PROPLIFTING AND PROPAGATION: CONSUMER PLANT PRACTICES OF ETHICS AND WELL-BEING

by

LEANDRIA GARRETT

(Under the Direction of Julie Campbell)

ABSTRACT

This thesis explores the moral and emotional dimensions of plant consumerism through two studies: the ethical perception of proplifting – which is the unauthorized taking of discarded plant material – and the perceived therapeutic benefits of home propagation. The results from the first study found that consumers have varying degrees of ethical acceptance, and the distinct moral framework that consumers adopt depends on demographics and cultural background. The second study highlights how consumers may link home propagation to benefits such as improved self-confidence, pride, and community involvement. Findings from the second study indicate that individuals who have previous experience with proplifting are more likely to agree that it offers at least one of the listed benefits. By situating plant care within moral and emotional settings, this research contributes to understanding the variability of consumer ethical behavior and personal benefits.

INDEX WORDS: Consumer Horticulture, Proplifting, Propagation, Consumer Ethics, Plant Property, Moral Judgement, Human Issues in Horticulture, Therapeutic Horticulture, Mental Health, Well-Being

PROPLIFTING AND PROPAGATION: CONSUMER PLANT PRACTICES OF ETHICS

by

LEANDRIA GARRETT

B.S, University of Georgia, 2023

A Thesis Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

MASTER OF SCIENCE

ATHENS, GEORGIA

2025

PROPLIFTING AND PROPAGATION: CONSUMER PLANT PRACTICES OF ETHICS

by

LEANDRIA GARRETT

Major Professor:	Julie Campbell
Committee:	Sheri Dorn
	Benjamin Campbell

Electronic Version Approved:

Ron Walcott
Vice Provost for Graduate Education and Dean of the Graduate School
The University of Georgia
December 2025

ACKNOWLEDGEMENTS

Thank you, Dr. Julie Campbell, Dr. Benjamin Campbell, and Dr. Sheri Dorn for giving me this opportunity and invaluable help. Thank you to those closest to me for the love and support. Thank you, Kit, for supervising every step of my journey.

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

CHAPTER 1

INTRODUCTION

Overview of Proplifting and Propagation

Plants have always been a prominent feature in everyday life. Human history is intricately intertwined with plants grown for food, materials, ecological services, and personal use. Historically, gardening has been embedded in domestic life. Gardens transitioned from functional landscapes to outlets for aesthetic expression, to forms of personal expression and community engagement (Timeline of American Garden History, 2018). Interest in indoor plants is largely connected to broader cultural trends, reflecting how lifestyles, identity, and social connections play a role in indoor plants' popularity.

Indoor plants have begun to take on new roles in the lives of many individuals. Indoor plants are present in countless homes, offices, and third places and offer an extension of the space's identity. Growing, trading, and propagating plants often meet the needs of an individual, whether this allows them to connect with others, create a feeling of comfort, or find a sense of belonging. The widespread enthusiasm for plants represents how people experience their relationships with living material, and how each relationship is shaped by personal values, social norms, and lived experiences.

While the culture of growing plants is dynamic depending on the individual, two practices have emerged as growing trends for houseplant enthusiasts: proplifting and home propagation. Both practices involve the act of plant multiplication, but they differ in motivation and

perception. Proplifting (the act of taking plant material without permission) raises questions about ownership, ethics, and moral judgment. In contrast, home propagation reflects patience, curiosity, and care on the part of an individual. Together, these two practices represent how human-plant interactions can vary, how plant material is acquired, and what is done with the material after it is gathered.

The purpose of this thesis is to examine how consumers understand the actions and intentions behind proplifting and propagation. Through two national surveys, this research investigates how ethical judgment around plant ownership is formed and how consumers might perceive the emotional and psychological benefits of plant care. The first study explores the consumer perception of proplifting, and how the perception may be influenced by situational context, personal values, and demographics. The second study examines how – through home propagation – a consumer might experience the benefits of personal fulfillment, increased self-confidence, and social connection. By analyzing both behaviors within the context of consumer horticulture, this thesis aims to understand how people perceive plants, how they assign value and meaning to plants, what might motivate their actions to proplift and/or propagate, and how these motivations reflect a moral and emotional depth to consumer horticulture.

The Rise of Houseplant Culture and Consumer Horticulture

The constant growth in houseplant popularity is connected to both long-standing horticultural traditions and newer social circumstances. During the COVID-19 pandemic, many people who were required to stay home during the lockdown chose to take up plant care as a means of coping with isolation and uncertainty. The primary purpose of the lockdown was to decrease spread of the virus by limiting social interaction. Studies were conducted on pandemic gardening practices and their results indicated that caring for a plant led to emotional stability, routine, and growth

during a period of stagnancy (Kingsley et al., 2023). Taking up houseplant care as a hobby was a practical response to limited mobility and control in one's life and it evolved into a cultural movement that has sustained through time by acting as a connection to nature and community (Bieri et al., 2024).

Alongside this visible shift in consumer interest towards indoor plants, we see new patterns of engagement develop for acquiring plant information. Digital platforms and online communities can now serve as educational platforms for urban gardening (Duda, 2024). The presence of online tutorials, social media focused on houseplant tips and tricks, and plant trading communities have all made horticulture readily accessible to a broader audience. This has transformed how the average person can learn about plant care.

Consumer interest is further trending toward plant aesthetics and the acquisition of novel species. Propagation, the collection of rare plants, and decorating the home with indoor plants are points of interest for people who have this hobby (Halleck, 2025). Many people choose to expand their collection of plants by purchasing plants that need extremely particular environments, such as carnivorous plants (Stimpson, 2025), or plants that are heavily variegated (Rapisarda, 2025).

There are significant economic implications for growing and selling indoor plants. The green industry has become one of the fastest-growing sectors in U.S. agriculture. In Florida, the industry generates over $31 billion USD annually and supports more than 266,000 jobs (Garden Center, 2025). As the consumer demand for indoor plants rises, commercial growers meet the needs through tissue culture propagation and online marketing. Such developments have allowed for large-scale production of rare tropical species. This results in a market where purchasing

behavior is driven by aesthetics and rarity. These drivers, however, can lead to improper management of plant material and concerns of ethical sourcing.

The expansion of consumer horticulture creates opportunities for challenges around ethics and ownership. Digital networks and marketing systems allow people to share knowledge with one another, but the boundaries of responsibility may be blurred due to the desire to grow collections. As tropical plants become increasingly commercialized, questions begin to arise about what may constitute ethical plant acquisition, exchange, and care.

Plant Patents and Intellectual Property

Historically, plants have been cultivated, grown, and traded freely with community members, friends, and families. However, selective breeding and ownership rights have led to researchers and lawyers developing plant intellectual property laws. The first instance of plant intellectual property rights occurred in the U.S. in the 1930s (Fowler, 2000), where plant intellectual property was defined as an act of protection for plants, new plant varieties, and plant-related innovations (United States Patent and Trademark Office, n.d.). With the development of intellectual property, plant patents were granted by the United States Patent and Trademark Office to inventors who discover or asexually reproduce a new and distinct plant variety, excluding wild plants (United States Patent and Trademark Office, n.d.).

Within laws surrounding plant patents, there are important distinctions between what is and is not considered copyright infringement. For example, patented plants that are asexually reproduced without authorization are considered an infringement (Fulcher et al., 2020). Conversely, the reproductive parts of plants cannot be patented, therefore any plants that were created sexually from patented plants are not legally protected (Fulcher et al., 2020). The development of plant intellectual property has resulted in financial support for agricultural

development. Plant patents directly encourage research and development in the agriculture industry due to financial incentive, and continue to promote innovation (Affordable Patent Agency, 2024). As of 2010, plant patented represented 61% of varietal rights in the U.S., and 84% of all plant patents were for ornamental plants (Drew et al., 2015). This indicate that plant breeding can be driven by plant patents. When breeding and innovation on species such as ornamental plants are supported, further work with these species will be the result (Simmonds et al., 2020). This positive cycle results in growth for plant breeding, plant research, and plant protection (Simmonds et al., 2020).

While plant patents support research and innovation in the green industry, there are questions about the ethicality of owning all rights of a living organism. Some sources argue that patent legislation was not initially designed for living organisms, and the limits set by the courts were written before the invention of genetic engineering (Belcher and Hawtin, 1989). Belcher and Hawtin state that Western society has a long tradition of ownership and physical property (1989), and patents are one method of acquiring and maintaining property. Many groups of people agree with this logic, and while the U.S. is a major producer in plant patents (World Population Review, 2025), it is not exclusively a product of Western and U.S. culture. Additionally, while the term plant patents might be something found in the U.S. other countries have their equivalents to this, such as the Plant Breeders' Rights Act in Canada (Trademarks & Patents, 2018).

Although there is discourse around plant property and the ownership of living organism, treating plants as intellectual property becomes increasingly important. The rights of patent protections allow plant breeders to receive royalties, which will then result in them devoting more resources to developing new varieties of plants (Chow, 2021). The development of new

varieties of plants is especially important in the face of climate change and global population growth (Xiong et al., 2022). Without the incentives that come with plant patents, traits such as drought-tolerance, pest-resistance, and greater yield may be under-developed, and can leave farmers and ecosystems more vulnerable. When rights are not respected, breeders may lose out on revenue, which may result in less desire for innovation towards the future of plant species (Chow, 2021).

Ethics, Ownership, and Plant Property

Modern houseplant enthusiasm has allowed for the development of a controversial trend known as proplifting. Proplifting refers to the act of taking discarded or damaged plant material without explicit permission with the sole intent of propagating the plant and growing it at home (DRM, 2021). Many people view this practice as a harmless form of recycling or plant rescue, while others see it as a blatant form of theft. There are ethical tensions surrounding proplifting, which highlights a central issue in consumer horticulture: the desire to nurture and collect can exist alongside behaviors that result in undermining the respect of property, conservation, and market integrity.

Consumer engagement with plants can be interpreted through a broad range of environmental and consumer ethics. Ethical decision-making regarding green consumption extends beyond environmental outcomes and includes personal moral identity and perceived social responsibility (Alam et al., 2023). Consumer environmental ethics emphasizes how individuals evaluate the morality of their everyday behavior based on the values of sustainability and stewardship. Everyday behavior can include making informed decisions about how they are purchasing, discarding, or acquiring living material.

In this context, plant ownership becomes a moral act because it involves making informed decisions about resource allocation. Choices surrounding plant sourcing and propagation methods mirror environmental dilemmas of exploitation that consumers face. An ethical consumer framework suggests that individuals generally desire to align their beliefs with how they conceptualize being good, responsible citizens (Ogiemwonyi & Jan, 2023). For example, someone who chooses to propagate their plants entirely at home and expands their collections through trade alone may perceive themselves as practicing sustainable consumption. On the other hand, a person who collects rare plants through the form of proplifting might believe they are practicing conservation or preservation by saving a plant that might have otherwise died without their intervention. By applying consumer environmental ethics to horticulture, we can understand how plant ownership operates in a moral landscape that is ambiguous and dependent on an individual's personal beliefs and background.

The Moral Foundations Theory suggests that ethical reasoning is shaped by intuitive responses based on fairness, harm, and loyalty. All these factors influence how people interpret the morality of their own actions (Ramos et al., 2024). For some individuals, taking a cutting from a discarded plant aligns with their own moral reasoning of care through attempts of rehabilitation. For others, the practice of proplifting might be a violation of fairness by taking what does not belong to them.

Plants are living entities and often evoke emotional attachments, ultimately holding a unique space in moral psychology. Acts of plant rescue through proplifting can result in feelings of compassion and responsibility. This leads people to view proplifting as inherently good, even when conventional boundaries of ownership are ignored. This overlap of emotional response and

societal norms can explain why behaviors such as proplifting can feel ethically justified to many people, where they see themselves as caretakers rather than thieves.

Ethical engagement with plants is inherently connected to ecological stewardship. Aldo Leopold has a foundational theory on such an engagement, titled *Land Ethic*. This theory reframes human relationships with land, water, animals, and plants as a moral obligation rather than ownership (Leopold, 2008). He argued that Western society has no establishment to humanity's relationship with the natural world, as land and its living communities are treated as property (Leopold, 2008). Through Leopold's theory, it can be then argued that we grant ourselves privileges of interacting with such things, but we often lack the duty that could be referred to as stewardship. He proposes that ethics should thus be extended to include the land as an ecological necessity, and we should challenge the economic model of land and plant use to be a cooperative ethic rather than an ownership (Leopold, 2008).

