Effect of Crapemyrtle Bark Scale on Crapemyrtle Industry and Consumer Demand

Pulkit Marwah, Department of Agricultural Economics, Texas A&M University, Pulkit.Marwah91@tamu.edu
Yu Yvette Zhang, Department of Agricultural Economics, Texas A&M University, YZhang@tamu.edu
Mengmeng Gu, Texas AgriLife Extension Service, Department of Horticultural Sciences, Texas A&M University, MGu@tamu.edu

Selected Poster prepared for presentation at the 2019 Agricultural & Applied Economics Association Annual Meeting, Atlanta, GA, July 21-23

Effect of Crapemyrtle Bark Scale on Crapemyrtle Industry and Consumer Demand

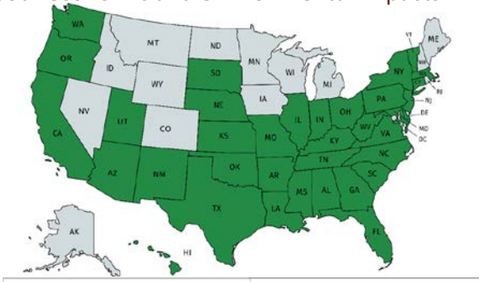
Pulkit Marwah[1]
Yu Yvette Zhang[1]
Mengmeng Gu[2]
[1]Department of Agricultural Economics, Texas A&M University
[2]Texas AgriLife Extension Service, Department of Horticultural Sciences, Texas A&M University

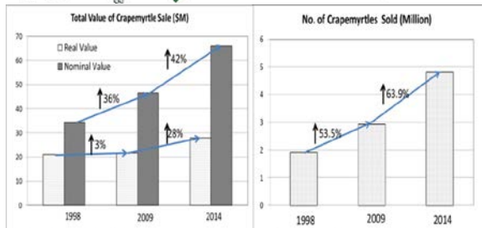
Introduction

- Crapemyrtle is the most popular summer flowering tree in the U.S.
- Crapemyrtle bark scale (*Acanthococcus lagerstroemiae*) has been confirmed in all the Southeastern U.S. except for Florida.
- In its native range in East Asia, CMBS is a serious threat to crapemyrtles, persimmons, and pomegranate plants.
- No biological control of the crape myrtle bark scale is known.
- California Department of Food and Agriculture has rated CMBS as a 14 on a scale of 1 to 15 with 15 being most serious.
- It has "moderate host range," has "both high reproduction and dispersal potential" and "could cause both economic and environmental impacts".









Picture Source: https://agrilife.org/extensionento/files/2017/10/Crape-mrytle-bark-scale-EHT-049.pdf; Graph Source: USDA NASS Census of Horticultural Specialties 1998, 2009, 2014

Objective

- Understand the impact that CMBS has on producers and overall demand of crapemyrtles.
- This study is funded by USDA-Specialty Crop Program with the ultimate goal of increasing knowledge of the scale & control strategies, and minimizing the potential economic loss caused to consumers, growers and the environment.

Methodology

- Interviewed businesses from Georgia, California, Louisiana, Texas, Florida, Tennessee, and Mississippi, at the 2018 Texas Nursery/Landscape Expo.
- Used MTurk for choice experiments with different attributes of crapemyrtle plants to identify consumers' demand for crapmyrtles and their preferences for different traits related to CMBS. Participants were asked to choose from two options with all the attributes listed. We had 16 scenarios like these with different combinations.

Both trees described below have attained maturity and will not bloom/flower more than the current state. Now, hypothetically, you have to make a purchasing decision to buy a tree. Which buying option would you choose from each of the scenarios below? (choose one)

Plant A	Plant B	Neither
Leaf color: Dark green	Leaf color: Light green	
Flowering: Dense	Flowering: Sparse	
Bark color: Brown	Bark color: Blackish	
Price: $350	Price: $300	
a	b	c

Model

A linear random utility model (McFadden & Train, 2000) has been used in the past literature (Yin et. al., 2018) with a random parameter logit model (Gao & Schroeder, 2009)

$$U_{ij} = \alpha_i \cdot p_{ij} + \sum_{k=1}^{T} \beta_{ij} \cdot x_{ijk} + \varepsilon_{ij}$$

