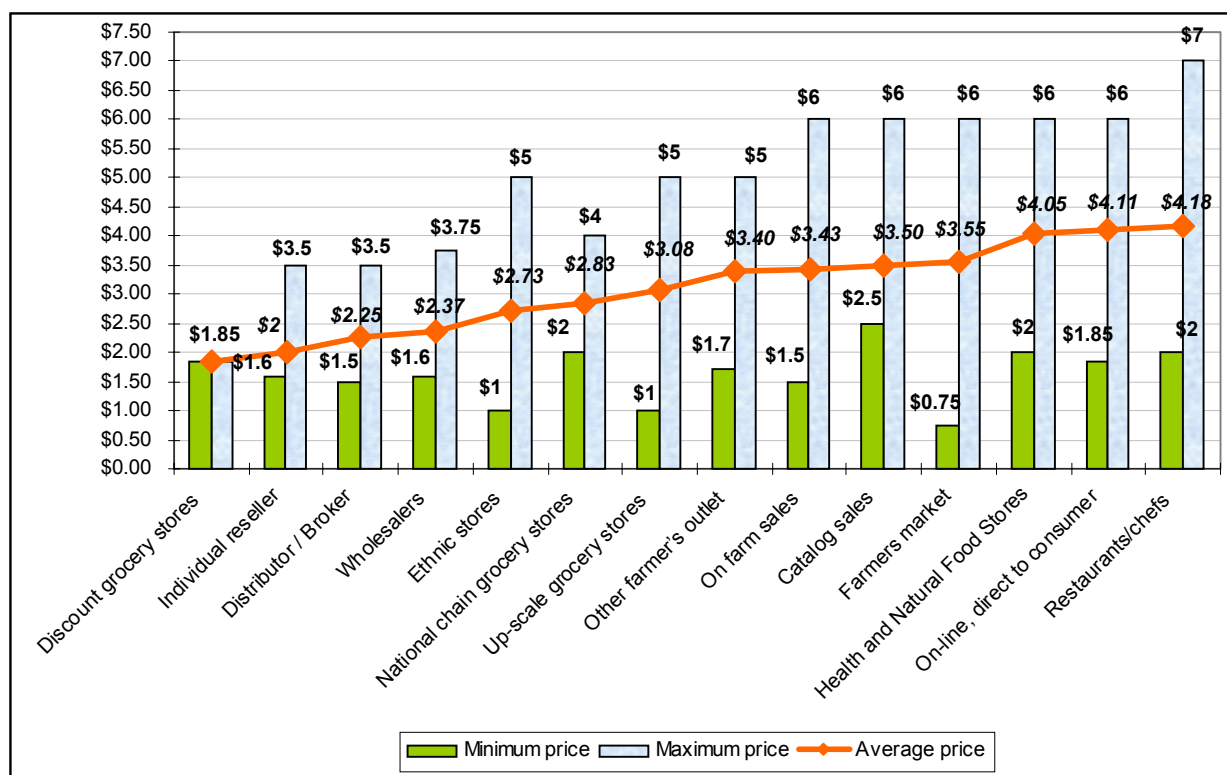


Figure 9. Prices paid by different buyers.