Modern plant ownership mirrors the economic view that Leopold critiques. Practices that harm the land, such as commercialization of rare species and proplifting, expose the tension between care and exploitation. While consumers may experience genuine attachment to plants and a desire to nurture life, if done incorrectly, the actions can perpetuate habits that are extractive of the natural world. Proplifting habits have the possibility of viewing plants as a resource that must be possessed and reproduced without ecological accountability. This land-ethical perspective reframes proplifting behaviors by emphasizing obligation over entitlement. Propagation, purchase, and collection participate in an ecological community, and therefore it carries moral weight.

Social norms and social media further shape how plant ethics and plant-related behavior are perceived by consumers. As social media use and online spaces have grown, digital communities

central to plant culture appear. Reddit's r/proplifting serves as an informal area where participants share their experience with proplifting and discuss what are considered acceptable actions of proplifting within the community. They encourage members to collect only fallen, damaged, or discarded plant material, and actively discourage the removal of healthy plants from stores or private property (Reddit, 2019). By creating rules that users must agree upon when joining the forum, a style of community-driven governance is put in place. The legitimacy of their actions will be validated through peer interaction, rather than by an authority with whom they have potential to disagree.

The legal framework of proplifting addresses theft and property. Ethical norms surrounding plant ownership are more complex, since these norms cannot rely solely on law to define right from wrong. From a virtue-ethical standpoint, moral behavior should be established through character, intention, and the desire to do good, rather than the fear of legal consequences (Morrison and Driggs, 2007). This suggests that ethical plant stewardship should be guided by virtues such as respect, moderation, and justice for the environment rather than patent law and profit incentives (Day, n.d.). These virtues balance personal enjoyment with ecological responsibility.

Despite an increase in discussion about plant trade ethics and conservation policy, academic research addressing proplifting on a consumer scale remains limited. Existing studies examine commercial and global markets, such as the trade of live plants online (Giltrap et al., 2009), or the illegal trafficking of endangered species (Whitehead et al., 2021). Analyses such as these often highlight both the ecological and regulatory dimensions of plant trade. However, they do not explore the everyday moral reasoning of consumers who engage in informal propagation or

low-level plant removal. This gap indicates a need to investigate how individuals justify, normalize, or reject behaviors such as proplifting within consumer horticulture.

Propagation, Therapeutic Horticulture, and Well-Being

Propagation is a fundamental horticultural skill that duplicates plants asexually. For many plants, propagation occurs easily and does not require formal education or training. Additionally, propagation has been found to offer several therapeutic benefits (IFAS Communications, n.d.). Due to the therapeutic benefits, many wellness programs offer horticultural therapy. The Therapeutic Horticulture Activities program at the University of Florida, for example, uses propagation activities such as dividing, cutting, and rooting plants, and creates purposeful exercise that promotes patience, sensory engagement, and mindfulness (IFAS Communications, n.d.). In the therapeutic context, propagation is valued due to the gentle and repetitive attention that they encourage. By watching a cutting develop roots and new growth, the participants are allowed to visually experience an example of growth, renewal, and success.

Therapeutic horticulture operates within an established psychological framework that connects plant-based activities to a holistic approach for well-being. It is defined as a "professionally facilitated treatment of intervention that uses plant and nature-based activities to work towards the psychological, physical, cognitive, social, spiritual, and vocational goals of its participants" (North Carolina Botanical Garden, 2023). Plant-related activities such as propagation are designed to engage fine motor skills and cognitive focus. In doing this, people are able to connect with their bodies, practice emotional regulation, social inclusion, and self-efficacy.

A relational theory relevant to therapeutic horticulture is the Companion Species Theory (Haraway, 2003). This relational theory suggests that human and plant interactions are

understood as co-creative and mutually transformative. Haraway proposes that humans are not separate or dominant over other species, and instead we are in a constant process of connecting with outside species by learning, adapting, and coexisting through ongoing encounters (Haraway, 2003). While this theory was originally centered on animals, it can be naturally extended to plants. Swain (2022) expands on a companion species with plants, by explaining that "plants still shape us, and we shape them…it's a companion species all the way down…to the root." Propagation therefore becomes a tangible form of interspecies dialogue. Humans engage in acts of attentive care and observation, and plants respond through growth and adaptation.

Therapeutic horticulture also acknowledges that well-being is deeply social, and propagation practices can serve as an opportunity to connect with others and build belonging within a community. Therapeutic horticulture programs are designed to create a sense of connection and belonging in participants, where community is embraced as a form of healing (Bruzzichesi, 2025).

Although the therapeutic value of horticulture is well established, the specific role of home propagation as a source of psychological benefits for consumers is less explored. Much of the existing research on horticultural therapy emphasizes gardening, landscaping, and general plant care (Söderback et al., 2004), while propagation receives less attention. This oversight limits our understanding of how this hobby may uniquely be a source of well-being and personal reflection for many consumers who are interested in both horticulture and self-care. By focusing on propagation, this research contributes to filling that gap, as it can be seen as both a psychological practice of healing and a moral practice of care that connects personal growth to ecological consciousness.

Connecting Ethics and Well-Being

Both proplifting and propagation are chosen interactions with plants created by a consumer. They show us how individuals engage with the green industry in both moral and emotional contexts. By acquiring and propagating a plant, human values of nurture, curiosity, and belonging can be observed. Often, people will allow their identities to become visible through these practices and will define themselves as stewards, collectors, and caretakers. Both the ethical and emotional dimensions are embedded in this concept. Tending to a cutting reflects empathy and connection, while deciding to remove a plant from a location allows for an opportunity of self-reflection on fairness and responsibility. Such encounters reveal that plant culture is about moral participation in a shared ecological community.

Within this shared foundation, proplifting and propagation reflect two contrasting actions of human-plant relationships. The justification of proplifting exposes how ethical boundaries may shift under motivation, where the desire to own and have something under one's care may override a respect for ownership. Meanwhile, propagation within one's personal space channels a response to the desire for care and pride in creation. Here, the moral framework is rooted in stewardship and continuity. While the two behaviors might outwardly oppose one another, it reveals the actions of consumers in both their homes and public spaces.

When these two dimensions are paired, this research can contribute to a better understanding of human-plant interactions directly from a consumer's standpoint. It reveals how ethical variability is present within plant consumerism, showing how acts of proplifting can be either virtuous or questionable depending on the context. It highlights propagation as a mechanism for emotional growth, demonstrating that growing plants can lead to psychological healing. Additionally, it informs horticultural education, policy, and outreach by emphasizing the need for programs that encourage ethical engagement with plants.

Research Questions and Objectives

This thesis is made up of two interrelated studies that examine how individuals ethically and emotionally engage with plants through horticultural practices. Both chapters explore different dimensions of these interactions, where one emphasizes moral judgement and ownership and the other emphasizes well-being and care. Together, they aim to reveal how people justify, experience, and find meaning in plant-related behaviors that are influenced by consumption, ethics, and restoration.

The first study investigates how consumers perceive and evaluate the ethicality of proplifting, which is the act of taking plant material without permission. This chapter focuses on understanding the moral framework and contextual cues that influence ethical approval or disapproval across different scenarios of plant-taking. Specifically, this chapter asks, "How do consumers perceive the ethicality of proplifting across contexts?" and "What demographics or attitudinal variables predict ethical approval or disapproval of proplifting?" The first question examines how judgement may vary when proplifting occurs in different settings, such as retail stores, public gardens, or protected lands. The second question investigates whether age, gender, political affiliation, or education levels may influence how individuals self-evaluate proplifting behaviors.

The second study examines the positive, internal benefits of home propagation through a framework of therapeutic horticulture. It focuses on how individuals interpret the benefits of propagating plants, and how these perceptions might be influenced by personal experience. The research questions for this chapter are "What benefits do consumers associate with home propagation?" and "How do experience levels and demographics influence perception of propagation benefits?" The first question allows us to understand the perceived outcomes of

propagation activities, such as improved self-confidence, therapeutic value, and social connection. The second question assesses whether factors such as age, gender, and prior propagation experiences shape such attitudes.

References

Affordable Patent Agency. (2024, February 22). *Exploring the importance of plant patents in agricultural innovation*. Affordable Patent Agency. https://affordablepatentagency.com/importance-plant-patents-agricultural-innovation/

Alam, M. N., Ogiemwonyi, O., Hago, Ibrahim. E., Azizan, N. A., Hashim, F., & Hossain, M. S. (2023). Understanding consumer environmental ethics and the willingness to use green products. *Sage Open*, *13*(1). https://doi.org/10.1177/21582440221149727

Belcher, B., & Hawtin, G. (1989). *A patent on life: ownership of plant and animal research*. International Development Research Centre.

Bieri, D., Joshi, N., Wende, W., & Kleinschroth, F. (2024). Increasing demand for urban community gardening before, during and after the COVID-19 pandemic. *Urban Forestry & Urban Greening*, *92*, 128206. https://doi.org/10.1016/j.ufug.2024.128206

Bruzzichesi, A. (2025, April 25). *Therapeutic horticulture at NC Botanical Garden*. NC State Extension. https://therapeutic-hort.ces.ncsu.edu/2025/04/therapeutic-horticulture-at-nc-botanical-garden/

Chow, E. (2021, November 9). *"Asexual reproduction prohibited"? Plant propagation and patent law*. IPOsgoode. https://www.yorku.ca/osgoode/iposgoode/2021/11/09/asexual-reproduction-prohibited-plant-propagation-and-patent-law/

Day, P. R. (n.d.). *The Impact of Patents on Plant Breeding Using Biotechnology*. Rutgers, The State University of New Jersey. https://ecommons.cornell.edu/server/api/core/bitstreams/121edf36-b88b-4d99-9c3f-728cc4361d53/content

Drew, J., Yue, C., Anderson, N. O., & Pardey, P. G. (2015). Premiums and discounts for plant patents and trademarks used on ornamental plant cultivars: A hedonic price analysis. *HortScience*, *50*(6), 879–887. https://doi.org/10.21273/hortsci.50.6.879

DRM. (2021, November 18). *The ethics of the new trend called "proplifting."* What To Do About…Everything. https://medium.com/what-to-do-about-everything/the-ethics-of-the-new-trend-called-proplifting-df8c7d1efb2d

Duda, E. (2024). Urban gardening education: User reflections on mobile application designs. *PLOS ONE*, *19*(9), e0310357. https://doi.org/10.1371/journal.pone.0310357

Fowler, C. (2000). The plant patent act of 1930: sociological history of its creation. *Journal of the Patent and Trademark Office Society*, *82*(9), 621–644.

Fulcher, A., Fessler, L., & Stackhouse, T. (2020). *A Green Industry Guide to Plant Patents and Other Intellectual Property Rights*. University of Tennessee Institute of Agriculture . https://plantsciences.tennessee.edu/wp-content/uploads/sites/25/2021/11/Green-Industry-Guide-to-Plant-Patents-UT-Extension-PB1882.pdf

Garden Center. (2025, February 25). *Florida green industries generate a big economic impact*. GardenCenter. https://www.gardencentermag.com/article/florida-green-industries-generate-a-big-economic-impact/

Giltrap, N., Eyre, D., & Reed, P. (2009). Internet sales of plants for planting – an increasing trend and threat?1. *EPPO Bulletin*, *39*(2), 168–170. https://doi.org/10.1111/j.1365-2338.2009.02283.x

Halleck, L. F. (2025, April 14). Garden library - trends in the houseplant and gardening world for 2025. *Halleck Horticultural*. https://lesliehalleck.com/garden-library/articles/trends-in-the-houseplant-and-gardening-world-for-2025

Haraway, D. J. (2003). *The companion species manifesto: Dogs, people, and significant otherness*. Prickly paradigm press chicago. (2003)

IFAS Communications. (n.d.). *Propagation - environmental horticulture - University of Florida, Institute of Food and Agricultural Sciences*. UF/IFAS. Retrieved October 16, 2025, from https://hort.ifas.ufl.edu/therapeutic-horticulture-activities-database/propagation/

Kingsley, J., Donati, K., Litt, J., Shimpo, N., Blythe, C., Vávra, J., Caputo, S., Milbourne, P., Diekmann, L. O., Rose, N., Fox-Kämper, R., van den Berg, A., Metson, G. S., Ossola, A., Feng, X., Astell-Burt, T., Baker, A., Lin, B. B., Egerer, M., … Byrne, J. (2023). Pandemic gardening: A narrative review, vignettes and implications for future research. *Urban Forestry & Urban Greening*, *87*, 128062. https://doi.org/10.1016/j.ufug.2023.128062

Leopold, A. (2008). The Land Ethic. In *Rethinking Landscape*. Routledge. https://doi.org/10.4324/9781315881409-23

Morrison, R. N., & Driggs, T. D. (2007). An Agricultural Law Research Article Virtue Ethics and Sustainability Policies. *Drake Journal of Agricultural Law*. https://doi.org/https://nationalaglawcenter.org/wp-content/uploads/assets/bibarticles/morrisondriggs_virtue.pdf