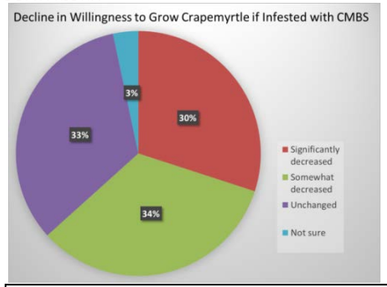
Where U_{ij} is the utility of individual i, p_{ij} is the price of alternative j for individual i, k is the k^{th} attribute of alternative j, and α_i and β_{ij} are marginal utilities for price and k^{th} attribute respectively. So the following equality holds

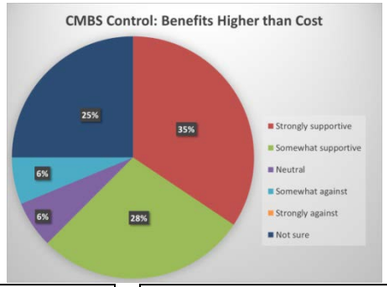
$$\alpha_i \cdot p_{ij} + \sum_{\substack{l=1 \\ l \neq k}}^{T} \beta_{il} \cdot x_{ijl} + \beta_{ik} \cdot x_{ij(k=0)} + \varepsilon_{ij} = \alpha_i \cdot (p_{ij} + WTP^k) + \sum_{\substack{l=1 \\ l \neq k}}^{T} \beta_{il} \cdot x_{ijl} + \beta_{ik} \cdot x_{ij(k=1)} + \varepsilon_{ij}$$

So the WTP can be calculated by the following

$$WTP^k = -\beta_k / \alpha$$

Results





Variable	Mean (Std Dev)
Age	34.35 (8.974)
Household Size	4.05 (2.262)
No. of Children	1.97 (2.620)
Female	39.87%
Education	
Master's degree, Professional degree or Doctorate degree	24.69%
Some College, Associate's degree, or Bachelor's degree	65.82%
Regular High School Diploma, GED or equivalent	8.86%
No schooling completed	0.63%
Employment	
Full Time	84.18%
Part Time	10.13%
Do Not Work	3.80%
Other	1.90%
Race	
White	81.01%
Black or African American	12.03%
Asian	1.90%
American Indian or Alaska Native	5.06%
Hispanic	
Yes	24.05%
No	75.95%
No. of Respondents	158

Income	T
Average Income	$62,721.52 (43,693.33)
Less than $20,000	6.33%
$20,000 to $29,999	9.49%
$30,000 to $39,999	**13.29%**
$40,000 to $49,999	**10.13%**
$50,000 to $59,999	**19.62%**
$60,000 to $69,999	**11.39%**
$70,000 to $79,999	**11.39%**
$80,000 to $89,999	3.16%
$90,000 to $99,999	5.70%
$100,000 to $149,999	5.70%
$150,000 to $199,999	1.90%
$200,000 to $249,999	0.63%
$250,000 to $299,999	0.63%
$300,000 to $349,999	0.63%
$350,000 to $399,999	0%
$400,000 to $449,999	0%
$450,000 to $499,999	0%
$500,000 or more	0%
No. of Respondents	158

	coef	exp(coef)	se(coef)	z	p		Δ WTP	
Leaf	0.2066	1.2295	0.1075	1.9200	0.0550	Leaf	99.34	*
Flower	0.2360	1.2662	0.1055	2.2400	0.0250	Flower	113.47	*
Bark	-0.0471	0.9540	0.0731	-0.6500	0.5190	Bark	-22.66	
Price	-0.0021	0.9979	0.0010	-2.0600	0.0400	Total	190.14	**

Conclusions

- Producers anticipated a decline in willingness to grow crapemyrtle when infested with bark scale.
- We found industry demand for systemic and scientific CMBS control.
- Consumer WTP for crapemyrtle significantly decreased due to CMBS infestation, with dense flowering being the most important attribute (highest WTP).