Impact of the COVID-19 Pandemic on Gardening in the United States: Postpandemic Expectations

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Additional index words. consumer purchasing, coronavirus, green industry

Summary. **The COVID-19 pandemic altered the way many consumers and businesses transacted business. Concerning the green industry, many households began gardening and/or purchased more green industry products. As the pandemic ends and households begin to return to normal, green industry firms need to understand this new normal. Using an online national survey of households, we assessed which households were more likely to remain in the market after entering during the height of the pandemic (2020). Findings indicated that younger consumers (i.e., Millennials and younger individuals who were born in 1985 or after) were less likely to indicate they always garden (before the pandemic) but more likely to have started gardening during the pandemic and perceived that they would not continue to garden as states returned to normal (2021). This age group was also more likely to not have gardened in 2020, but they intended to garden in 2021. This finding shows a dichotomy in gardening preferences in this young age group. Further findings indicated that race, household income, number of children in the household, and the impact of the pandemic on the household also help explain the household's decision to garden or not.**

As the COVID-19 pandemic gripped the country in the early part of 2020, many people were quarantined at home for days, weeks, or months. Because of the lockdowns, consumers changed their buying habits. They changed not only how much they were purchasing but also what they purchased and how they made those purchases. Even though the changing work environment hampered numerous industries, the green industry had a favorable year because people were spending more time at home due to quarantine and/or teleworking. For instance, the number of adult Americans who reported working from home grew from 20% before the pandemic to a little more than 70% during the peak of lockdowns (Parker et al., 2020). As a result of the lockdowns, the green industry experienced an estimated 8% increase in revenues for plant and landscape items (e.g., pots, fertilizers, etc.) from Jan. 2020 to July 2020 compared with the same period in 2019 (Campbell et al., 2021).

The increase in sales in 2020 was driven by a combination of increased purchasing by long-term buyers and new entrants to the market. Firms relying on these trends (increased purchasing by buyers and new entrants) to make future decisions need to have a better understanding of whether consumers will remain in the market and of the characteristics of consumers likely to remain in the market. As noted by Campbell et al. (2021), 62% of respondents noted they intended to return to prepandemic purchasing levels; however, the other 38% intended to maintain their postpandemic purchasing levels.

Because many consumers anticipate reverting to their prepandemic green industry product purchasing and activity levels, it is essential to understand who will be remaining in the market and who will be exiting the market. Therefore, the goal of this study was to conduct an exploratory analysis of how the pandemic changed the willingness of participants to garden in 2020, and their intentions as the country moves away from the peak pandemic levels in 2021. We hypothesized that demographics would have a role in gardening participation in 2020 and 2021. Notably, we expected age to have a pivotal role in beginning to garden and in the intention to continue gardening. Previously, Baby Boomers (born in 1964 or before) spent the most on gardening, and younger consumers (i.e., Millennials, born in 1985 or after) comprised the largest group to begin gardening activities (Gardencentermag.com, 2016). Therefore, we expected that younger consumers would be more likely to garden in 2020 because of the pandemic but also more likely to not garden in 2021. We further hypothesized that working from home and loss of household income because of COVID-19 would positively impact gardening because respondents would have more time to grow a garden and have an increased need to produce their own food because of the loss of income.

Methodology

To gain a better understanding of the impact of the COVID-19 pandemic on gardening, an online survey of consumers in the United States was designed and implemented during Jan. 2021. Potential participants were acquired from the database of consumers of Toluna Inc. (Wilton, CT). Toluna Inc. has millions of panelist respondents in their panel database, uses various data quality checks, including duplicate respondent prevention, and speed-checks participant exclusion based on previous surveys completed. Toluna Inc. contacted random panelists within their database, and they agreed to receive a link to participate in this survey. A total of 4243 consumers completed the survey. Within the survey, red herring questions were used to ensure respondents were attentive to the questions being asked. The only screening question was age because the respondent had to be 18 years or older.

The sample was relatively representative of the median age, median income, race, and survey region of the

Received for publication 6 July 2021. Accepted for publication 15 Oct 2021.

Published online 21 December 2021.