North Carolina Botanical Garden. (2023, July 6). *What is Therapeutic Horticulture?* North Carolina Botanical Garden. https://ncbg.unc.edu/engagement/therapeutic-horticulture/what-is-th/

Ogiemwonyi, O., & Jan, M. T. (2023). The correlative influence of consumer ethical beliefs, environmental ethics, and moral obligation on green consumption behavior. *Resources,*

Conservation & Recycling Advances, *19*, 200171. https://doi.org/10.1016/j.rcradv.2023.200171

Oregon State University. (n.d.). *What is TEK?* Traditional Ecological Knowledge Lab. Retrieved October 24, 2025, from https://tek.forestry.oregonstate.edu/what-tek

Ramos, G. A., Johnson, W., VanEpps, E. M., & Graham, J. (2024). When consumer decisions are moral decisions: Moral Foundations Theory and its implications for consumer psychology. *Journal of Consumer Psychology*, *34*(3), 519–535. https://doi.org/10.1002/jcpy.1427

Rapisarda, A. (2025, February 21). The value of variegata plants: Why are they so desirable? *Casa Botanica*. https://casa-botanica.com/en/blogs/blog-1/de-waarde-van-variegata-planten-waarom-zijn-ze-zo-gewild?srsltid=AfmBOoppjM1YT8cxra4I8JkB5yvEMokw_EiWJtjKZOXDMTojUxIzqWWe

Reddit. (2019). *Update on rules and standards! What is proper proplifting and what is theft? Come inside and see! : R/proplifting*. https://www.reddit.com/r/proplifting/comments/fq220f/update_on_rules_and_standards_what_is_proper/

Simmonds, M. S. J., Fang, R., Wyatt, L., Bell, E., Allkin, B., Forest, F., Wynberg, R., da Silva, M., Zhang, B. G., Shi Liu, J., Dong Qi, Y., & Demissew, S. (2020). Biodiversity and patents: Overview of plants and fungi covered by patents. *PLANTS, PEOPLE, PLANET*, *2*(5), 546–556. https://doi.org/10.1002/ppp3.10144

Söderback, I., Söderström, M., & Schälander, E. (2004). Horticultural therapy: The ‘healing garden’and gardening in rehabilitation measures at Danderyd hospital rehabilitation

clinic, Sweden. *Pediatric Rehabilitation*, *7*(4), 245–260. https://doi.org/10.1080/13638490410001711416

Stimpson, A. (2025, October 19). Welcome to the killer plant club. *The Washington Post*. https://www.washingtonpost.com/home/2025/10/19/allure-carnivorous-plants/

Swain, K. (2022, November 12). *Plants as companion species*. Kathleen Swain. https://kathleenswain.com/2022/11/12/donna-haraway-companion-species-and-plants/

Timeline of American garden history. (2018, December 4). Smithsonian Gardens. https://gardens.si.edu/collections/archives/timeline-of-american-garden-history/

Trademarks & Patents. (2018, February 22). *All You Need To Know About Patenting A Plant In Canada*. Trademark Patent. https://www.trademarkspatentslawyer.com/blog/all-you-need-to-know-about-patenting-a-plant-in-canada

United States Patent and Trademark Office. (n.d.). *Plant and plant variety protection*. USPTO. Retrieved November 14, 2025, from https://www.uspto.gov/ip-policy/patent-policy/international-convention-protection-new-varieties-plants-upov

Whitehead, D., Cowell, C. R., Lavorgna, A., & Middleton, S. E. (2021). Countering plant crime online: Cross-disciplinary collaboration in the FloraGuard study. *Forensic Science International: Animals and Environments*, *1*, 100007. https://doi.org/10.1016/j.fsiae.2021.100007

World Population Review. (2025, November 13). Patents by country. *World Population Review*. https://worldpopulationreview.com/country-rankings/patents-by-country

Xiong, W., Reynolds, M., & Xu, Y. (2022). Climate change challenges plant breeding. *Current Opinion in Plant Biology*, *70*, 102308. https://doi.org/10.1016/j.pbi.2022.102308

CHAPTER 2

PROPLIFTING AND MORAL JUDGEMENT: HOW CONSUMERS VIEW AND NAVIGATE PLANT PROPERTY[1]

[1] Garrett, L., Campbell, J. To be submitted to a peer reviewed article.

Abstract

The popularity of owning and propagating indoor plants is continuously growing amongst consumers of all demographics due to the rewarding nature and ease of caring for plants at home. Asexual propagation encourages consumers to duplicate their plants with minimal effort, which leads to the increasing interest of proplifting. The allure of easy and frugal propagation techniques has encouraged consumers to acquire plant material without permission, known as "proplifting." Reproducing plants without permission from the entity that owns the plant – either directly from living plants or from discarded material like leaves, nodes, roots, stems, or seeds – has been done throughout the history of plant cultivation. While this practice appears harmless on a superficial level, it is important to consider the ethical concerns that exist alongside proplifting. Such concerns include potential financial harm to for-profit businesses, non-profit organizations, and individuals. In addition to financial harm, there is great concern for conservation efforts of rare and endangered plant species. If individuals take plant material from such efforts, it could lead to the destruction of restoration efforts that rely on healthy, genetically diverse individuals. This research investigates consumer perceptions of the ethics surrounding proplifting through the form of a national survey which provides scenarios for respondents to voice their opinions on whether a situation would be considered ethically acceptable or unacceptable. The findings aim to contribute to a broader understanding of ethical consumer behavior in the context of plant propagation.

Introduction

A specialty plant shop in Portland, Oregon, posts to their Instagram followers detailing the attempted theft of a wide variety of plant cuttings, including cuttings from *Philodendron*, variegated *Monstera*, and *Scindapsus* plants. The seller noted that a young woman was touring

their greenhouse as a part of a group. At the end of the tour, the plant shop owner noticed cuttings and confronted the thief. The attempted theft was estimated to be around $2,000 USD including plant material and plant damages. The thief pled guilty to second-degree theft. Though this story seems like fiction, the whole account of the theft appears in *The Guardian* (Chapman, 2020).

Stories such as this are becoming more frequent as the interest in indoor plants and gardening surged significantly during 2020 (Fratello et al., 2021), which in turn further popularized the practice of proplifting. Proplifting, or "prop-lifting," is the recently developed term that refers to the practice of propagating plant material – often discarded with attached nodes – without obtaining permission from the owner (Potts, 2025). Proplifters seemingly have no barriers to where they will proplift from: For instance, a porch pirate stealing indoor plants off a porch in Akron, Ohio; the theft of variegated *Monstera* and *Philodendron* painted lady at a specialty plant shop in Seattle, Oregon; the theft of hundreds of rare *Philodendron* from a wholesale specialty nursery in Florida; and to conservancies and gardens (notably Kew Gardens in London, England) around the world (Wilson, 2023; Jones, 2025).

As proplifting continues to increase, complicated questions about the morality of theft for something that can "just grow back" need to be addressed. For many plant hobbyists and collectors, there is a desire to add to their collections at no cost with the idea that taking only a small part of the plant and/or rescuing a cutting from the floor/trash is a harmless activity. This notion is perpetuated online, such as on Reddit's r/Proplifting, where the number-one rule is "submitters must acquire props and pups that have already fallen and are in no way physically attached to a living plant from a store…." (Reddit.com, 2025). This normalization of taking plant material from a store even if it is "not attached" to a living plant plays a significant role in

normalizing proplifting through content of successful proplifting experiences that reach thousands of viewers. Other outlets, such as *Better Homes and Gardens*, give advice on how to ethically obtain "free" plant material without proplifting, notably: ask for permission, do not damage for sale plants, take small pieces, and take pieces not attached to the plant (Potts, 2025).

Consumers often believe proplifting is a method of rescuing plant material that might otherwise be thrown out. Because of this belief, proplifting is often difficult to prevent, with the most popular method of deterrence being signage and warnings of prosecution if caught. Proplifting is a crime, with a financial consequence for not only the retail or nursery locations that sell plants, but also for farmers, insurance companies, and the proplifter – who may be arrested or pay fines (Mears et al., 2007). Through loss of plant material, lack or inability to enforce theft-prevention measures, and unknown numbers of lost plants per year, nurseries and garden centers financially suffer from theft. These consequences often go unconsidered by consumers, therefore one must consider both the intentions and held beliefs that are present alongside actions of proplifting. Although consumers may have neutral to good intentions behind proplifting, they have little knowledge of the broader impacts from their actions.

In addition to the financial concerns of casual plant theft, there is a larger issue of theft in the illegal plant trade. Poaching from the wild or from curated collections is a significant issue for conservation: by losing individuals in a population, there is a direct loss to the genetic variation within species. Maintaining genetic diversity for endangered plant species is crucial in ensuring adaptability and long-term survivability within populations (Maschinski, et al., 2020). Often, individuals who purchase rare plants online do not realize their plants were poached and trafficked rather than grown in a nursery where progeny or clones are readily available. Plants sold online are often shipped through intermediate countries to keep the plant origins and the

sellers' identity hidden (Mauso, 2024). This is a growing issue for plant conservationists, botanical gardens, and restoration initiatives. The Botanic Gardens Conservation International is a plant conservation network which has implemented a campaign to bring light to the rising trend of illegal plant trade through online platforms (Mauso, 2024).

Given the increasing spread of proplifting throughout the world, it is essential to better understand the motivations around proplifting. This study examines opinions, beliefs, and attitudes towards the ethics of proplifting. By presenting respondents with a variety of hypothetical scenarios, this research seeks to understand the factors that influence an individual's ethical judgement of proplifting. Examples from these scenarios have been pulled from real-world instances of plant theft and include proplifting from retail stores, botanical gardens, and federally protected lands.

The second part of this study explores whether attitudes toward proplifting correlate with behaviors relating to authority, societal norms, and respect for property rights. These questions were created to gain insight into the scope of unauthorized plant propagation, and the reasons consumers participate in this practice. Do consumers proplift out of ignorance? Are they choosing to disregard the severity of the situation? Or do they do it as an act of rebellion towards the system of buying and selling plants? By understanding these patterns, the green industry and conservationists can develop targeted strategies centered on education and communication to effectively address issues specific to them.

Materials and Methods

In June 2024, a national online survey was conducted to understand consumer attitudes and behaviors related to proplifting (taking plant material without explicit permission). Participants were recruited from the national database of Toluna, Inc. (Dallas, TX, USA). Random panelists

within Toluna's database were contacted by Toluna and provided a link to the survey (IRB #PROJECT00009658). Participants who agreed to participate entered and completed the survey.

A total of 3,354 respondents completed the survey. After entering the survey, respondents answered 6 questions around proplifting then answered 10 demographic questions. Respondent characteristics mirrored the U.S. adult population for median age, median household income, race, and gender (Table 2.1).

Table 2.1 Demographics of Sample Population Compared to U.S. Population Data

	Means	
	Sample	**US Population***
Median Age (years)**	44	38
Silent Gen	6.11%	
Baby Boomers	26.64%	
Gen X	23.94%	
Millennial	26.16%	
Gen Z	17.15%	
Region***		
Far West	13.01%	17%
Rocky Mountains	2.22%	4%
Southwest	10.84%	13%
Plains	5.24%	7%
Great Lakes	14.70%	14%
Mideast	15.53%	15%
New England	4.21%	5%
Southeast	30.25%	26%
Race		
White	63.10%	63.7%
African American	15.56%	12.2%
Hispanic	9.85%	16.3%
Other race	11.49%	7.8%
Gender		
Male	44.15%	49%
Female	55.85%	51%
Political Affiliation		
Democrat	36.76%	
Republican	32.26%	
Independent	25.25%	
Other	5.72%	
Education		

Highschool or Less	29.89%
Some College	21.20%
Associate/Trade Degree	12.61%
Bachelors Degree	21.82%
Greater than Bachelors Degree	14.47%
Household	
Kids in Household	.76
Adults in Household	2.23
Median Household Income	$62,500.50
Urbanicity	
Metro	25.31%
Suburban	51.79%
Rural	22.90%
Primary Plant Buyer	79.90%

*Based on 2020 census data unless otherwise noted (U.S. Census Bureau, 2021)
**Based on definitions from Parents, 2025
***Based on definitions from Abadi, 2018

With respect to proplifting questions, the survey asked questions around the following topics (1) understanding of proplifting, (2) agreement on a given definition of proplifting, (3) prior proplifting experience, (4) scenario-based ethical evaluations of proplifting, (5) personal ethical standings and (6) likelihood of proplifting in a given scenario (Table 2.2).

