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Enhancing the Profitability of Horticultural Products with Market Based Information

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*Selected Paper prepared for presentation at the Southern Agricultural Economics Association
Annual Meeting, Orlando, FL, February 6-9, 2010*

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Introduction

The green industry consists of the floriculture sector (cut flowers, potted foliage plants and bedding/garden plants) and environmental horticulture sector (Johnson, 1997). The environmental horticulture sector includes crops grown outdoors and primarily used for landscaping purposes including golf courses. The industry includes wholesale nursery growers, brokers and distributors, retail garden centers, landscape contractors and maintenance firms, and home centers and mass merchandisers that have specialized lawn and garden departments (S-1021 Technical Research Committee, 2005). In 2004, the North Carolina green industry recorded wholesale cash receipts of \$845 million. This is over \$200 million in excess of the receipts from tobacco (\$620 million) and turkeys (\$449 million). In 2004, North Carolina accounted for 6.2 percent of the national cash receipts from the green industry and ranked fourth nationally, behind Georgia, Texas and Alabama. Potted poinsettia is one of the green industry products that is growing very rapidly in North Carolina. As with many emerging products, the availability of market information on poinsettia is limited. This study seeks to contribute to the body of information on poinsettias by providing information on the nature of its demand. Such information will help enhance the marketing of poinsettias and strengthen the green industry in North Carolina and the nation by making it more productive, efficient and profitable.

The increasing importance of the green industry in North Carolina is noteworthy for at least three reasons. First, there is a moratorium on large scale hog operations in the state which makes it imperative that additional sources of growth have to be found in the state's agricultural sector, especially given the importance of the sector in the economy. Second, there is a possibility, though remote, that the broiler industry in the state could be adversely affected by an outbreak of bird flu. The third reason is the demise of the tobacco program. With the

elimination of tobacco quotas, tobacco prices, returns and production are expected to decrease thus making tobacco a less profitable and significant portion of North Carolina's agricultural economy. However, the demise of the tobacco program is accompanied by tobacco buyout payments that started in October 2005 and will run for a period of ten-years. The tobacco buyout payments present both challenges and opportunities for farmers in North Carolina. One of the challenges involves the investment of proceeds from the buyout program. A second challenge is how best to reallocate the land that was previously used to produce tobacco. These challenges offer the opportunity of finding profitable enterprise alternatives. Much effort has gone into finding alternative farm enterprises. Past efforts in this regard include the assessment of the profitability of producing mushrooms, medicinal herbs, vegetables and others. Products that constitute the green industry seem to be viable and profitable alternative enterprises as indicated by their rapid growth in sales in North Carolina, the United States and other countries.

The sustained growth in the green industry implies that the products are one of the few areas in production agriculture that is increasing in value and employing more people. The industry provides an alternative for farmers that have produced traditional crops such as tobacco, corn, cotton and vegetables. This is an especially good opportunity for farmers who may have been displaced as a result of the end of the tobacco program or the structural changes in the farm sector that have forced many small farms out of business. Nursery owners are not the only beneficiaries of the continued expansion of the green industry. The expansion generates rural economic activity, employment and income through the use of dormant resources or the improved allocation of such resources. In addition, society benefits from improved aesthetics and environmental protection. Helping the green industry to thrive will serve the interest of farmers, rural communities and the agricultural sector in North Carolina. In addition to others,

such help could be in the form of market analysis for individual green industry products such as poinsettias. This study assesses the demand for poinsettias. Specifically, the study estimates the demand for poinsettias in the U.S. and analyzes the impact of regions on the structure of demand for poinsettias.

Previous Work

Substantial research has been done on the green industry by members of the S1021 Regional Research Committee. Some past and current studies, including those conducted by members of the Committee, that have focused on the green industry help to underscore the importance of the sector. Some of these studies have attempted to develop baseline data for some states (Foshee et al., 1990) while others recognized the competitive relationship among states and regions as a major issue in making financial and marketing decisions regarding future investments and economic strategies (Brooker , Hinson and Turner, 2000). Rhodus and Hoskins (1995) surveyed members of the Perennial Plant Association and found that 86 percent of the respondents reported sales increases. Turner and Kriesel (1995) found that the green industry is the second leading employer in U.S. production agriculture. An earlier study by Jinkins and Ahearn (1991) also found that greenhouse and nursery products generate the second highest net value added per dollar of gross income. A related study by Brazee et al. (2004) found that the combined green industry in Illinois had a total workforce of 170,000 people and generated over 3 jobs for each job in the industry (employment multiplier of 1.52) and \$2.70 for each dollar of income in the industry (income multiplier of 2.7).