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https://doi.org/10.21273/HORTTECH04911-21

United States population (Table 1). The median age of the sample was 42 years, which was slightly higher than the census estimate of 38 years (U.S. Census Bureau, 2019a). The age difference was most likely attributable to the survey sample because it included only respondents 18 years or older, and the census estimate includes all age groups. During the analysis, we did not use age; instead, we used generational dummy variables such as Baby Boomer and older, Generation X (Gen X), and Millennials and younger. The median household income of the sample was $62,501, but the census estimate was $62,843 (U.S. Census Bureau, 2019b). Regarding the region, as defined by the Bureau of Economic Analysis, the sample was dispersed in a manner similar to that of residents in each region. Regarding race, the sample comprised 81% (census estimate = 76%) white, 9% (census estimate = 13%) African American, and 9% (census estimate = 11%) other race (U.S. Census Bureau, 2019b). Lower education levels were oversampled, with individuals with high school or less education comprising 15% of the sample and census estimates indicating that individuals with high school or less education would comprise 38% of the population (U.S. Census Bureau, 2020). Finally, women were oversampled (62% female vs. census estimate of 51% female) (U.S. Census Bureau, 2019b) compared with men because women have been shown to be the primary shoppers for the majority of households (Flagg et al., 2013; Wolfe, 2013; Zepeda, 2009).

Survey respondents were asked questions about their gardening habits, purchasing behaviors, and demographics. Of particular importance to this work, respondents were asked "Did you do any of the following because you spent more time at home during the COVID-19 pandemic (i.e., would have not but did because you were home more)?". Respondents were given the following options to choose from: "planted a garden," "put in new turfgrass," "outdoor renovations," "other landscaping activities," or "no changes." Respondents were also asked "Are you planning on planting a garden during 2021?", with possible answers being "no," "yes, because I always plant a garden," "yes, because I am worried about food shortages," "yes, if I work from home due to the pandemic," or "yes for some other reason." Using these questions, respondents were grouped into the following categories: no garden in 2020 or 2021, no in 2020 and yes in 2021, yes in 2020 and no in 2021, yes in 2020 and yes in 2021, and yes always garden.

Because the variables of interest were categorical in nature, a multinomial logit model (MNL) was used to analyze the data. As noted by Greene (2012), the MNL model can be specified as follows:

$$P(R_i = j) = \frac{e^{\beta_j' x_i}}{\sum_{v=1}^{3} e^{\beta_v' x_i}} \text{ where j} = 1, 2, 3, 4, 5 \quad [1]$$

where the $P(R_i = j)$ is the probability that respondent i chose option j (i.e., no garden in 2020 or 2021, no in 2020 and yes in 2021, yes in 2020 and no in 2021, yes in 2020 and yes in 2021, an yes always garden), v is a set of respondent demographics (Table 1), and β is a vector of parameters. The MNL coefficient parameters are not easily interpretable because they represent the log-odds of choosing a category. Therefore, the marginal effects were calculated. For a continuous variable, the marginal effects represent the increase or decrease in the probability of being in a category given a one-unit change in the explanatory variable. The marginal effect for categorical variables represents the change in the probability given a change in the base category of the explanatory variable. Statistical software (STATA version 17.0; StataCorp, College Station, TX) was used for the analysis.

Results and discussion

Gardening in 2020 and 2021. When respondents were asked if they did anything different in 2020 during the height of the pandemic because of being home more, 34% indicated that they planted a garden because of being home more (Table 2). Similarly, 42% of respondents who participated in the 2021 National Gardening Survey indicated they increased their gardening because of the COVID-19 pandemic (National Gardening Association, 2021). Respondents also put in new turfgrass (9%), did outdoor renovations (such as put in new plant beds, etc.; 16%), and conducted other landscaping activities (19%). Notably, 50% indicated they did not do anything additional because of being home more because of the pandemic, which was similar to the 2021 National Gardening Survey estimate of 50% purchasing none of the products on their list during 2020.