Table 2.2 Survey Questions Related to Proplifting

Item	Answer Choice
Question 1: Have you ever heard of the term “proplifting”?	Yes / no / not sure
Question 2: Does the definition of “proplifting” above align with your definition of “proplifting?”	Yes / no
Question 3: Have you ever proplifted from any of the following?	Multiple Choice (select all that apply)
I have never proplifted	
Chain hardware stores	
Mass merchandiser	
Local retail nursery/greenhouse	
Public gardens	
State or federal land	
Offices/restaurants	
Individuals	
Grocery stores	
Other	
Question 4: Using the definition provided in this survey, do you think it is ethical to proplift plant material from any of the following?	Rating Scale 0 = Definitely not ethical 25 = Probably not ethical
Chain hardware stores	
Mass merchandiser	
Local retail nursery/greenhouse	

Public gardens State or federal land Offices/restaurants Individuals Grocery stores Other	75 = Probably ethical 100 = Definitely ethical
Question 5: Please rate yourself given the following situation	Never / Sometimes / Usually / Always
When given rules you find it easy to remember and follow them.	
When shopping at a big box store you often put things back where they belong.	
When shopping at a local store you often put things back where they belong.	
You wouldn't consider stealing from a family store, regardless of financial situation.	
You wouldn't consider stealing from a big box store, regardless of financial situation.	
When approached by an authority figure, you listen to what they say and do what is asked of you, often without questioning any further.	
When approached by a park ranger, you listen to what they say and do what is asked of you, often without questioning any further.	
When approached by a police officer, you listen to what they say and do what is asked of you, often without questioning any further.	
When approached by a store manager, you listen to what they say and do what is asked of you, often without questioning any further.	
Question 6: How likely would you act in a given scenario?	Rating Scale
You're browsing through a mass merchandiser (e.g., Lowes or Home Depot) and see a plant you've been wanting for a long time. The price is very high and the store has a large inventory of them. No one is near you so you decide to pinch off a node and take the plant material home to propagate it.	0 = Extremely dislikely 25 = Dislikely 50 = Unsure 75 = Likely 100 = Extremely likely
You are shopping at your local nursery run by an individual who has been in your community for years. You see a leaf on the ground and know you can propagate it. It would be swept up and dossed at the end of the day anyway. You decide to pick up the plant and put it in your pocket. You continue shopping and purchase a couple of other plants so that you're still supporting them.	
You are walking through a botanical garden and are awestruck at a beautiful plant they have on display. You ask an employee if you are allowed to get cuttings of it and they say that they are not allowed to give away any plant material. Once they walk away you decide to pinch off a piece of the plant in a less noticeable spot.	
You are hiking through a national park and see an area taped off with a sign posted stating "Department of Natural Resources restoration project, access strictly prohibited". Inside this area are a bunch of rare carnivorous plant. You collect carnivorous plants for a hobby and know that it is extremely valuable and would be a great addition to your collection, you might even be able to sell parts of it. No one else is around so you go into the taped-off area and dig up one plant.	
You're getting coffee at a local café and spot a beautiful plant in the corner. This plant has vines trailing down, so you decide to pinch off a leaf once you finish up your drink and take it home.	
Visiting a friend, you notice a new plant added to their collection. You have been wanting this plant for years and you know they won't cherish it as much as you. When they step out of the room you quickly put it in your bag and find a reason to leave.	

You're browsing through Facebook Marketplace when you see someone selling a plant you want. They offer porch pickup and have a box to drop the cash in. Once you get to their house you take the plant and leave without paying.

You just bought a new plant and took it home. On the tag, it says "Patented plant, propagation prohibited." You ignore the tag and propagate it anyway. A couple months later your cuttings are large enough to sell and you make a little extra cash.

Proplifting behaviors and attitudes were analyzed using descriptive statistics. Cluster analysis was then utilized to group respondents with similar ethical stances. Question 4 ("Using the definition provided in this survey, do you think it is ethical to proplift plant material from any of the following?") was then used in the clustering procedure. Ward's method for hierarchical clustering was used as the clustering algorithm, given it minimizes the variance within clusters.

The quality of clusters was then evaluated using pseudo-F statistics and pseudo-T squared tests. The higher the value of a pseudo-F indicates a better-defined cluster, while a lower pseudo-T squared value indicates cluster stability. With both metrics, it was determined that eight clusters would allow for reasonable interpretation with maximized differences between groups. All analyses were conducted in StataNow/BE 18.5 (StataCorp).

A multinomial logit model was then utilized to better understand the role of demographics on cluster membership. Marginal effects (dy/dx) were then calculated for each cluster. In this context, dy/dx values represent the change in the probability of belonging to a specific cluster, relative to the base outcome for categorical variables or a one-unit change in the predictor for continuous variables. Values with p-values ≤ 0.100 were considered significant and are discussed in the analysis section.

Results

For the initial analyses, clusters were assessed by their proplifting experience and opinions. In table 3, clusters were compared across where they had proplifted. Clusters 1-3 reported the

highest level of previous proplifting behaviors, with the highest percentage of proplifting from grocery stores (mean = 19.61%), individuals (mean = 16.63%), and public gardens (mean = 15.26%). Contrasting this behavior are clusters 6-7, where a large majority of respondents have never proplifted before (mean = 77.51%). Cluster 7 stands out by reporting the strongest history of non-participation, with 81.59% of respondents having no prior proplifting experience. Cluster 8 also has minimal proplifting experience, though, 34.41% of respondents have reported that they have proplifted from individuals in the past.

Respondents were grouped into clusters based on their reported approval of proplifting across a range of locations (Table 2.3). These location-based ethics ratings provided the basis for determining which individuals consistently supported proplifting, those who approved based on context and location, and those who entirely reject the act. Once grouped, clusters were then able to be compared across prior experiences (Table 2.4), broader ethical standards (Table 2.5), and demographics (Table 2.6). This comparison allows us to find and better understand differences amongst groups.

Table 2.3 shows the extent that context may influence ethical judgement across scenarios. Cluster 1 respondents rated most scenarios as ethical with means at around 94, suggesting a consistent acceptance rate of proplifting regardless of the source. Opposite to this lies cluster 7, where the means of most locations were less than 15. Cluster 8 also has low means of proplifting approval, with means between 14 and 23 for most scenarios. However, cluster 8 has strong support for proplifting from individuals, where the mean approval is around 79. Additional opinions about contextual support are evident in cluster 5. This group generally rated locations as unethical to steal from unless the source was a local nursery or greenhouse, public gardens, or from individuals, with means between 74 and 81. These findings emphasize that for many

individuals, the ethical status of proplifting is not based on a critical belief of right or wrong, but depends on where they gather the material.

Table 2.3 Mean Ethics Ratings of Proplifting and Distribution of Responses by Cluster

Scenario (abbrev.)	Cluster 1				Cluster 2			
	Mean	% Not Ethical (0-25)	% Neutral (26-74)	% Ethical (75-100)	Mean	% Not Ethical (0-25)	% Neutral (26-74)	% Ethical (75-100)
Chain hardware	94.75	0.00%	2.24%	97.76%	74.11	1.04%	46.62%	52.34%
Mass merch.	94.81	0.00%	1.00%	99.00%	74.35	1.04%	45.41%	53.55%
Local nursery/ greenhouse	94.18	0.00%	1.49%	98.51%	77.20	0.00%	37.26%	62.74%
Public garden	94.03	0.00%	1.49%	98.51%	79.87	0.00%	30.50%	69.50%
State/fed. Land	94.76	0.00%	1.00%	99.00%	73.25	3.99%	39.34%	56.67%
Office/ restaurant	94.30	0.00%	1.99%	98.01%	76.25	0.35%	40.55%	59.10%
Individual	94.30	0.00%	1.49%	98.51%	80.57	0.00%	33.45%	66.55%
Grocery store	94.72	0.00%	1.24%	98.76%	76.69	0.69%	38.47%	60.83%
Other	94.08	0.00%	2.24%	97.76%	73.51	2.43%	43.50%	54.07%
Scenario (abbrev.)	**Cluster 3**				**Cluster 4**			
	Mean	**% Not Ethical (0-25)**	**% Neutral (26-74)**	**% Ethical (75-100)**	**Mean**	**% Not Ethical (0-25)**	**% Neutral (26-74)**	**% Ethical (75-100)**
Chain hardware	69.68	0.69%	64.72%	34.60%	49.34	5.62%	90.12%	4.25%
Mass merch.	66.06	1.20%	68.85%	29.95%	53.36	3.50%	87.75%	8.75%
Local nursery/ greenhouse	63.28	3.44%	73.84%	22.72%	49.21	5.50%	90.38%	4.12%
Public garden	57.78	7.75%	75.39%	16.87%	49.59	6.62%	89.50%	3.88%
State/fed. Land	57.11	9.12%	75.22%	15.66%	48.12	10.12%	85.12%	4.75%
Office/ restaurant	62.02	3.61%	78.31%	18.07%	49.76	6.25%	88.25%	5.50%
Individual	61.14	3.10%	78.31%	18.59%	54.73	4.62%	81.88%	13.50%
Grocery store	67.58	1.03%	69.71%	29.26%	51.95	3.12%	90.62%	6.25%
Other	59.74	4.82%	78.66%	16.52%	50.83	4.12%	91.00%	4.88%
Scenario (abbrev.)	**Cluster 5**				**Cluster 6**			
	Mean	**% Not Ethical (0-25)**	**% Neutral (26-74)**	**% Ethical (75-100)**	**Mean**	**% Not Ethical (0-25)**	**% Neutral (26-74)**	**% Ethical (75-100)**

Chain hardware	49.88	14.00%	77.33%	8.67%	38.04	18.18%	80.42%	1.40%
Mass merch.	37.96	31.33%	63.33%	5.33%	32.44	0.00%	26.57%	73.43%
Local nursery/ greenhouse	74.90	3.33%	42.00%	54.67%	40.91	13.64%	81.82%	4.55%
Public garden	75.87	0.00%	41.33%	58.67%	44.27	8.39%	83.92%	7.69%
State/fed. Land	53.28	17.33%	51.33%	31.33%	40.19	12.24%	82.87%	4.90%
Office/ restaurant	51.31	17.33%	56.00%	26.67%	33.70	22.38%	76.92%	0.70%
Individual	81.10	0.67%	30.00%	69.33%	38.88	16.78%	81.82%	1.40%
Grocery store	43.40	20.67%	69.33%	10.00%	37.73	17.13%	80.07%	2.80%
Other	36.53	36.00%	58.67%	5.33%	28.59	37.06%	62.59%	0.35%

Scenario (abbrev.)	**Cluster 7**				**Cluster 8**			
	Mean	**% Not Ethical (0-25)**	**% Neutral (26-74)**	**% Ethical (75-100)**	**Mean**	**% Not Ethical (0-25)**	**% Neutral (26-74)**	**% Ethical (75-100)**
Chain hardware	12.16	84.13%	15.24%	0.63%	22.95	56.63%	41.58%	1.79%
Mass merch.	12.29	87.62%	11.11%	1.27%	21.23	60.93%	36.20%	2.87%
Local nursery/ greenhouse	12.31	89.84%	7.62%	2.54%	21.39	63.80%	32.62%	3.58%
Public garden	11.57	87.62%	12.38%	0.00%	23.37	64.87%	29.39%	5.73%
State/fed. Land	8.95	95.56%	4.44%	0.00%	11.77	81.00%	19.00%	0.00%
Office/ restaurant	11.49	88.89%	10.79%	0.32%	18.14	69.18%	30.47%	0.36%
Individual	10.24	90.48%	9.52%	0.00%	79.86	0.00%	38.35%	61.65%
Grocery store	12.70	85.71%	12.38%	1.90%	21.02	60.57%	35.48%	3.94%
Other	10.71	88.89%	10.48%	0.63%	14.71	79.57%	19.00%	1.43%

Table 2.4 indicates the proportion of respondents who have reported previous experience with proplifting. The groups who have proplifted the most, such as clusters 1 and 2, are also the clusters who have voiced the most support for proplifting in general. It can be noted, however, that the overall proportion of individuals who have proplifted before are below half of the total respondents for clusters 3-8. While some of these clusters are supportive of proplifting, their percentage of doing it remains low. This indicates while that there might be a general tolerance for it from many demographics, the actual instance of proplifting may not be as prevalent.

