

# #PlantsDoThat

## Horticulture: The Art, Science, & Business of Plants

Horticulture contributes \$196 billion to the US economy across a diverse array of businesses. But the story doesn't end there. Horticulture benefits the wealth and health of every citizen and every community in the US.

Produced by  
**National Initiative for  
Consumer Horticulture**

ConsumerHort.org



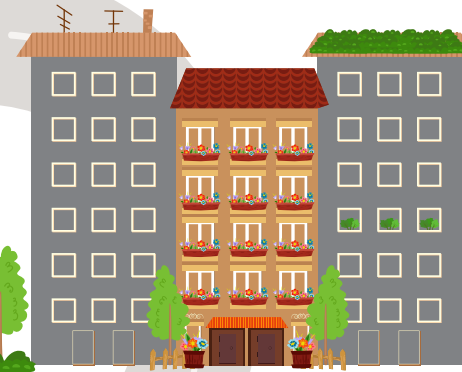
### Where We LIVE

A 25-foot tree reduces annual heating and cooling costs for typical homes by 8-12%.

1/4 of American homes grow berries, veggies, or fruit trees.

Our homes represent 25% of our personal wealth. Well-landscaped homes are more valuable.

Improvements to your landscape pays off! The return on investment for landscape upgrades is 109%.



### Where We WORK

Green roofs provide beauty and moderate rooftop temperatures, reducing heat loads and lowering energy costs.

Office plants reduce employee sick time by 14% and improve work productivity and speed.

Upkeep and preservation of urban green habitats creates new jobs, boosts local economies, and adds to community prosperity.



Horticulture creates 2 million jobs across a diverse array of businesses.



### Where We SHOP

Stores with landscaped areas have expanded sales resulting from longer shopping occasions and can charge more due to higher perceived quality.

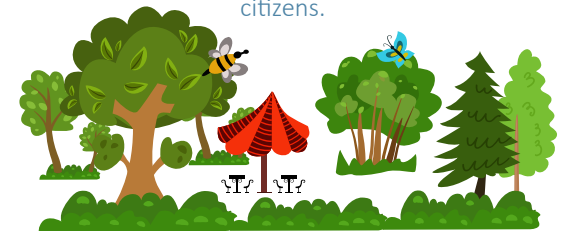
### Where We PLAY

America's public gardens are key tourist destinations and contribute \$2.3 billion in community tourism spending.

Parks provide cities and citizens significant value. In Philadelphia, parks generate \$23 million in city revenue, \$16 million in municipal cost savings, and \$1.1 billion in cost savings for citizens.

There are 4 million miles of US roadways. Street trees preserve paved surfaces. Shaded roads save up to 60% of repaving costs. Trees also improve driver safety and result in fewer traffic accidents.

Trails and greenways increase property values and make adjacent homes sell faster.



Produced by  
**National Initiative for  
Consumer Horticulture**

ConsumerHort.org

## Authors

Hall C, Thilmany D, Mellard S, Gray J, Hamrick D, Altman K, Behe B, Bumgarner N, Calabro J, Carson J, Gouge D, Miller M, Parker P and McBride P (2017). #PlantsDoThat Horticulture: The Science, Art & Business of Plants, National Initiative for Consumer Horticulture. Available from <http://consumerhort.org/>.

## References

Appleseed, I. (2009, May 2009). "Valuing central park's contributions to New York City's economy." from <http://www.appleseedinc.com/reports/centralpark-may2009.pdf>.

Bradshaw, J. and L. Tozer (1993) *Enviroscaping to Reduce Energy: a Guide to Microclimate Modification*.

Balogun, A. A., et al. (2014). "Effect of tree-shading on energy demand of two similar buildings." *Energy and Buildings* 81: 305-315.

Berry, R., et al. (2013). "Tree canopy shade impacts on solar irradiance received by building walls and their surface temperature." *Building and Environment* 69: 91-100.

Bringslimark, T., et al. (2007). "Psychological Benefits of Indoor Plants in Workplaces: Putting Experimental Results into Context." *HortScience* 42(3): 581-587.