Regarding 2021, 62% responded they were planting a garden because they always plant a garden (Table 2). Only 11% indicated they would plant a garden if they worked from home because of the pandemic, which was 3% lower than the percentage of respondents who were going to garden because they were worried about food shortages. Of particular interest was that 34% of consumers planted a garden in 2020 because of being at home more, but that only 11% indicated being home more was the reason for this in 2021. This seemed to indicate that many consumers who started gardening because of the pandemic may not continue gardening as their lives return to normal.

Examining the main categories of interest (i.e., no garden in 2020 or 2021, no in 2020 and yes in 2021, yes in 2020 and no in 2021, yes in 2020 and yes in 2021, and yes always garden) according to generation provided by the respondent showed heterogeneity among generations (Table 3). For instance, 48% of Baby Boomers and older individuals indicated they did not garden in 2020 and would not garden in 2021, although 36% indicated they always garden. These findings are similar to those of the 2021 National Gardening Survey, which found that Baby Boomers' gardening levels remained stagnant or declined (National Gardening Association, 2021). Of the Gen X, Millennials, and younger consumers, ≈30% indicated not gardening in 2020 or 2021 and 44% and 37% indicated always gardening, respectively. There tended to be more variability in gardening/not gardening in 2020 compared to 2021 for younger consumers. Furthermore, 15% of Millennials and younger respondents indicated they gardened in 2020 but would not be gardening in 2021 compared with 10% of Baby Boomers and older respondents.

Marginal effects from the MNL model. When examining each category of the MNL model, Gen X and younger respondents were 5.2%

Table 1. Descriptive statistics of respondents who participated in a 2021 national survey about gardening conducted in Jan. 2021.

	Sample mean	Sample SD	U.S. Census mean[z]
Region[y]			
West	14%		17%
Rocky Mountains	3%		4%
Southwest	11%		13%
Plains	5%		7%
Great Lakes	14%		14%
Mideast	19%		15%
New England	5%		5%
Southeast	28%		26%
Median age (years)	42.0		38
Age generation[x]			
Baby Boomers and older	29%		
Gen X	29%		
Millennials and younger	42%		
Race			
Caucasian	81%		76%
African American	9%		13%
Other race	9%		10%
Male	38%		49%
Political affiliation			
Democrat	43%		
Republican	29%		
Other political affiliation	29%		
Education			
High school or less	15%		38%
Some college/associate's degree	32%		28%
Bachelor's degree	31%		22%
More education than that required for a bachelor's degree	22%		13%
Children in household (no.)	0.8	1.18	
Adults in household (no.)	2.2	1.04	
Urbanicity			
Urban	25%		
Suburban	53%		
Rural	22%		
Median household income (U.S. dollars)	$62,501		$62,843
Primary food shopper	94%		
Primary plant shopper	85%		
Work at home during the pandemic?[w]			
Yes, because of the pandemic	44%		
No	50%		
Yes, because of other reasons	6%		
Income change during pandemic[w]			
Decreased	44%		
Stayed the same	46%		
Increased	10%		

[z]Census estimates are based on 2019 estimates, except for the median household income and median age, which were measured from 2015 to 2019.
[y]States are divided into regions using the definitions of the Bureau of Economic Analysis (Abadi, 2018).
[x]Baby Boomers (born in 1964 or before), Gen X (born between 1965 and 1984), Millennials (born in 1985 or later).
[w]The pandemic refers to the COVID-19 pandemic that was identified in the United States during early 2020 and continued throughout 2021.

and 8.6% less likely than Baby Boomers and older respondents to be in the "no in 2020 and no in 2021" category (Table 4). Males, those with higher education, those living in rural areas, and respondents with higher incomes were less likely to be in this category, however. Regarding pandemic-specific independent variables, respondents who worked at home because of the pandemic were 10.1% less likely to say no in 2020 and 2021, whereas both decreased incomes and increased incomes because of the pandemic resulted in 11.5% and 8.3% decreases, respectively, in the probability of being in this category relative to the base category of no change in household income.

Regarding yes in 2020 and no in 2021, Millennials and younger

Table 2. Changes in gardening in 2020 and 2021 using data from a national survey about gardening conducted in Jan. 2021.