Table 2.4 Proportion of Respondents Reporting Previous Proplifting Experiences by Cluster

Summary Item (Have you ever proplifted from any of the following?)	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8
I have never proplifted	39.55%	46.62%	51.98%	66.50%	66.67%	73.43%	81.59%	60.93%
Chain hardware stores	17.41%	10.23%	9.81%	4.12%	6.67%	3.15%	2.54%	1.79%
Mass merchandiser	22.89%	10.23%	11.02%	5.88%	5.33%	4.55%	1.90%	1.79%
Local retail nursery/greenhouse	19.40%	9.53%	10.15%	5.88%	6.67%	3.50%	2.86%	2.15%
Public gardens	20.40%	12.31%	13.08%	6.38%	5.33%	5.24%	0.63%	2.87%
State or federal land	12.44%	6.41%	8.26%	4.25%	5.33%	3.15%	0.95%	0.36%
Offices/restaurants	17.41%	11.96%	8.61%	5.50%	4.67%	5.94%	0.95%	0.72%
Individuals	21.39%	16.12%	12.39%	10.62%	15.33%	5.59%	4.44%	34.41%
Grocery stores	26.37%	14.73%	17.73%	9.62%	4.00%	6.64%	3.49%	3.58%
Other	2.24%	0.52%	2.07%	2.38%	0.67%	4.55%	6.98%	0.72%

In addition to evaluating proplifting directly, respondents were asked about their broader ethical orientation. Such ethical stances include rule-following, returning merchandise, and listening to various authority figures (Table 2.5). On average, most clusters chose to rate themselves between “usually” and “always” on these measures, which suggests that the majority of respondents believe they have positive social ethical norms. However, slight differences are present across clusters.

Table 2.5 Mean Responses to Personal Ethical Standings

Summary Item	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8
Scale: 1 = never, 2 = sometimes, 3 = usually, 4 = always								
Follows rules	3.28	3.04	2.88	2.87	3.13	2.88	2.87	3.38
Returns merch. big box store	3.27	3.06	2.77	2.88	3.09	2.82	2.87	3.25
Returns merch. local store	3.26	3.10	2.85	2.93	3.16	2.82	2.90	3.35
Wouldn’t steal from family store	2.96	2.74	2.66	2.58	2.81	2.45	2.52	3.21
Wouldn’t steal from big box store	2.92	2.74	2.54	2.59	2.77	2.44	2.48	3.15
Listens to authority	3.13	2.91	2.78	2.78	2.83	2.74	2.70	3.15
Listens to park rangers	3.31	3.10	2.92	2.92	3.23	2.80	2.85	3.47

Listens to police	3.27	3.10	2.89	2.97	3.23	2.95	2.85	3.48
Listens to store managers	3.16	2.80	2.70	2.66	2.83	2.63	2.57	3.08

Clusters 6 and 7 reported the lowest overall compliance with following rules (2.88 and 2.87) and listening to authority figures (2.74 and 2.70) (Table 2.5). Cluster 8 contrasts these groups by having the highest personal and societal standards under most circumstances. Clusters 1 and 2 are the most supportive of proplifting yet rated themselves with moderately high personal and social ethics. This shows that their acceptance of proplifting is not generally tied to low ethical standings.

Table 2.6 presents us with the results of the multinomial logit analysis, which allows us to gain a better understanding of which demographic characteristics are more likely and less likely to be a member of each cluster. A positive dx/dy number represents a higher likelihood of the listed demographic to be represented by the cluster, while a negative dx/dy represents a lower likelihood of the listed demographic to be represented by the cluster. The p-value lets us determine if the demographic is statistically significant, a p-value ≤ 0.100 is considered significant.

Table 2.6 Results of multinomial logit analysis, derivative and p-values, for demographic information by cluster

Variable	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
	dy/dx	p	dy/dx	p	dy/dx	p	dy/dx	p
Silent gen	0.0256	0.120	-0.0042	0.831	0.0293	0.187	0.0183	0.438
Gen X	0.0266	**0.085**	-0.005	0.791	0.0618	**0.005**	0.015	0.512
Millennial	-0.0638	**0.000**	-0.0361	0.094	0.0945	**0.002**	0.0291	0.305
Gen Z	0.0146	0.386	-0.0301	0.150	-0.0169	0.446	0.0275	0.320
Far West	-0.0139	0.695	-0.0527	0.232	-0.0428	0.348	-0.0289	0.608
Rocky Mountains	-0.0280	**0.072**	-0.0158	0.484	0.0073	0.766	0.0512	**0.082**
Southwest	0.0045	0.854	-0.06	0.023	0.0026	0.938	0.0001	0.998
Plains	-0.0357	**0.011**	-0.0143	0.476	0.0306	0.178	-0.0039	0.873

Great Lakes	-0.0139	0.356	-0.029	0.131	-0.0205	0.321	0.0549	**0.034**
Mideast	-0.0263	0.244	-0.0311	0.327	0.0256	0.501	0.0001	0.997
New England	0.0278	0.716	0.0227	0.138	-0.0384	**0.016**	0.0162	0.360
African American	0.0279	**0.010**	0.0719	**0.000**	0.0059	0.676	0.0158	0.328
Hispanic	-0.0027	0.818	-0.0386	**0.015**	-0.0024	0.888	0.0153	0.441
Other race	-0.0442	**0.000**	-0.0332	**0.049**	-0.0045	0.803	0.0282	0.187
Male	-0.0588	**0.000**	-0.0901	**0.00**	-0.0415	0.133	0.0691	**0.078**
Republican	0.0077	0.613	-0.0286	0.138	0.0049	0.819	0.0192	0.422
Independent	-0.0172	0.245	-0.0323	**0.099**	-0.0035	0.874	0.0099	0.692
Other	-0.0504	**0.001**	0.0061	0.815	0.0232	0.420	-0.0103	0.731
High school or less	-0.0343	0.229	-0.0172	0.686	0.037	0.461	0.0076	0.886
Some College	-0.0203	0.132	0.0112	0.628	0.0085	0.728	-0.0325	0.226
Associate/trade degree	0.0126	**0.001**	0.0101	**0.077**	0.0079	0.143	-0.0109	0.132
Greater than bachelor	-0.0064	0.195	0.0053	0.405	-0.0022	0.719	-0.003	0.665
Mean # of Kids in Household	-0.0561	**0.000**	-0.0179	0.283	-0.0084	0.619	0.0449	**0.027**
Mean # of Adults in Household	-0.0463	**0.000**	-0.0181	0.364	-0.0431	0.027	0.078	**0.003**
Suburban	0.000	**0.017**	0.000	0.648	0.000	0.722	-0.000	0.345
Rural	0.0572	**0.000**	0.0395	**0.023**	0.0285	0.112	-0.0496	**0.025**
Median Household Income	0.000	**0.017**	0.000	0.648	0.000	0.722	-0.000	0.345
Primary Purchaser of Plants	0.0572	**0.000**	0.0395	**0.023**	0.0285	0.112	-0.0496	**0.025**

Variable	**Cluster 5**		**Cluster 6**		**Cluster 7**		**Cluster 8**	
	dy/dx	p	dy/dx	p	dy/dx	p	dy/dx	p
Silent gen	-0.0137	0.138	-0.0054	0.707	-0.0128	0.312	-0.0371	**0.00**
Gen X	-0.0057	0.550	0.0026	0.854	-0.0299	**0.013**	-0.0655	**0.00**
Millennial	**0.0242**	**0.084**	0.016	0.363	-0.0102	0.501	-0.0538	**0.00**
Gen Z	0.004	0.760	-0.0065	0.676	0.0006	0.972	0.0068	0.605
Far West	-0.0086	0.740	-0.0583	0.007	0.1875	**0.006**	0.0175	0.592
Rocky Mountains	0.0083	0.553	-0.025	0.093	0.0208	0.287	-0.0188	0.067
Southwest	0.0064	0.727	-0.0315	0.102	0.0725	**0.025**	0.0055	0.736
Plains	-0.0015	0.892	0.0178	0.260	0.0139	0.398	-0.0069	0.500
Great Lakes	0.0087	0.472	-0.0074	0.609	0.0138	0.414	-0.0071	0.484
Mideast	0.0275	0.249	-0.0156	0.498	0.0254	0.406	-0.0057	0.714
New England	0.0069	0.392	-0.0238	**0.035**	-0.018	0.141	0.0385	**0.00**
African American	-0.011	0.128	-0.0248	**0.014**	-0.0363	**0.000**	-0.0493	**0.00**
Hispanic	0.0146	0.142	-0.0079	0.512	0.025	**0.066**	-0.0034	0.702
Other race	0.0019	0.853	0.0131	0.325	0.0289	**0.056**	0.0098	0.341

Male	0.0129	0.519	-0.0234	0.209	0.0716	**0.021**	0.0601	**0.028**
Republican	-0.0033	0.761	0.027	0.120	0.0058	0.713	-0.0326	**0.000**
Independent	0.022	0.110	0.029	0.121	0.0029	0.862	-0.0109	0.243
Other	0.0042	0.782	0.0254	0.277	0.0139	0.515	-0.0121	0.259
High school or less	0.0218	0.488	0.0027	0.943	-0.014	0.624	-0.0036	0.860
Some College	-0.0012	0.930	0.0032	0.866	0.0365	**0.094**	-0.0053	0.614
Associate/trade degree	-0.003	0.342	0.0041	0.332	-0.0153	**0.003**	-0.0055	0.231
Greater than bachelor	0.0018	0.537	-0.0039	0.368	0.0028	0.530	0.0057	**0.078**
Mean # of Kids in Household	0.0014	0.886	0.0195	0.128	0.0113	0.378	0.0053	0.591
Mean # of Adults in Household	0.0116	0.366	-0.004	0.798	0.0233	0.161	-0.0014	0.902
Suburban	0.000	0.590	-0.000	0.921	-0.000	**0.015**	0.000	0.492
Rural	0.0075	0.393	-0.0248	**0.079**	-0.0589	**0.00**	0.0007	0.948
Median Household Income	0.0129	0.519	-0.0234	0.209	0.0716	**0.021**	0.0601	**0.028**
Primary Purchaser of Plants	-0.0033	0.761	0.027	0.120	0.0058	0.713	-0.0326	**0.000**
Observations	3,354							
Wald chi square	641.13							
p > chi square	0.000							
Log pseudolikelihood	-6,245.4264							
Pseudo R^2	0.0548							

Cluster 1: Highly accepting group (n = 402)

Cluster 1 demonstrated the greatest support for proplifting with mean ethical ratings consistently around 94 across all contexts and a 0% disapproval of proplifting. Respondents in this cluster consistently viewed proplifting as ethical, with little change in opinion based on the source of the found plant material. Prior experiences also aligned with this belief. This cluster had the highest reporting of proplifting overall in the past. Despite their stances on proplifting,

the respondents in this cluster rated themselves moderately high on personal ethics questions. Demographically, this group was significantly represented by Gen X (dx/dy = 0.0226, p = 0.085), whereas Millennials are not likely to be in this group (dx/dy = -0.0638, = 0.00). Regions such as the Southwest (dx/dy = -0.028, p = 0.072) and the Great Lakes (dx/dy = -0.0357, p = 0.011) are not likely to be a part of this cluster. They are represented by Males (dx/dy = 0.0279, p = 0.010). They are not likely to be politically Independent (dx/dy = -0.0442, p = 0.000) or have Other Politics (dx/dy = -0.0588, p = 0.000). They are not represented by individuals with an Associate's Degree (dx/dy = -0.0504, p = 0.001). They are likely to have kids in the household (dx/dy = 0.0126, p = 0.001). They do not generally live in Suburban (dx/dy = -0.0561, p = 0.000) or Rural (dx/dy = -0.0463, p = 0.000) areas. They are generally the primary purchaser of plants for their household (dx/dy = 0.0572, p = 0.000).

Cluster 2: Supportive group (n = 577)

Cluster 2 respondents had a general acceptance of proplifting, with mean ethical scores ranging between 74 and 80. While they reported support, there was more hesitancy towards proplifting than cluster 1. When it comes to personal ethical standings, this group rated themselves generally high on following rules and listening to authorities, including park rangers and police. Demographically, this group was significantly represented by Males (dx/dy = 0.0719, p = 0.000). They are not represented by Republican (dx/dy = -0.0386, p = 0.015), Independent (dx/dy = -0.0332, p = 0.049), or Other (dx/dy = -0.0901, p = 0.000) political affiliation. Their education level will generally not be Some College (dx/dy = -0.0323, p = 0.099). They do have children in the household (dx/dy = 0.0101, p = 0.077). Lastly, they are generally the primary purchaser of plants for their household (dx/dy = 0.0395, p = 0.023).

Cluster 3: Moderately supportive group (n = 581)

Cluster 3 leaned toward proplifting being an ethical act, with mean approval ratings between 57 and 69. This group believed the most ethical location to steal from were chain hardware stores (~34%) mass merchandisers or grocery stores (~29%). Their personal ethical standings show them to be moderate, with a typical report between "sometimes" and "usually," regardless of the instance. Individuals in this group were demographically represented by Millennials (dx/dy = 0.0618, p = 0.005) and Gen Z (dx/dy = 0.0945, p = 0.002). They are not represented by Males (dx/dy = -0.0384 , p = 0.016).