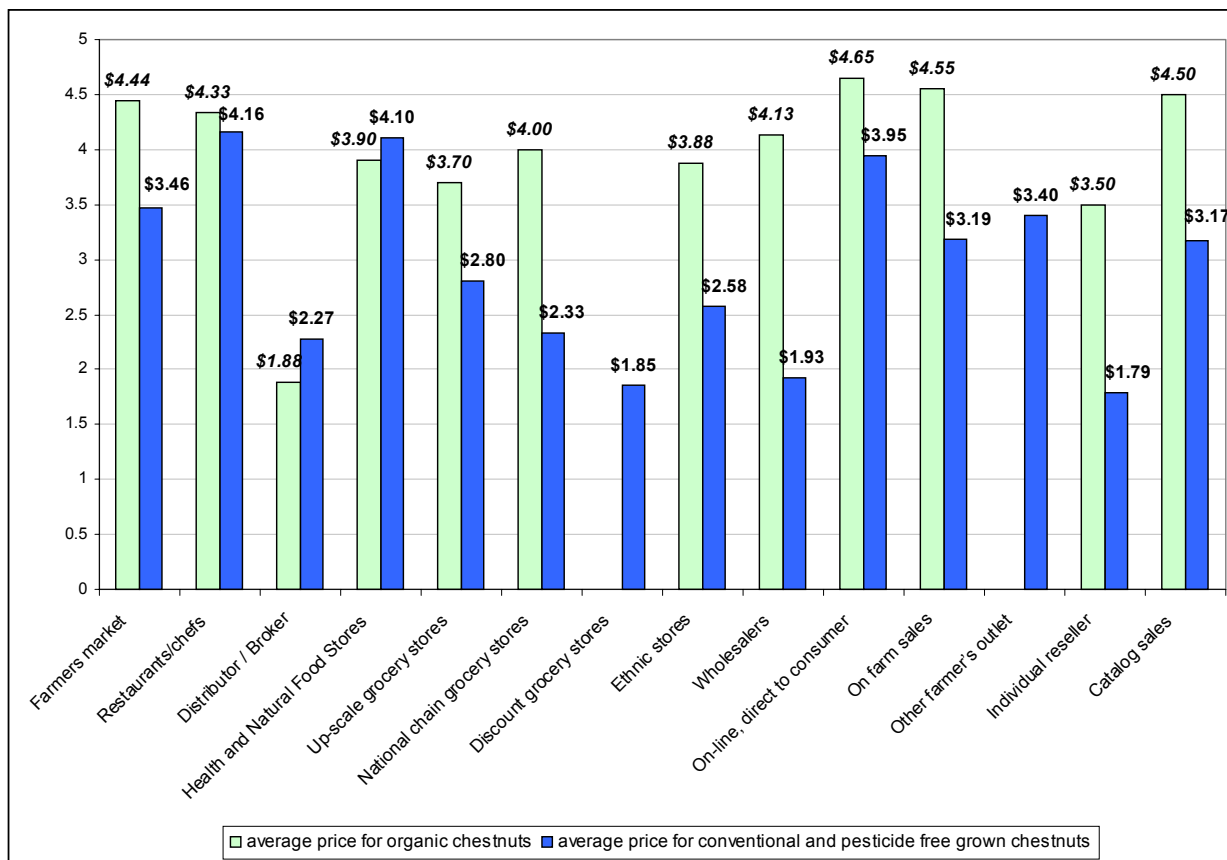
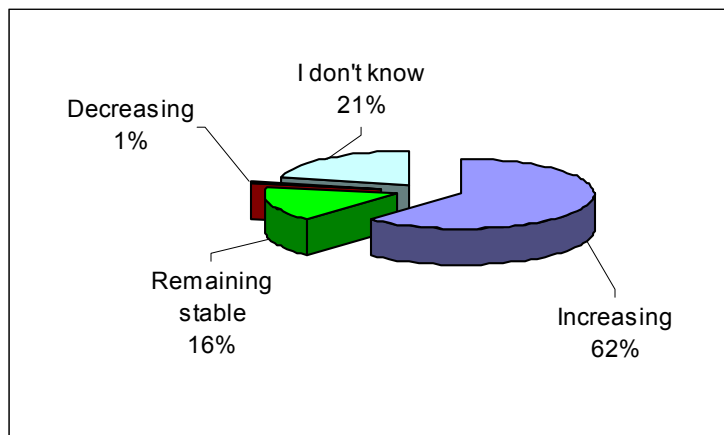


Figure 10. Premium price obtained for organic production.

### *Trends in demand*

The majority of respondents (56%) indicated that demand for fresh chestnuts increased by 10% - 25% in the past five years. At the present time, respondents stated that demand for fresh chestnuts is steady (37%) or strong (32%). Demand for fresh chestnuts is expected to continue to increase by 10% to 25% in the next five years (62% of respondents) (Figure 11).

Due to the nature of the industry with its current focus on production of fresh chestnuts, few respondents expressed a clear opinion regarding demand for value added products.