Butterfield, Bruce (2016). "National Gardening Survey 2016 edition." *Garden Research.com*.

Clements, J., et al. (2013). "The Green Edge: How Commercial Property Investment in Green Infrastructure Creates Value." *Natural Resources Defense Council*.

Coma, J., et al. (2016). "Thermal assessment of extensive green roofs as passive tool for energy savings in buildings." *Renewable Energy* 85: 1106-1115.

Crompton, J. L., et al. (2004). "The proximate principle: the impact of parks, open space and water features on residential property values and the property tax base." *Ashburn, Va., National Recreation and Park Association*.

Damigos, D. and F. Anyfantis (2011). "The value of view through the eyes of real estate experts: A Fuzzy Delphi Approach." *Landscape and Urban Planning* 101(2): 171-178.

Des Rosiers, F., et al. (2002). "Landscaping and House Values: An Empirical Investigation." *Journal of Real Estate Research* 23(1/2): 139-161.

Dravigne, A., et al. (2008). "The Effect of Live

Plants and Window Views of Green Spaces on Employee Perceptions of Job Satisfaction." *Hort Science* 43(1): 183-187.

Escobedo, F. J., et al. (2015). "Urban forest structure effects on property value." *Ecosystem Services* 12: 209-217.

Farmer, M. C., et al. (2013). "Bird diversity indicates ecological value in urban home prices." *Urban Ecosystems* 16(1): 131-144.

Freybote, J., et al. (2016). "Understanding the contribution of curb appeal to retail real estate values." *Journal of Property Research* 33(2): 147-161.

Gibbons, S., et al. (2014). "The Amenity Value of English Nature: A Hedonic Price Approach." *Environmental and Resource Economics* 57(2): 175-196.

Gray, T. (2017). *Re-Thinking Human-Plant Relations by Theorising Using Concepts of Biophilia and Animism in Workplaces*. *Reimagining Sustainability in Precarious Times*, Springer: 199-215.

Hall, C. and Dickson, M. (2011). *Economic, Environmental, and Health/Well-Being Benefits Associated with Green Industry Products and Services: A Review*, *J. Environ. Hort.* 29(2):96-103.

Hodges, Alan W., et al. "Economic Contributions of the Green Industry in the United States in 2013." *HortTechnology* 25.6 (2015): 805-814.

Hui, E. C. M., et al. (2012). "The impact of landscape views and storey levels on property prices." *Landscape and Urban Planning* 105(1-2): 86-93.

Kadish, J. and N. R. Netusil (2012). "Valuing vegetation in an urban watershed." *Landscape and Urban Planning* 104(1): 59-65.

Ko, Y., et al. (2015). "Long-term monitoring of Sacramento Shade program trees: Tree survival, growth and energy-saving performance." *Landscape and Urban Planning* 143: 183-191.

Kovacs, K. F. (2012). "Integrating property value and local recreation models to value ecosystem services from regional parks." *Landscape and Urban Planning* 108(2-4): 79-90.

Laverne, R. J. and K. Winson-Geideman (2003). "The influence of trees and landscaping on rental rates at office buildings." *Journal of Arboriculture* 29(5): 281-290.

Lerner, A. and M. Stopka (2016). "The Financial Benefits of Biophilic Design in the Workplace."

Lipetzky, T., et al. (2016) "An Overview of Public Attitudes of the Role of Food and Agriculture on Colorado's Economy, Environment and Overall Health." [http://foodsystems.colostate.edu/wp-content/uploads/2017/02/Public-Attitudes-Gov-Forum\\_Tom-Dawn-Martha.pdf](http://foodsystems.colostate.edu/wp-content/uploads/2017/02/Public-Attitudes-Gov-Forum_Tom-Dawn-Martha.pdf)

Liu, S. and D. Hite (2013). "Measuring the Effect of Green Space on Property Value: An Application of the Hedonic Spatial Quantile Regression." *Southern Agricultural Economics Association, 2013 Annual Meeting, Orlando, Florida*.