Cluster 4: Neutral or unsure group (n = 800)

Cluster 4 represented a more neutral stance towards proplifting, with average ethical ratings between 49 and 50. This group had a slight majority of no proplifting experience with 66.5% of respondents reporting that they have never proplifted before. Their personal ethics fell near the middle, with no strong personal standards on either end of the spectrum. Demographically, this group comes from the Southwest (dx/dy = 0.0512, p = 0.082) and the Mideast (dx/dy = 0.0549, p = 0.034). They are likely to have Other (dx/dy = 0.0691, p = 0.078) political stances. They generally are from Suburban (dx/dy = 0.0449, p = 0.027) or Rural (dx/dy = 0.078, p = 0.003) areas. They are not often the primary purchaser of plants for their household (dx/dy = -0.0496, p = 0.025).

Cluster 5: Situational supporters (n = 150)

Cluster 5 respondents had acceptance of proplifting based on specific contexts. They generally supported proplifting if it was from individuals (69.33% ethical approval) or from public gardens, local nurseries, or local greenhouses (54-58% ethical approval). On personal ethic standings, they scored moderately, with "usually" following rules and listening to park rangers. This group is only significantly represented by Gen Z (dx/dy = 0.0242, p = 0.084).

Cluster 6: Skeptical supporters (n = 286)

Cluster 6 respondents felt generally neutral about proplifting, unless it was done from a mass merchandiser (73.43% ethical approval). Nearly all other answers clustered around neutral support for the act. Reported past proplifting experience was also low, including proplifting from mass merchandisers (only 4.55% reported from this source). This indicates general support for the action, but no desire to do it themselves. Their personal ethical standings reported slightly less conviction for following rules and listening to authority figures. Individuals in this cluster will generally not be White (dx/dy = -0.0238, p = 0.035) or Male (dx/dy = -0.0248, p = 0.014). They are also not the primary purchaser of plants for their household (dx/dy = -0.0248, p = 0.079).

Cluster 7: Highly critical group (n = 315)

Cluster 7 was the group that overall disapproved of proplifting. Most have never proplifted before (81.59% reporting no history of doing this act). Regardless of the situation or location, cluster 7 reported that it would be unethical to proplift. Their personal ethical standards were amongst the lowest of all clusters, especially on following rules and listening to authority. Demographically, this group will generally not have Millennials (dx/dy = -0.0299, p = 0.013) present. They are more often from the Rocky Mountains (dx/dy = 0.1875, p = 0.006) and the Plains (dx/dy = 0.0725, p = 0.025). They are not usually Male (dx/dy = -0.0363, p = 0.000). Politically, this cluster included Republicans (dx/dy = 0.025, p = 0.066), Independent (dx/dy = 0.0289, p = 0.056), or Other (dx/dy = 0.0716, p = 0.021). They often have a Graduate or Professional degree (dx/dy = 0.0365, p = 0.094), do not have children in the household (dx/dy = -0.0153, p = 0.003), are below the U.S. median household income (dx/dy = -0.000, p = 0.015) and are not the primary purchaser of plants for their household (dx/dy = -0.0589, p = 0.00).

Cluster 8: Selective supporters (n = 279)

The final cluster was generally disapproving of proplifting, with mean ethical ratings between 11 and 22, and a majority (60.93%) that has never proplifted before. This contrasted starkly with their ethical rating of proplifting from individuals (61.65%), and reports of previous proplifting experience from individuals (34.41%). This cluster scored the highest on personal ethical standings, consistently rating "usually" to "always" on rule-following, returning merchandise, and listening to all authority figures. Cluster 8 will not generally be represented by Gen X (dx/dy = -0.0371, p = 0.000), Millennials (dx/dy = -0.0655, p = 0.000), or Gen Z (dx/dy = -0.0538, p = 0.000). They are often White (dx/dy = 0.0385, p = 0.000) and are not Male (dx/dy = -0.0493, p = 0.000). They have Other (dx/dy = 0.0601, p = 0.028) political leanings. They are not represented by an education level of high school or less (dx/dy = -0.0326, p = 0.000). They also have adults in the household (dx/dy = 0.0057, p = 0.078).

Discussion

The clustering analysis identified eight distinct groups, with each group representing unique stances towards proplifting. These groups ranged from highly accepting of all proplifting activities to strongly critical. Additionally, several clusters demonstrated situational and selective approval for proplifting. Together, such results indicate a diversity of ethical perspectives on proplifting. These perspectives vary across demographics, experiences, and ethical standings.

Table 2.4 shows how past proplifting experiences may differ amongst clusters. Clusters 1-3 reported the highest experience levels of proplifting, especially from public gardens, individuals, and grocery stores. Clusters 6 and 7 contrast these behaviors, with a strong history (between 73 and 81%) of non-participation. Cluster 8 also reported an overall minimal proplifting experience,

though more than 30% had proplifted from individuals. Such distinctions align with ethical orientations, where behavior reflects attitudes.

Table 2.5 displays how ethical judgement may shift across scenarios. Cluster 1 consistently rated proplifting as ethical with a mean approval of around 94 and believe it is ethical regardless of the source. An extreme opposite of this is cluster 7, where the mean approval scores sit below 13 across all contexts. Cluster 5 revealed more support with specific situations, such as proplifting from local nurseries or greenhouses, public gardens, and individuals. Cluster 8 showed a strong negative opinion on proplifting unless it was done towards an individual, where the support jumps up to a mean of nearly 80. For many respondents, the ethical acceptability of proplifting is dependent upon context above most else.

Beyond the act of proplifting, respondents were asked about their broader ethical orientations. This was to see if there was correlation between low societal standards and ethical approval of proplifting. Such questions included rule following, returning merchandise to the correct location in stores, and listening to authority figures (Table 2.5). Most clusters rated themselves between “usually” and “always” on these items, which suggest they have generally positive ethical standards.

Clusters 6 and 7 reported the lowest compliance with rule following and listening to authority, sitting between “sometimes” and “usually” for most answers. This suggests their rejection of proplifting may be based more towards strong beliefs of ownership and property rather than conforming to societal norms. Contrasting this is cluster 8, which scored highest across all items. They consistently aligned with authority and rules, yet they were the most likely group to proplift from individuals. Clusters 1 and 2 rated themselves the highest on ethical items, while simultaneously being the most supportive of proplifting. This indicates that their

acceptance of proplifting is not a reflection of weak personal ethics, but the possibility of choosing to redefine ownership and property.

Demographic variables (Table 2.6) provided an understanding of the type of respondents who composed each cluster. Younger generations, particularly Millennials and Gen Z, were more likely to belong to the moderately (cluster 3) and situationally supportive (cluster 5) groups. Gen X respondents were more likely to be of the highly accepting (cluster 1) group. Older generations were less represented in the accepting groups and instead appear more frequently in the highly critical (cluster 8) group. Gender differences were also noticeable throughout the cluster profiles. Males were significantly present in the highly accepting and supportive (clusters 1 and 2) groups. While females were more present in the skeptical and critical (clusters 6, 7, and 8) groups. Political affiliation allows for further observation of the groups. Republicans, Independents, and those with Other affiliations were most represented in the critical clusters (7 and 8), while people who were politically unaffiliated or Democratic appeared more frequently in the supportive clusters. Higher education levels were prominent in cluster 7, and respondents with less formal education were overall less represented. Clusters 1 and 2 most often had children in the household, and respondents without children were more present in the critical clusters (7 and 8).

The cluster analysis revealed a wide range of ethical attitudes towards proplifting, telling us that public perceptions of this behavior have similar trends, but can be highly segmented based on individual factors. The eight clusters illustrate how responses vary by context. In this discussion, we will interpret these findings and attempt to understand what may cause these behaviors and the practical implications of proplifting.

Cluster 1: Highly accepting group.

Cluster 1 stands out as the most likely to proplift in nearly every situation and justify these behaviors by believing they are ethical. Respondents in this group reported the highest proplifting approval ratings, with minimal disapproval across all contexts. Their history of proplifting is supported by this strong endorsement, as they have a history of past engagement in this behavior. This cluster is largely composed of Gen X males who are the primary plant purchaser for their household, and they often have children in the household. This consistent acceptance of proplifting across all contexts allows us to come to the conclusion that targeted prevention, or educational outreach would have to be conducted for such individuals. Without this, the green industry could continue experiencing high levels of removal of plant materials, regardless of the setting.

Cluster 2: Supportive group.

Cluster 2 is broadly supportive of proplifting. Their attitudes suggest approval that is more conditional, rather than overall acceptance. The members of this group are often male, are the primary plant purchaser for their household, and have children. The overall openness to proplifting is paired with a self-reported tendency to follow rules and a general respect for authority indicates that their support may be due to perceived justification, such as proplifting being a harmless thing, rather than having a disregard for following laws.

Cluster 3: Moderately supportive group.

Cluster 3 indicates moderate support for proplifting, with approval ratings varying by context. This group most often viewed taking from chain hardware stores and mass merchandisers as the most ethical option, which suggests that corporate association may play a role in moral justification. This group is primarily composed of younger respondents such as

Millennials and Gen Z. The ethical flexibility of this group may be influenced by generational attitudes towards corporations and consumer culture.

Cluster 4: Neutral or unsure group.

Respondents in cluster 4 maintained a neutral stance, with mean ethical ratings in the high 40s and low 50s. This group includes a mixture of both suburban and rural respondents, with many representing the Southwest and Mideast regions. They largely report that they have no prior proplifting experience. This neutral opinion suggests that they have limited exposure or understanding of the practice, and a degree of uncertainty about the implications involved. This group represents an important part of the population, where opinions can be shaped through educational outreach as they develop a greater understanding of proplifting.

Cluster 5: Situational supporters.

Cluster 5 respondents appear to base their ethical judgements on context above all else. They show strong support for proplifting from local nurseries, public gardens, and individuals. In addition to this, they seem to generally disapprove or are more neutral about proplifting if it is from a mass merchandiser or a grocery store. This group is primarily composed of Gen Z, who may view plant ownership from an untraditional lens. They may believe proplifting from public gardens and local nurseries is the easiest way to build their collection and may have a unique perception on ownership. Cluster 5 generally believes they follow rules, respects property, and listens to authority, so they may believe that proplifting is not a harmful act.

Cluster 6: Skeptical group.

Cluster 6 members have mild approval for proplifting in very limited context. We see a slightly higher approval and strong neutral rating for proplifting from local nurseries and greenhouses, and public gardens. Despite this, they still report previous proplifting experience as

minimal, which suggests a moral tolerance, rather than a desire for action. This cluster includes fewer White and male respondents and is less likely to be the primary plant purchaser for their household. This suggests that their neutrality may be due to lower personal involvement with plants and plant purchasing.

Cluster 7: Highly critical group.

Cluster 7 consistently views proplifting as unethical across all scenarios. Most of the members have never engaged in the behavior. They are most often from the Rocky Mountain and Plains region and tend to have graduate or professional degrees. They are less likely to have children or be primary plant purchasers. This group's educational levels may align with a higher sense of rule adherence, and stronger trust for institutions.

Cluster 8: Selective supporters.

Although cluster 8 generally disapproves of proplifting, they show a high acceptance for proplifting from individuals. The recorded participation is overall low, but if a respondent has proplifted before, it is most likely that they have proplifted from an individual. This group has the highest self-ratings of personal ethics, where they almost always follow societal rules. This suggests that their approval in this context stems from how they perceive their relationships with others. Demographically, cluster 8 is largely White, female, older, with a political stance of other. This selectivity for proplifting may reflect a more nuanced ethical stance, which values the exchange of materials from one person to another.

When analyzing the ethics of proplifting, we must remember that it is not a universal belief. Ethics are shaped by power, culture, and both large-scale and small-scale systems. While this study reveals a spectrum of ethical viewpoints around proplifting, it must be analyzed through the lens of recognizing broader social norms, values, and current world tensions. Proplifting may

be technically considered theft, but it raises deeper questions around ownership, access to non-necessities such as indoor plants and beliefs of resistance against corporate or institutional ownership.

These findings have direct implications for the green industry, including ornamental plant breeders and retail nurseries. In addition, nonprofit organizations and conservation efforts can be especially vulnerable to theft. The willingness to take plants from botanical gardens and federal lands amongst clusters 1, 2, and 5 highlights a potential vulnerability in conservation efforts. For industry stakeholders, understanding that some consumers can justify plant theft in certain contexts indicates that prevention strategies must address ethical reasoning. Educational campaigns could be created to inform consumers that restoration projects are put in place to protect irreplaceable plants that provide ecological benefits, rather than them being plants that are collectibles.

When working with large-scale consumer surveys, there is always a chance of respondents not being truthful or answering questions to the best of their abilities. The study had measures in place to prevent individuals from answering questions without reading the content the questions were based on, but there is no way of knowing how many respondents bypassed those questions.