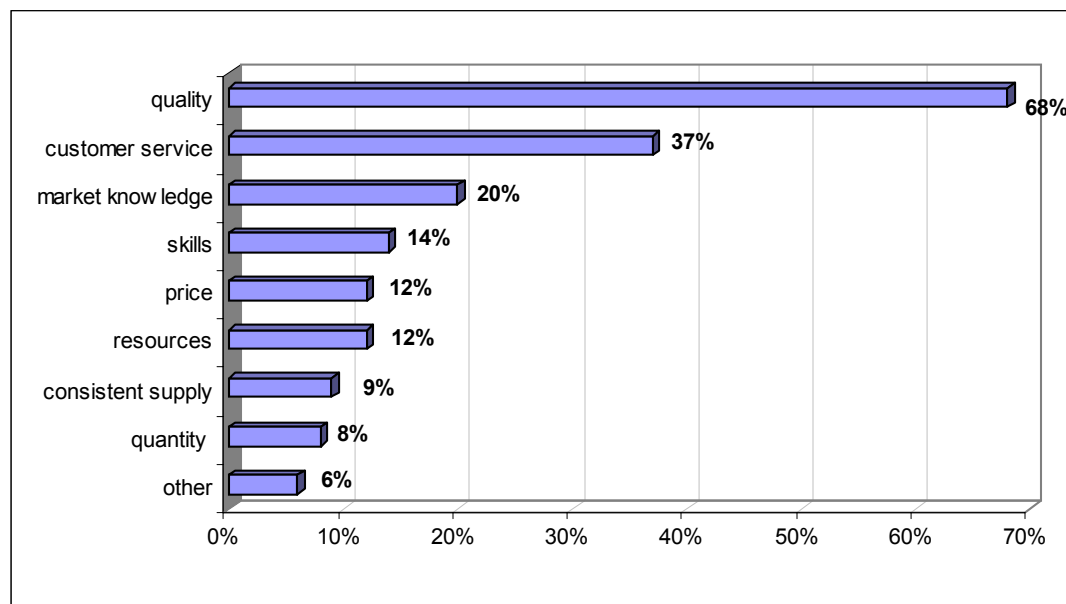


**Figure 11.** Demand trends for fresh chestnuts in the next five years.

### *Competitors*

Given the size of the domestic market, the industry is too small to thoroughly evaluate domestic competition. Most respondents (69%) declared that there are between 1 and 10 other chestnut producers in their area and 19% are the only chestnut producers in their area. Forty percent of the respondents felt that the number of chestnut farms remained stable in the past five years while 31% noted an increase. Over the next five years, 54% think that the number of chestnut farms will remain stable and 34% that they will increase. Since most producers are able to sell all production in a short amount of time they feel unthreatened by competition in the short run. For new or existing producers, competition can arise not only from local producers, but from imports. According to the USDA (2005), starting with 2001, total value of imports was almost constant (\$11million) but imports from China increased strongly (about 400%). Only 8% of respondents consider that the import of fresh chestnuts would become a threat in the next five years. The attitude towards imports is probably based on the fact that domestic supply should be of better quality and can reach the market earlier. This creates an opportunity for local producers to increase production and replace imports.

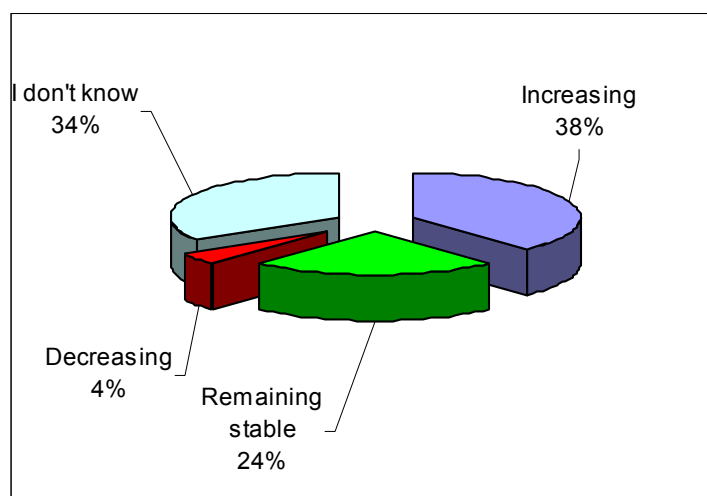
Producers already in the market try to provide value to their customers to maintain or to increase their market share. To do this, producers build competitive advantages that help them differentiate their product from the competition. For our respondents, the most often declared competitive advantage was quality (68%), followed by customer service (37%), and market knowledge (20%) (Figure 12).