Lundholm, J., et al. (2010). "Plant Species and Functional Group Combinations Affect Green Roof Ecosystem Functions." *PLoS ONE* 5(3).

McCord, J., et al. (2014). "Effect of public green space on residential property values in Belfast metropolitan area." *Journal of Financial Management of Property and Construction* 19(2): 117-137.

McPherson, E. G. and J. Muchnick (2005). "Effects of Street Tree Shade on Asphalt Concrete Pavement Performance." *Journal of Arboriculture* 31(6): 303-310.

McPherson, E. G., et al. (2011). "Million trees Los Angeles canopy cover and benefit assessment." *Landscape and Urban Planning* 99(1): 40-50.

McPherson, E. G. and J. R. Simpson (2002). "A comparison of municipal forest benefits and costs in Modesto and Santa Monica, California, USA." *Urban Forestry & Urban Greening* 1(2): 61-74.

McPherson, E. G. (1992). "Accounting for Benefits and Costs of Urban Greenspace." *Landscape and Urban Planning* 22(1): 41-51.

McPherson, E. G., et al. (1989). "Effects of 3 Landscape Treatments on Residential Energy and Water-Use in Tucson, Arizona." *Energy and Buildings* 13(2): 127-138.

McPherson, E. G., et al. (1988). "Impacts of Vegetation on Residential Heating and Cooling." *Energy and Buildings* 12(1): 41-51.

McPherson, E. G. (1988). "Functions of Buffer Plantings in Urban Environments." *Agriculture Ecosystems & Environment* 22-3: 281-298.

McPherson, E. G., et al. (2016). "Structure, function and value of street trees in California, USA." *Urban Forestry & Urban Greening* 17: 104-115.

Melichar, J. and K. Kaprova (2013). "Revealing preferences of Prague's homebuyers toward greenery amenities: The empirical evidence of distance-size effect." *Landscape and Urban Planning* 109(1): 56-66.

Mullaney, J., et al. (2015). "A review of benefits and challenges in growing street trees in paved urban environments." *Landscape and Urban Planning* 134: 157-166.

Nappi-Choulet, I. and S. Labussière (2015). "Greening up our cities: Bringing new value to new spaces in the Paris region." *Corporate Real Estate Journal* 5(1): 57-68.

Netusil, N. R., et al. (2014). "Valuing green infrastructure in Portland, Oregon." *Landscape and Urban Planning* 124: 14-21.

Nieuwenhuis, M., et al. (2014). "The Relative Benefits of Green Versus Lean Office Space: Three Field Experiments." *Journal of Experimental Psychology*. *Applied* 20(3): 199-214.

Niu, H., et al. (2010). "Scaling of Economic Benefits from Green Roof Implementation in Washington, DC." *Environmental Science & Technology* 44(11): 4302-4308.

Pandit, R., et al. (2014). "Valuing public and private urban tree canopy cover." *Australian Journal of Agricultural and Resource Economics* 58(3): 453-470.

Pandit, R., et al. (2013). "The effect of street trees on property value in Perth, Western Australia." *Landscape and Urban Planning* 110: 134-142.

Panduro, T. E. and K. L. Veie (2013). "Classification and valuation of urban green spaces—A hedonic house price valuation." *Landscape and Urban Planning* 120: 119-128.

Park, J., et al. (2017). "The influence of small green space type and structure at the street level on urban heat island mitigation." *Urban Forestry & Urban Greening* 21: 203-212.

Payton, S., et al. (2008). "Valuing the benefits of the urban forest: a spatial hedonic approach." *Journal of Environmental Planning and Management* 51(6): 717-736.

Pearson-Mims, C. H. and V. I. Lohr (2000). "Reported Impacts of Interior Landscaping in Office Environments in the United States." *HortTechnology* 10(1): 82-86.

Pérez, G., et al. (2014). "Vertical Greenery Systems (VGS) for energy saving in buildings: A review." *Renewable and Sustainable Energy Reviews* 39: 139-165.

Perini, K. and P. Rosasco (2013). "Cost-benefit analysis for green façades and living wall systems." *Building and Environment* 70: 110-121.