While these findings provide valuable insight into consumer ethics surrounding proplifting, their generalizability is limited by the survey's sample. This survey represented the population of the United States to the best of its ability, but shortcomings may arise due to respondents being self-selected. Cultural context, regional plant availability, and economic conditions are all factors that may shape perceptions differently in varying geographic areas. Further studies that incorporate additional samples could increase diversity and could help determine whether the patterns observed hold across differing respondents.

Due to the consistency of high ratings of theft from botanical gardens and federal land amongst clusters, further research could go into what makes this situation so tempting amongst consumers. The specific scenario provided talked specifically about rare carnivorous plants. Unfortunately, carnivorous plants are often a target of theft amongst collectors. There are many documented cases of theft for carnivorous plants specifically, with cases ranging from Venus Flytrap (*Dionaea muscipula*) poaching in North Carolina, to theft of Pitcher Plants (*Nepenthes*) (Solon, 2024). Theft amongst carnivorous plants in particular is a large concern for conservationists. Many carnivorous plants are on the brink of extinction due to poaching and the high demand of online purchases from collectors (Cross, et al., 2020). Additional surveys targeted specifically at carnivorous plant collectors could be a topic of interest for future research.

Theft from botanical gardens is another large concern for horticulturists. Botanical gardens are often in possession of endangered plants and will occasionally put these out on display for patrons to observe and learn about. However, many botanical gardens have reported theft of critically endangered plants, such as the *Nymphaea thermarum* at the Royal Botanic Gardens. This plant is extinct in the wild and is only known to exist in cultivation at a handful of botanical gardens, one of them being Kew Gardens (Leveille, 2014). Research on the topic of theft from these locations and the environmental impacts of losing such genetic material would provide us with greater understanding of the negative impacts of proplifting.

Problems that can arise from these results is the variability in ethical stances. If the green industry leaves these unaddressed, situational plant theft may be further normalized, leading to a greater poaching pressure on rare species. Poaching could lead to diminished success of restoration projects and a reduction of genetic diversity in wild and cultivated plant populations.

These outcomes greatly threaten conservation goals and could undermine progress towards restoration goals for horticultural institutions.

Addressing these issues requires a multifaceted approach. Educational outreach should be the first step and can help shift consumer perceptions by emphasizing the ecological importance of rare plant species. By finding a way to inform consumers about the importance of maintaining genetic diversity through leaving material in-situ, we can begin the process of prevention. Restoration sites and botanical gardens can incorporate physical deterrents such as fencing, increased surveillance and signage explaining the legal and scientific stakes of plant theft. Lastly, a stronger partnership between conservationists, industry leaders, and community organizations can create a shared ethic of stewardship. Increasing the number of stakeholders involved with plant theft can begin to reframe plant ownership as a collective responsibility.

Conclusion

This study explored the complex moral landscape surrounding proplifting. While this practice is dismissed as harmless, there are complex ethical, environmental, and systematic dimensions that must be explored when approaching the topic. By clustering consumer responses, the research conducted was able to demonstrate that attitudes towards proplifting vary greatly depending on context, individual morals, and societal norms. Consumer ethics around proplifting are not uniform, and resolutions towards the issue should not be a blanket approach.

The ethical nuances revealed from this study suggests that proplifting is not a simple matter of right or wrong, but rather a question of who determines ownership and access to live material. Such points of tension lead to believe that consumers are questioning the way current ownership and access to plants are being implemented. As propagation rises in popularity, the green industry's understanding of motivations behind proplifting must be acknowledged.

The results suggest that perceptions of proplifting are shaped by situational judgements. This indicates that plant ethics are often measured by consumers by how they feel in the moment, which is influenced by perceived risk, personal benefits, and the rarity of the material in question. Therefore, these patterns challenge the notion that plant theft is generally condemned and reveal an underlying variable of conditional acceptance.

By investigating not only what leads to proplifting, but how it is justified, this research acts as a first step towards future projects around prevention of proplifting. Further studies of plant ethics, conservation, and consumer behavior also benefit from understanding stances on proplifting and the ethical gray zone that has been established by consumers.

References

Abadi M. 2018. Even the US government can't agree on how to divide up the states into regions. Business Insider. https:// www.businessinsider.com/regions of-united-states-2018-5?op=1.

Chapman, G. (2020, January 15). A growing concern: Is it ever OK to steal plant cuttings? *The Guardian*. http://theguardian.com/lifeandstyle/2020/jan/15/plants-is-it-ok-to-steal-cuttings

Cottrell, S. (2025, September 26). A year-by-year generation guide and their personalities. Parents. https://www.parents.com/parenting/better-parenting/style/generation-names-and-years-a-cheat-sheet-for-parents/

Cross, A. T., Krueger, T., Gonella, P., & Fleischmann, A. (2020, September 11). *Conservation of carnivorous plants in the age of extinction*. Elsevier BV. https://www.researchgate.net/publication/344197206_Conservation_of_carnivorous_plants_in_the_age_of_extinction

Imran, Y., Wijekoon, N., Gonawala, L., Chiang, Y.-C., & De Silva, K. R. D. (2021). Biopiracy: Abolish corporate hijacking of indigenous medicinal entities. *The Scientific World Journal*, *2021*, 1–8. https://doi.org/10.1155/2021/8898842

Jenney, P. (2023, June 30). *A guide to seed intellectual property rights*. Organic Seed Alliance. https://seedalliance.org/publications/a-guide-to-seed-intellectual-property-rights/

Jones, B. (2025, July 16). News 5 Cleveland WEWS. *News 5 Cleveland WEWS*. https://www.news5cleveland.com/news/local-news/akron-familys-house-plants-stolen-by-porch-pirate

Leveille, D. (2014, January 14). The world's smallest water lily was stolen from London's Kew Gardens. *The World from PRX*. https://theworld.org/stories/2014/01/14/worlds-smallest-water-lily-stolen-londons-kew-gardens

Maschinski, J., Havens, K., Fant, J., & Andrea Kramer. (2020, September 8). *Maximizing genetic diversity for plant conservation - CPC*. Center for Plant Conservation. https://saveplants.org/best-practices/importance-representing-genetic-diversity-plant-conservation-collections/

Mauso, S. (2024, August 13). *Raising awareness about the illegal plant trade*. The Huntington. https://www.huntington.org/verso/raising-awareness-about-illegal-plant-trade

Mears, D. P., Scott, M. L., Bhati, A. S., Roman, J., Chalfin, A., & Jannetta, J. (2007). Evaluation of the agriculture crime technology information and operation network (ACTION) in nine counties in California, 2004-2005. *ICPSR Data Holdings*. https://doi.org/10.3886/icpsr04686.v1

Pain, E. (2016). French institute agrees to share patent benefits after biopiracy accusations. *Science*. https://doi.org/10.1126/science.aaf4036

Potts, L. (2025, June 21). The controversial plant propagation hack that has gardeners divided. *Better Homes & Gardens*. https://www.bhg.com/what-is-proplifting-11753036

Reddit. (2025). *r/proplifting*. Reddit. https://www.reddit.com/r/proplifting/

San Fratello, D., Campbell, B. L., Secor, W. G., & Campbell, J. H. (2022). Impact of the COVID-19 pandemic on gardening in the united states: Postpandemic expectations. *HortTechnology*, *32*(1), 32–38. https://doi.org/10.21273/horttech04911-21

Schmidt, E. (2022, January 20). *Propagation prohibited? Understanding plant patent protection*. University of Cincinnati Law Review Blog.

https://uclawreview.org/2022/01/20/propagation-prohibited-understanding-plant-patent-protection/

Smessaert, J., Missemer, A., & Levrel, H. (2020). The commodification of nature, a review in social sciences. *Ecological Economics*, *172*, 106624. https://doi.org/10.1016/j.ecolecon.2020.106624

Solon, Z. (2024, March 1). Two charged with stealing nearly 600 Venus flytraps in Brunswick County. *WECT*. https://www.wect.com/2024/03/01/two-charged-with-stealing-nearly-600-venus-flytraps-brunswick-county/?utm_source=chatgpt.com

Wilson, E. (2023, October 20). Help us stamp out plant theft at Kew. *Kew*. https://www.kew.org/read-and-watch/plant-theft-at-kew

CHAPTER 3

PROPAGATING INDOOR PLANTS AS A FORM OF SELF-DIRECTED THERAPEUTIC HORTICULTURE[2]

[2] Garrett, L., Campbell, J. To be submitted to a peer reviewed article.

Abstract

Home propagation is a widespread practice among horticulturists and everyday consumers alike due to its accessibility, ease of success, and gratification of growing new plants. While many discussions around propagation emphasize its environmental and economic benefits, attention should also be directed towards its impact on individual well-being. This study investigates the relationship between home propagation and improvements in mood, self-confidence, and opportunities for social interaction. Using survey data from respondents across the United States, findings indicate that successful propagation attempts lead to personal fulfillment, a sense of accomplishment, and opens the possibility of engagement with other enthusiasts. These results suggest that home propagation can function as both a therapeutic measure of building self-confidence and a community-building activity, extending beyond its perception as a casual hobby.

Introduction

Therapeutic horticulture is becoming a popular method of treatment for a growing number of people with social, mental, and intellectual disorders. Therapeutic horticulture is the intentional use of plant-related activities, for the goal of promoting health and well-being. Furthermore, it has the potential to combat social isolation. Findings from prior research suggest that therapeutic horticulture supports people who are socially excluded by providing structured opportunities for connection and care (Sempik et al., 2014). In recent years, indoor plants have become closely tied to the growing “wellness” movement due to studies that have demonstrated a range of benefits. These include improved air quality through the removal of toxins and pollutants, reduced blood pressure and respiratory issues, and enhanced attention span and productivity from those who work at home (Horticulture Connected and Gilsenan, 2020). Additionally,

interactions with indoor plants are linked to psychological well-being, with Lee et al. (2015) finding that people feel more comfortable and soothed after a transplanting task.

In addition to the physical and psychological outcomes, there are theoretical perspectives that frame humans and indoor plants as having an intertwined and co-constitutive relationship. Such theories include the Donna Haraway concept of companion species and the Actor-Network Theory. These theories assert that the act of caring for indoor plants enables humans to interpret the needs of their plants while shaping the rhythms of daily life and community (Rajaveräjä, 2020). From this perspective, other research on horticulture programs illustrates how human-plant relationships contribute to belonging, health, and social inclusion (Diamant and Waterhouse, 2010). All these factors reinforce the role of plants as critical components in therapeutic practices.

Propagation has merit as a self-directed therapeutic activity. An individual can derive therapeutic benefits, such as stress reduction, from horticultural activities conducted independently outside of a professional therapy setting. Propagation requires careful attention to plants by understanding that plant growth is affected by factors such as light, temperature, humidity, water, nutrition, and soil (Pennisi, 2022). This horticultural activity offers a metaphor for personal care as well as care for others, themes that are often incorporated in therapeutic approaches. Propagation also requires the hobbyist to have patience that is rewarded with a sense of accomplishment from the successful creation of new plants. These hands-on activities encourage internal benefits such as developing a new skill, self-confidence, resilience, and an understanding of renewal (Oh et al., 2020).

Home propagation often uses simple techniques of creating cuttings by removing plant pieces from a parent plant and rooting them. This is commonly done through water propagation, but

propagation through soil, LECA (lightweight expanded clay aggregate), and grafting are other commonly used options to generate new plants (Parmar et al., 2024). Many indoor plants propagate easily, and with only a few leaves or nodes, an individual can generate multiple new plants. Beyond its technical simplicity, home propagation appeals to hobbyists due to affordability, accessibility to rare species, and personal satisfaction associated with creating new life (Oboni and Hossain, 2025). Social media communities further amplify this trend by encouraging an exchange of knowledge, online plant sales, and the normalization of propagation as a social activity (Oboni and Hossain, 2025).

Parallel to the growth in hobbyist propagation, consumer demand for indoor plants has risen significantly, with a 22% increase in sales from 2020 to 2021 (Terrarium Tribe and Jones, 2023). Commercial growers have responded to this surge by scaling up production and diversifying plant offerings (Greenhouse Grower and Wilcox, 2023). Companies such as Costa Farms have chosen to utilize tissue culture labs to produce larger quantities of tropical plants that have historically been difficult to propagate at a large scale (Greenhouse Grower and Wilcox, 2023). By using tissue culture labs, genetic consistency and disease-free stock are ensured for consumers (Chen and Henny, 2015). Together, these trends highlight how propagation is becoming central to the houseplant market.