Gardening in 2020[z,y]	
Activity	**Proportion of respondents (%)**
Planted a garden	34
Put in new turfgrass	9
Outdoor renovations (e.g., put in new plant beds, etc.)	16
Other landscaping activities	19
No changes	50
Gardening in the Future (2021)	
No	9
Yes, because I always plant a garden	62
Yes, because I am worried about food shortages	14
Yes, if I work from home because of the pandemic	11
Yes, for some other reason	4

[z]Gardening in 2020 does not sum to 100% because respondents could choose multiple answers.
[y]Half (50%) of the respondents indicated no changes. The percentages for the other categories are for those respondents who did not choose "no changes."

respondents were 3.8% more likely to be in this category compared with Baby Boomers and older individuals (Table 4). This finding is extremely important because the green industry needs to replace the aging Baby Boomers who garden (National Gardening Association, 2021), and Millennials tended to start gardening but did not continue to garden. However, there was considerable heterogeneity within the younger age groups. Therefore, a key question is, how does the green industry engage with this group to bring them back to gardening as their lives return to normal postpandemic?

In addition to age, households with more children were also more likely to be in the yes in 2020 and no in 2021 category, as were African Americans (Table 4). Similar to the age findings, households with children and African American respondents are critical groups for the green industry. As with the birth to death philosophy of persuading children to purchase a product at an early age and keeping that product until death, engaging children in gardening from a young age can be a means to persuading them to continue gardening as they get older. African Americans have considerable buying power because they comprise 13% of the population (U.S. Census Bureau, 2019b). Because these groups (households with children and African Americans) participated in gardening in 2020 but were more likely to stop gardening in 2021, the green industry needs to devote considerable efforts to persuading these groups to return to gardening.

The no in 2020 but yes in 2021 category is defined by younger respondents (Gen X, Millennials, and younger individuals) rather than Baby Boomers and older individuals (Table 4). This highlights the heterogeneity within age groups because younger respondents are more likely to not garden in 2021 after gardening in 2020, and they are more likely to not garden in 2020 but to garden in 2021. It is likely that there are underlying characteristics within these age groups that create this dichotomy. For instance, the garden 2020/not garden 2021 respondents may see a garden as not worth the time it requires to continue gardening, whereas the not garden 2020/garden 2021 younger consumers may see gardening as something that can reduce anxiety and relieve stress (Hall and Knuth, 2019) caused by the pandemic.

After examining the yes 2020 and yes 2021 category, Millennials and younger respondent were 5% more likely to be in this category, as were males (2.4%), households with children (1.3% for every child older than the mean age), and households with higher incomes (0.2% per $10,000 increase in household income from the mean) (Table 4). Respondents who indicated that they worked at home during the pandemic were 5.4% more likely to be in this category. Respondents with both decreased and increased household incomes during the pandemic were 4.0% and 6.9%, respectively, more likely to be in this category. Although seemingly contradictory, decreasing household incomes may drive respondents to grow a garden to potentially save money by growing food for themselves or to sell, whereas increasing household incomes may allow respondents to have additional resources to continue gardening.

Millennials and younger consumers were 4.9% less likely to say they always garden, and African Americans were 10% less likely to say they always garden (Table 4). However, males, those with higher education, households with increasing numbers of children and adults, respondents living in rural areas, those with higher incomes, and respondents indicating they had decreased income during the pandemic were more likely to always garden. Of key interest was that households with decreasing income during the pandemic were more likely to always garden. This could be because of the garden becoming a source of food to offset spending on food, or it could be attributable to the improved self-esteem that interacting with plants can create (Hall and Knuth, 2019).

Table 3. Changes in gardening across age generations using data from a national survey about gardening conducted in Jan. 2021.

	Baby Boomers and older[z]	Gen X	Millennials and younger	Total (all sample respondents)
Gardening	**Proportion of respondents (%)**			
No in 2020, no in 2021	48	30	30	35
Yes in 2020, no in 2021	10	13	15	13
No in 2020, yes in 2021	1	3	5	3
Yes in 2020, yes in 2021	5	11	13	10
Always garden	36	44	37	39

[z]Baby Boomers (born in 1964 or earlier), Gen X (born between 1965 and 1984), Millennials (born in 1985 or later).