Sander, H. A. and C. Zhao (2015). "Urban green and blue: Who values what and where?" *Land Use Policy* 42: 194-209.

Saphores, J.-D. and W. Li (2012). "Estimating the value of urban green areas: A hedonic pricing analysis of the single family housing market in Los Angeles, CA." *Landscape and Urban Planning* 104(3-4): 373-387.

Sawka, M., et al. (2013). "Growing summer energy conservation through residential tree planting." *Landscape and Urban Planning* 113: 1-9.

Shoemaker, C. A., et al. (1992). "Relationships between Plants, Behavior, and Attitudes in an Office Environment." *HortTechnology* 2(2): 205-206.

Simpson, J. R. and E. G. McPherson (1998). "Simulation of tree shade impacts on residential energy use for space conditioning in Sacramento." *Atmospheric Environment* 32(1): 69-74.

Shukur, F. et al. (2016) "The Values of Parks to the House Residents." *Procedia- Social and Behavioral Sciences* 9 (2012): 350-359.

Thomsen, J. D., et al. (2011). "People-plant Relationships in an Office Workplace: Perceived Benefits for the Workplace and Employees." *HortScience* 46(5): 744-752.

Trust for Public Land and the Philadelphia Parks Alliance (2008). *How Much Value Does the City of Philadelphia Receive from its Park and Recreation System?* <http://cloud.tpl.org/pubs/>

[ccpe\\_PhilParkValueReport.pdf](#)

Tyrvaainen, L. and A. Miettinen (2000). "Property prices and urban forest amenities." *Journal of Environmental Economics and Management* 39(2): 205-223.

Wang, Z.-H., et al. (2016). "Cooling and energy saving potentials of shade trees and urban lawns in a desert city." *Applied Energy* 161: 437-444.

Wolf, K. L. (2014). "City trees and consumer response in retail business districts." *Handbook of Research on Retailer-Consumer Relationship Development* (Musso F., Druica E., eds). Hershey, PA: IGI Global: 152-172.

Wolf, K. L. (2008). "Community Context and Strip Mall Retail Public Response to the Roadside Landscape." *Transportation Research Record* (2060): 95-103.

Wolf, K. L. (2005). "Trees in the small city retail business district: Comparing resident and visitor perceptions." *Journal of Forestry* 103(8): 390-395.

Wolf, K. L. (2004). "Nature in the Retail Environment: Comparing Consumer and Business Response to Urban Forest Conditions." *Landscape Jnl.* 23(1): 40-51.

Wolf, K. L. (2004). "Trees and business district preferences: a case study of Athens, Georgia, U.S." *Journal of Arboriculture* 30(6): 336-346.

Zhang, B., et al. (2014). "The cooling effect of urban green spaces as a contribution to energy-saving and emission-reduction: A case study in Beijing, China." *Building and Environment* 76: 37-43.

## Credits

Produced by the National Initiative for Consumer Horticulture (NICH), March 2017.

Thank you to Dr. Charlie Hall, Ellison Endowed Chair in International Floriculture and Professor, and Sara Mellard, graduate student, Texas A&M University for providing the evidence base. Graphic developed by Jennifer Gray, AmericanHort and the Horticultural Research Institute. Committee members: Ken Altman, Altman Plants; Dr. Bridget Behe, Michigan State University; Dr. Natalie Bumgarner, University of Tennessee; Dr. Jill Calabro, AmericanHort; Janet B. Carson, University of Arkansas Cooperative Extension Service; Danny Gouge, Willoway Nurseries; Dr. Charlie Hall, Texas A&M University; Debbie Hamrick (Committee Chair), NC Farm Bureau Federation; Dr. Marvin Miller, Ball Horticultural Co.; Patrick Parker, Savatree; Dr. Dawn Thilmany McFadden, Colorado State University, and Penny McBride, Vertical Harvest.

## More Information

- National Initiative for Consumer Horticulture, [ConsumerHort.org](http://ConsumerHort.org)
- Ellison Chair, Texas A&M, [EllisonChair.TAMU.edu](http://EllisonChair.TAMU.edu)