In an effort to provide assistance for new businesses in the green industry, Barton et al. (1994) developed a tool to assess the profitability and cost of establishing new garden centers.

Adrian, Duffy and Loyd (1996) also assessed turfgrass-sod as a viable farm enterprise. Some studies have also focused on consumers of green industry products in an effort to better understand the nature of the market. Abdelmagid, Wohlgenant and Safely (1996) used demand estimates for selected nursery plants sold in North Carolina to conclude that purchases of the products were affected more by their prices than by income and other variables. Hardy et al. (2000) seemed to confirm the link between housing construction and the growth of the green industry by finding that a good landscape increased the perceived value of a home by an average of 12 percent over its base price. Berghage et al. (2005) provided information to producers and consumers in Pennsylvania on the performance of new plants and cultivars while Ingram et al. (2005) evaluated horticultural production as alternative enterprises for Kentucky farmers. Shields and Willis (1995) found that the growth in the environmental horticulture industry far outpaces the growth in traditionally important agricultural crops and commodities.

Some of the preceding findings may well be applicable to North Carolina producers and consumers. However the state may have unique competitive advantages that need to be explored and capitalized on in order to ensure that the industry grows optimally. It is also necessary to identify financial, economic and other factors that operators in the state can use to manage their operations more effectively.

Poinsettia is the single most valuable flowering plant crop in the U.S. and is the most popular potted flowering or foliage plant for the Christmas season (Gast, 2009). North Carolina is the second largest producer of poinsettias in the U.S. and earned almost \$18 from the crop in 2008. This amount represents almost 12 percent of the national receipts of \$154 million in 2008. However, there is limited information on the market for poinsettias. Price and Price (2002) found that age, education and region are important variables that affect the likelihood of buying

poinsettias. The nature of the limited information and the growing importance of the crop underscore the need to add to the literature on the market for poinsettias.

Theoretical Model

Consumer demand theory is the relevant model for this study. Each consumer maximizes utility by allocating income to a bundle of goods and services. Maximization of the income-constrained utility function results in a set of first order equations. Solving the first order condition equations simultaneously gives a system of individual ordinary demand equations for each consumer. Horizontal aggregation across consumers, results in a market demand equation for each product where quantity demanded is expressed as a vector of prices, income, number of consumers and other qualitative variables that may affect demand.

Methods

We specify the per capita demand for poinsettias to be a function of price, income and regional variables as:

$$PCD = f(PRI, PCI, NE, PNE, MW, PMW, WE, PWE).$$

PCD is the per capita demand for poinsettia in pots per state, PRI is the price of poinsettia in dollars per pot, NE is a dummy variable that represents the intercept effect of the Northeast region of the U.S. and PNE is the interaction term between price and region and is used to measure the slope effect of the Northeast region. MW and PMW respectively represent the intercept and slope effects of the Midwest region. WE and PWE respectively represent the intercept and slope effects of the Western region of the US.

Data on poinsettia prices and quantities were obtained from the 2008 Floriculture Crops Summary (USDA/NASS, 2008). Prices of poinsettias and quantities sold in 2005 were obtained for each of 36 states. The per capita quantity for each state was estimated as the total quantity divided by the corresponding 2005 population (U.S. Census Bureau, 2010). The dummy variable for the Northeast region (NE) is coded as 1 if the observation is from a state in the Northeast (Maine, Vermont, New Hampshire, New York, Massachusetts, Connecticut, Rhode Island, Pennsylvania, New Jersey and Maryland) and 0 otherwise. The interaction term, PNE, was obtained as a product of price and the dummy variable for the Northeast region. The dummy variable for the Midwest region was coded as 1 if the price and income data were taken from a state in the Midwest (Ohio, Indiana, Michigan, Wisconsin, Illinois, Missouri, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, and Kansas) and 0 otherwise. The interaction term PMW was also obtained as a product of the price and dummy variable for the Midwest region. The dummy variable that represents the Western region (WE) was generated by assigning it a value of 1 if the state is in the Western region (Montana, Washington, Oregon, Idaho, Wyoming, Colorado, Utah, Nevada, California, Arizona and New Mexico) and 0 otherwise. The product of price and the dummy variables for the Western region represent the interaction, PWE. The base region for the equation is the Southern U.S. which includes the states of Delaware, Virginia, West Virginia, Kentucky, Tennessee, North Carolina, South Carolina Georgia, Alabama, Mississippi, Louisiana, Arkansas, Oklahoma and Texas and Florida. Coefficients of the above demand function were estimated by using regression analysis.