**Figure 12.** Competitive advantages of chestnut producers.

### *Trends in price*

Based on survey data, thirty seven percent of respondents indicated that the price of fresh chestnuts increased an average of 10 to 25% in the last five years or remained stable (33%). In the next five years, 38% of respondents predicted that the price of fresh chestnuts will increase while 24% of respondents believed that prices will remain stable (Figure 13).



**Figure 13.** Trends in price for fresh chestnuts in the next five years.

### *Policies that influence the industry*

One federal policy that threatens profitability in the US chestnut market is the existence of free trade agreements that allow less expensive chestnuts to enter into the US. The US government is

trying to assist food producers from less developed countries to compete in international food markets (USAID 2003). Subsidizing the entry of low cost chestnuts impacts the domestic chestnut producer who is struggling to overcome many barriers related to a minor crop. Another policy mentioned was the quarantine restriction on importing potentially promising cultivars that are not available domestically. The shortage in domestic supply for certain cultivars coupled with the delay in testing and releasing new cultivars due to quarantine will adversely influence chestnut production. Respondents mentioned an increase in regulations for agriculture, which makes it more difficult to grow chestnuts. An important aspect mentioned by some of the respondents in this respect was the lack of chemicals approved for minor crops as chestnuts. Growers can only experiment with different pesticides used for other nut species but don't have the assurance that they are using a certified product.

There were no policies identified as helpful to enter into the chestnut market. There are grants that may assist producers as the USDA Sustainable Agriculture Research and Education (SARE) grant or the USDA Integrated Organic Program but none is specific for chestnuts.

## **CONCLUSIONS AND RECOMMENDATIONS**

The US chestnut industry is a nascent industry. The majority of the chestnut producers have been in business less than ten years. The volume of production is low (a majority of producers obtain less than \$5,000 annually from the chestnut business and 35% have not had a first sale yet). US chestnut producers are mainly part-timers or hobbyists. Only 20% of respondents are fulltime farmers and only two are 100% involved in the chestnut business. The size of production operations is small (50% plant between three to ten acres of chestnuts), harvested manually. Trees are very young (46% have trees younger than ten years), barely entering commercial production. The majority of respondents sell only fresh chestnuts in bulk or packaged while a few of respondents sell value added products.

Chestnut production has many positive aspects. Chestnut cultivation can be a source of profit due to high demand, good prices, high volume of imports compared to domestic production and relatively low initial investment requirements. Producing chestnuts can be a way to diversify an existing agricultural business. Chestnuts can be grown organically, have many nutritional and health benefits (e.g., gluten-free flour) and are associated with positive feelings such as tradition, holiday, and family that can help advertise the product.

One of the biggest barriers to success in the chestnut business is the lack of information for producers, retailers, and consumers. For producers, there is a serious lack of expertise and experience about cultivars, orchard management, prices, markets, and distribution channels. There is little knowledge among buyers on how to handle the chestnuts and increase shelf life. There is limited consumer awareness of the product (Gold et al. 2004b). Another barrier is the five to ten year time lag to get a return on investment. There is a serious shortage of available chestnut cultivars for commercial production, the crop is perishable, there are problems related to pest and disease control and the market is uncertain. Specific policies such as subsidizing cheap imports, existent quarantines for cultivars from other countries and lack of chemicals registered for use with chestnuts can also be considered barriers to success.

Chestnut is still a minor crop in the US and because of that not much attention is provided by federal or state agencies, universities, or other organizations. Chestnut growers associations must join their efforts to fund and support chestnut research and development of the industry. Both production and consumption of chestnuts should be stimulated. The focus should be on generating demand by increasing consumers' awareness about chestnuts and providing information and support to actual and future producers in order to generate enough domestic production to meet the created demand. Imports can be out competed by providing high quality, fresh and timely products.

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