Table 4. Marginal effects from the multinomial logit model (MNL) using data from a national survey about gardening conducted in Jan. 2021.

	Gardening									
	No in 2020, no in 2021		Yes in 2020, no in 2021		No in 2020, yes in 2021		Yes in 2020, yes in 2021		Always garden	
Explanatory variables[z]	MNL coefficient	*P* value	MNL coefficient	*P* value	MNL coefficient	*P* value	MNL coefficient	*P* value	MNL coefficient	*P* value
Region[y]										
Rocky Mountains	**0.107**	**0.051**	0.008	0.806	0.017	0.457	−0.003	0.921	**−0.129**	**0.006**
Southwest	0.012	0.717	−0.013	0.541	0.009	0.465	0.027	0.181	−0.035	0.277
Plains	0.013	0.747	−0.013	0.616	−0.009	0.427	0.005	0.829	0.004	0.920
Great Lakes	0.027	0.387	−0.013	0.519	0.004	0.732	0.010	0.574	−0.028	0.357
Mideast	−0.022	0.447	**−0.035**	**0.052**	0.009	0.375	0.002	0.889	0.045	0.119
New England	−0.006	0.893	−0.023	0.411	0.029	0.203	0.034	0.255	−0.035	0.423
Southeast	**0.053**	**0.055**	−0.008	0.643	0.012	0.234	0.007	0.637	**−0.064**	**0.017**
Age generation[x]										
Gen X	**−0.052**	**0.019**	0.024	0.179	**0.026**	**0.048**	0.023	0.132	−0.021	0.366
Millennials and younger	**−0.086**	**0.000**	**0.038**	**0.022**	**0.046**	**0.000**	**0.050**	**0.001**	**−0.049**	**0.036**
Race										
African American	−0.001	0.984	**0.085**	**0.001**	−0.003	0.680	0.018	0.268	**−0.100**	**0.001**
Other race	**−0.056**	**0.055**	0.016	0.462	0.007	0.433	0.028	0.102	0.005	0.884
Male	**−0.105**	**0.000**	−0.019	0.117	0.005	0.325	**0.024**	**0.007**	**0.095**	**0.000**
Political affiliation										
Republican	−0.015	0.455	0.007	0.641	−0.001	0.863	−0.004	0.678	0.014	0.511
Other political affiliation	0.026	0.201	0.009	0.516	0.000	0.954	−0.009	0.391	−0.027	0.190
Education										
High school or less	0.007	0.787	0.013	0.513	−0.007	0.300	−0.009	0.526	−0.004	0.887
Some college or associate's degree	0.033	0.127	0.008	0.580	**−0.010**	**0.091**	−0.012	0.261	−0.019	0.384
Bachelor's degree or more college	**−0.049**	**0.035**	0.004	0.799	−0.003	0.661	0.008	0.464	**0.040**	**0.095**
Number of children in household	**−0.066**	**0.000**	**0.010**	**0.069**	−0.002	0.461	**0.013**	**0.000**	**0.045**	**0.000**
Number of adults in household	**−0.036**	**0.001**	0.007	0.265	0.002	0.637	0.003	0.433	**0.024**	**0.013**
Urbanicity										
Suburban	−0.030	0.149	0.024	0.102	0.001	0.902	−0.002	0.863	0.007	0.750
Rural	**−0.099**	**0.000**	0.033	0.103	−0.006	0.425	0.004	0.792	**0.068**	**0.010**
Household income	**−0.009**	**0.001**	−0.002	0.194	0.000	0.452	**0.002**	**0.097**	**0.009**	**0.000**
Primary food shopper	−0.046	0.252	0.006	0.831	−0.014	0.307	−0.037	0.228	**0.091**	**0.028**
Primary plant shopper	**−0.289**	**0.000**	0.019	0.260	0.002	0.820	**0.056**	**0.000**	**0.212**	**0.000**
Work from home during the pandemic?[w]										
Yes, because of the pandemic	**−0.101**	**0.000**	0.015	0.272	−0.001	0.817	**0.054**	**0.000**	**0.033**	**0.099**
Yes, because of other reasons	−0.002	0.946	**0.047**	**0.097**	**−0.016**	**0.037**	−0.010	0.640	−0.020	0.603
Income change during pandemic[w]										
Decreased	**−0.115**	**0.000**	0.012	0.334	0.003	0.598	**0.040**	**0.000**	**0.060**	**0.001**