Results and Discussion

Table 1 contains the summary results for the per capita disappearance of poinsettias in the U.S. and for each region for 2005. On average, 21 pots of poinsettias were purchased per 100 persons at an average price of \$4.51 per pot. Consumption varied by region from a low of 19 pots per 100 persons in the Midwest to a high of 23 pots per 100 persons in the West. The highest average price per pot (\$4.71) was in the Midwest and is only about 8 percent higher than the lowest price of \$4.35 per pot in the South.

Table 1: Mean Per Capita Disappearance and Prices of Poinsettias in the Regions of the United States in 2005.

Region	Mean Quantity (pots/person)	Mean Price (\$/pot)
All Regions	0.21	4.51
South	0.20	4.35
Northeast	0.23	4.58
Midwest	0.19	4.71
West	0.23	4.49

The regression results in Table 2 indicate that the regression model is statistically significant. The Adjusted R-Square of 27 indicates that 27 percent of the variation in poinsettia purchases could be explained by changes in its price. Five of the eight explanatory variables are statistically significant at the 5 percent level. As expected, the price of poinsettias is statistically significant and its estimated coefficient of -0.18 represents the slope for the demand equation in

the South, which is the base region. This slope yields in an own-price elasticity estimate of -3.87 indicating that demand for poinsettias is relatively elastic in the Southern United States. This finding of an elastic demand differs from the expectation that the demand for poinsettias will be inelastic because of its very seasonal nature. It also differs from earlier work by Ejimakor and Kyei (2009) which found that, based on revenue and price data, the demand for North Carolina

Table 2: Estimated Regression Coefficients for the Per Capita Demand for Poinsettias in the United States.

Variable	Mean	Estimated Coefficient	t-value
Dep.Variable PCD (pots/person)	0.21	-	-
Indep. Variables			
Intercept	-	1.010	3.26
Price (\$/pot)	4.51	-0.185**	-4.02
PCI (\$/capita)	35,494.36	-0.00001	-0.21
NE ¹ (1 if northeast, 0 otherwise)	0.17	-0.605**	-2.18
PNE (\$/pot)	0.76	0.151**	2.33
MW ¹ (1 if Midwest, 0 otherwise)	0.25	-0.591**	-2.20
PMW (\$/pot)	1.18	0.138**	2.32
WE ¹ (1 if West, 0 otherwise)	0.22	-0.621	-1.62
PWE (\$/pot)	1.0	0.149	1.73

F-Value = 2.63, Adjusted R² = 0.27, See = 0.11, N = 36.

1. The South is the base region.

poinsettias is inelastic. This discrepancy may be due to the inclusion of more states and regions in this study. The estimated equation indicates that income does not have a significant effect on the demand for poinsettias. The estimated coefficients for two of the three regional dummy variables and their interaction terms are statistically significant. The dummy variable for the Northeast region (NE) has both an intercept and slope effect. The intercept for the demand for poinsettias in the Northeast is 0.45 (1.05 – 0.60) and is smaller relative to that for the south. The structure of demand for the Northeast is also different from that of the South. The estimated slope for the demand equation in the Northeast is 0.03 (-0.18 + 0.15). This slope results in an own price elasticity coefficient of -0.58 indicating that, unlike the South, the demand for poinsettias in the Northeast is inelastic. The intercept for the demand estimate for the Midwest region is 0.46 (1.05 – 0.59) which is almost the same as the 0.45 estimated for the Northeast. However, the slope of the estimated demand equation from the Midwest is -0.04 which is lower than that for the South and slightly higher than that of the Northeast. Based on the slope, the estimated own-price elasticity for poinsettias in the Midwest is -0.86. The estimated coefficients for the intercept and interaction term for the Western region variable are not statistically significant.

Conclusions

Price is an important factor in the demand for poinsettias. Demand varies by region and structural differences were found to exist in the demand for poinsettias based on regions.

Demand for poinsettias is most responsive to changes in its price in the Southern and Western United States and least responsive in the Northeast and Midwest. The available data suggests that the prices of poinsettias are lower in the regions (South and West) where demand is elastic and higher in regions with inelastic demand. However, the regional differences in prices do not seem

to fully reflect the differences in price elasticity. This suggests that the market for poinsettias in the Northeast and Midwest regions of the U.S. may be able to support higher prices for the floricultural crop.

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