(*Continued on next page*)

Table 4. (*Continued*)

Explanatory variables[z]	Gardening									
	No in 2020, no in 2021		Yes in 2020, no in 2021		No in 2020, yes in 2021		Yes in 2020, yes in 2021		Always garden	
	MNL coefficient	*P* value	MNL coefficient	*P* value	MNL coefficient	*P* value	MNL coefficient	*P* value	MNL coefficient	*P* value
Increased	**−0.083**	**0.001**	−0.005	0.813	0.010	0.322	**0.069**	**0.001**	0.009	0.763
Observations (no.)					3,917					
Wald chi-square					790.680					
$P >$ chi-square					0.000					
Log pseudolikelihood					−4755.407					
Pseudo R^2					0.085					

[z]Baseline for categorical variables: region = southeast; age generation = Baby Boomers or older; race = caucasian; gender = female; political affiliation = democrat; education = bachelor's degree; primary food shopper = no; primary plant shopper = no; work from home during the pandemic = no; income changed during the pandemic = no change.
[y]States are divided into regions using the definitions of the Bureau of Economic Analysis (Abadi, 2018).
[x]Baby Boomers (born in 1964 or earlier), Gen X (born between 1965 and 1984), Millennials (born in 1985 or later).
[w]The pandemic refers to the COVID-19 pandemic that was identified in the United States during early 2020 and continued throughout 2021.
Bold indicates significance at ≤0.10.

Conclusions

The novel COVID-19 virus altered the daily routine of millions of Americans. Many now work from home or did work from home as a result of widespread lockdowns. As the pandemic took effect, many households changed what they purchased and how they purchased, and they altered how they interacted with the green industry. This research showed that 34% of respondents planted a garden solely because they had more time at home because of the pandemic. However, only 11% indicated they would plant a garden in 2021 if they had more time at home. This indicates that the green industry needs to be careful when making long-term plans based on the booming demand seen in 2020, because many of the consumers who began gardening in 2020 will leave the market.

Examining which consumers are likely to leave and which are likely to remain in the market provides interesting insights, such as notably considerable heterogeneity. Some younger consumers planted a garden in 2020, but they were not planning to participate in 2021; however, other younger consumers planted a garden in 2020 and planned to plant a garden in 2021, with the last group of younger consumers not planting in 2020 but planting in 2021. As noted by the 2021 National Gardening Survey, mental health reasons and more available time were the primary reasons why people started to garden (National Gardening Association, 2021). Therefore, generic marketing to bring younger consumers into gardening may not prove fruitful because some younger consumers are already in the market or may need to be convinced to stay in the market. Because the 2021 National Gardening Survey noted mental health and having more available time as prime reasons for gardening, as younger consumers return to "normal" as the pandemic subsides (which may reduce mental health issues and create less time for gardening), they may not continue gardening. Therefore, because the 2021 National Gardening Survey also noted mental health, good exercise, and family activity as reasons for beginning to garden (National Gardening Association, 2021), retailers should focus on the health benefits of gardening.

Households with lower incomes were more likely to garden; however,

households with higher incomes tend to spend more income on gardening (Gardencentermag.com, 2016). Because many retailers may not be able to tailor their product lines to both low- and high-income consumers, retailers need to determine whether targeting gardeners who will participate every year but spend less on gardening is a better strategy than targeting consumers who will spend more on gardening but may not participate every year.

Retailers should be aware of how the postpandemic market may differ from both the prepandemic and pandemic markets. Making decisions based on what happened in 2020 will most likely lead to decisions that overestimate the market, especially the types of customers who are or will be in the market. Moving forward, growers, retailers, and the whole supply chain need to critically assess (i.e., identify their customers) the market to understand the post-COVID-19 market for green industry products.

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