While the therapeutic and social benefits of horticulture are well documented (Diamant and Waterhouse, 2010), (Mourão et al., 2021), little formal attention has been directed towards propagation as a distinct practice of well-being within the field. Existing research highlights how gardening activities support health, create belonging within a community, and strengthen a community as a whole (Diamant & Waterhouse, 2010), but the specific ways in which home propagation contributes to the psychological well-being and social connection remain

underexplored. The objective of this study is to address this gap by examining how consumers understand the therapeutic and social dimensions of their own self-directed propagation experiences. More specifically, this research seeks to: assess consumer perceptions of the therapeutic benefits associated with plant propagation, such as stress reduction, accomplishment, and self-confidence; investigate how propagation practices facilitate social interaction, including both online and in-person interactions; and explore how demographics and attitudes may shape a consumer's perspective on propagation.

Materials and Methods

A national online survey was conducted during Summer 2025 to understand consumer attitudes and behaviors related to home plant propagation. Participants were recruited from the national database of Toluna Inc. (Dallas, TX, USA). Participants were given a link to the survey, and those agreeing to participate were entered into the survey. IRB approval #PROJECT00007590. After entering the survey, respondents were asked a variety of plant purchasing and propagation behavior questions along with demographic questions (Table 3.1). A total of 1,220 respondents completed the survey.

Table 3.1 Demographics of Sample Population Compared to U.S. Population Data

	Means	
	Sample	**US Population***
Median Age (years)	46	38
Silent Gen	6.52%	
Baby Boomers	28.11%	
Gen X	26.89%	
Millennial	26.67%	

Gen Z	11.81%	
Region**		
Far West	10.78%	17%
Rocky Mountains	2.16%	4%
Southwest	11.03%	13%
Plains	5.70%	7%
Great Lakes	15.58%	14%
Mideast	16.73%	15%
New England	3.98%	5%
Southeast	32.47%	26%
Race		
White	63.28%	63.7%
African American	19.57%	12.2%
Hispanic	8.62%	16.3%
Other race	8.53%	7.8%
Gender		
Male	45.82%	49%
Female	54.18%	51%
Political Affiliation		
Democrat	33.86%	
Republican	35.23%	
Independent	26.30%	
Other	4.61%	
Education		

Highschool or Less	42.73%
Some College	11.71%
Associate/Trade Degree	23.37%
Bachelors Degree	13.00%
Greater than Bachelors Degree	9.19%
Household	
Kids in Household	0.68
Adults in Household	2.18
Median Household Income	$62,500.50
Urbanicity***	
Metro	24.69%
Suburban	49.29%
Rural	26.02%
Primary Plant Buyer	80.51%

*Based on 2020 census data unless otherwise noted (U.S. Census Bureau, 2021)

**Based on definitions from Abadi, 2018

The survey included questions on past propagation habits, perceived benefits of propagation, community interactions around propagation, online presence related to propagation, and perceived advantages of indoor plants in the home (Table 3.2).

Table 3.2 Survey Questions Related to Propagation

Item	Answer Choice
Question 1: Have you ever propagated a plant (propagation means to grow from seed, roots, plant cuttings, etc.)?	Yes / No / Not sure

Question 2: Which of the following would you consider to be benefits of propagating plants?	Continuous scale:
Builds my self-confidence	0 = strongly disagree
Successfully propagating a plant fills me with immense pride	25 = somewhat disagree
Offers me therapeutic benefits (such as lowered blood pressure, reduced heart rate, or a generally calmer state of being	50 = neither agree nor disagree
I like to talk about the benefits of propagating plants and want my friends and family to try it for themselves	75 = somewhat agree
	100 = strongly agree
Question 3: Thinking about propagating, which of the following describes you…	Choose all that apply
I like to share my plants with friends and family to propagate	
I trade plants with my friends and family to build out collections	
If I see a plant at a store, I know my friend has been looking for, I will feel inclined to reach out to them and let them know where I saw it	
If I have questions about plant care I usually reach out to friends and family for help	
* none of the above	
Question 4: I am a member of plant forum communities and try to post or respond to posts as often as I am able to	Single choice
Yes and active	
Yes but not really active	
No	
Not sure	
Question 5: What are (would be) some advantages of houseplants in your home?	Choose all that apply
Makes me feel happy	
Gives me a sense of purpose	
Pretty to look at	
Makes my family feel happier	

Cleans the air	
Makes me feel relaxed	
Makes me more productive	
Builds a sense of family	
Other (please specify)	
* there are no advantages	
Question 6: How important are houseplants to you socially?	Choose all that apply
I am likely to discuss houseplants at work	
I like to talk about plants with my family	
I would like to volunteer with other gardeners in my community	
I wish I could hang out in public places (like restaurants or bars) and talk about plants with other like-minded people	
It would be fun to be invited to someone's house to share a meal and discuss plants	
I would learn more about plants if I were part of a garden club that met regularly	
I connect with online personalities and social media influencers when I want to engage with others about gardening	

Initial analysis included descriptive statistics to better understand the relationship between propagation activities and perceived benefits of propagation. Further analysis included cluster analysis to group respondents by similarity in the perceived benefits of propagation (Question 2, Table 3.2). Respondents were grouped into clusters using Ward's method for hierarchical clustering, which was chosen due to its ability to minimize variance within clusters, creating high-quality groups (Murtagh & Legendre, 2014).

The quality of clusters was then evaluated using pseudo-F and pseudo-T squared tests. Higher pseudo-F values indicate better-defined cluster, and lower pseudo-T squared values suggest cluster stability. Based on these criteria, 8 clusters were identified as the most stable groups and these clusters are further discussed below. All analyses were conducted in StataNow.BE 18.5 (StataCorp).

Results

Eight clusters were identified and represent the grouping of respondents with similar perspectives of the benefits of propagation, ranging from those who have highly benefited from the hobby to those who believed there were little to no benefits (Table 3.3). The variation in these mean responses provides the foundation for the clustering analysis, which indicates that the highly supportive, moderately supportive, and skeptical groups of respondents.

Table 3.3 Mean Responses to the Benefits of Propagation and Distribution of Responses by Cluster

Scenario (abbrev.)	**Cluster 1**				**Cluster 2**			
	Mean	**% Strongly Disagree (0-25)**	**% Neutral (26-74)**	**% Strongly Agree (75-100)**	**% Strongly Disagree (0-25)**	**% Neutral (26-74)**	**% Strongly Agree (75-100)**	**% Strongly Disagree (0-25)**
Builds my self confidence	71.90	0.00%	55.60%	44.40%	44.40%	69.34	0.00%	63.20%
Fills me with pride	66.59	1.49%	63.43%	35.07%	35.07%	78.98	0.00%	28.00%
Offers therapeutic benefits	66.50	0.00%	70.90%	29.10%	29.10%	77.94	0.00%	31.20%
I socialize through houseplants	58.91	1.49%	83.96%	14.55%	14.55%	80.96	0.00%	15.20%
Scenario (abbrev.)	**Cluster 3**				**Cluster 4**			
	Mean	**% Strongly Disagree (0-25)**	**% Neutral (26-74)**	**% Strongly Agree (75-100)**	**Mean**	**% Strongly Disagree (0-25)**	**% Neutral (26-74)**	**% Strongly Agree (75-100)**

Builds my self confidence	46.22	7.22%	92.40%	0.38%	76.57	0.00%	32.14%	67.86%
Fills me with pride	50.37	3.42%	93.54%	3.04%	91.14	0.00%	0.00%	100.00%
Offers therapeutic benefits	48.52	4.56%	92.78%	2.66%	90.68	0.00%	3.57%	96.43%
I socialize through houseplants	51.72	3.04%	91.63%	5.32%	20.86	64.29%	35.71%	0.00%
Scenario (abbrev.)	**Cluster 5**				**Cluster 6**			
	Mean	**% Strongly Disagree (0-25)**	**% Neutral (26-74)**	**% Strongly Agree (75-100)**	**Mean**	**% Strongly Disagree (0-25)**	**% Neutral (26-74)**	**% Strongly Agree (75-100)**
Builds my self confidence	61.07	10.96%	50.68%	38.36%	93.42	0.00%	2.39%	97.61%
Fills me with pride	69.75	0.00%	58.90%	41.10%	94.34	0.00%	1.71%	98.29%
Offers therapeutic benefits	46.21	10.96%	84.93%	4.11%	92.28	0.34%	4.78%	94.88%
I socialize through houseplants	17.47	73.97%	26.03%	0.00%	90.84	0.00%	9.56%	90.44%
Scenario (abbrev.)	**Cluster 7**				**Cluster 8**			
Chain hardware	**Mean**	**% Strongly Disagree (0-25)**	**% Neutral (26-74)**	**% Strongly Agree (75-100)**	**Mean**	**% Strongly Disagree (0-25)**	**% Neutral (26-74)**	**% Strongly Agree (75-100)**
Builds my self confidence	27.47	53.85%	46.15%	0.00%	2.73	100.00%	0.00%	0.00%
Fills me with pride	29.86	49.45%	47.25%	3.30%	3.20	100.00%	0.00%	0.00%
Offers therapeutic benefits	17.37	75.82%	24.18%	0.00%	3.05	100.00%	0.00%	0.00%
I socialize through houseplants	20.00	67.03%	32.97%	0.00%	3.22	100.00%	0.00%	0.00%
Builds my self confidence	27.47	53.85%	46.15%	0.00%	2.73	100.00%	0.00%	0.00%

After clusters were identified and evaluated, further analysis was conducted to examine the demographic differences between groups. Multinomial logistic regression was used to determine

which demographc variables potentially impact cluster membership. Marginal effects (dy/dx) were calculated to interpretate the likelihood of cluster membership across clusters (Table 3.4).

Table 3.4 Results of multinomial logit analysis, derivative and p-values, for demographic information by cluster

	Cluster 1		Cluster 2		Cluster 3		Cluster 4	
Variable	**dy/dx**	**p**	**dy/dx**	**p**	**dy/dx**	**p**	**dy/dx**	**p**
Silent gen	-0.0258	0.646	-0.0839	**0.000**	0.0025	0.967	0.0056	0.391
Gen X	-0.0109	0.773	-0.0082	0.717	-0.0054	0.883	0.0037	0.361
Millennial	-0.0099	0.800	0.0052	0.821	0.0352	0.368	-0.0031	0.325
Gen Z	0.1095	**0.068**	-0.0591	**0.009**	0.0482	0.390	-0.0051	**0.070**
Far West	0.0273	0.597	0.0260	0.450	-0.0295	0.508	0.0010	0.817
Rocky Mountains	0.0428	0.710	-0.0200	0.714	-0.0453	0.609	0.0009	0.906
Southwest	0.0198	0.685	-0.0188	0.475	-0.0337	0.424	-0.0049	0.101
Plains	0.0637	0.335	-0.0630	**0.010**	-0.0135	0.814	0.0022	0.688
Great Lakes	0.0682	0.117	0.0286	0.325	-0.0174	0.651	-0.0026	0.351
Mideast	0.0433	0.322	-0.0274	0.231	0.0414	0.308	-0.0030	0.309
New England	0.0516	0.537	0.0059	0.896	0.0327	0.677	-0.0011	0.840
African American	-0.0066	0.853	0.0282	0.322	0.0013	0.972	0.0005	0.899
Hispanic	-0.0874	**0.044**	0.0905	**0.055**	0.0522	0.345	-0.0174	**0.001**
Other race	-0.0352	0.479	0.0370	0.369	0.0888	0.122	-0.0013	0.798
Male	0.0499	**0.070**	-0.0295	**0.089**	-0.0077	0.780	-0.0023	0.368
Republican	-0.0126	0.696	0.0206	0.366	0.0251	0.464	-0.0024	0.402
Independent	-0.0445	0.175	-0.0004	0.986	0.0744	**0.046**	0.0028	0.419
Other	-0.0800	0.124	-0.0099	0.810	0.1355	**0.073**	0.0031	0.691
High school or less	0.0171	0.695	-0.0424	**0.097**	-0.0315	0.428	0.0025	0.643
Some College	0.0406	0.487	-0.0103	0.727	-0.0684	0.125	0.0141	0.365

Associate/trade degree	0.0407	0.402	-0.0399	**0.075**	-0.0534	0.185	0.0028	0.667
Greater than bachelor	-0.1045	**0.040**	-0.0266	0.351	-0.1181	**0.013**	0.0124	0.430
Mean # of Kids in Household	0.0019	0.874	-0.0124	0.153	-0.0063	0.610	-0.0008	0.542
Mean # of Adults in Household	-0.0035	0.768	-0.0023	0.814	-0.0175	0.160	0.0020	**0.003**
Suburban	-0.0485	0.129	0.0059	0.780	0.0237	0.479	0.0003	0.918
Rural	-0.0443	0.206	-0.0208	0.391	0.0558	0.175	-0.0041	0.185
Median Household Income 2024	0.000	0.462	0.000	0.291	0.000	0.083	0.000	0.854
Primary Purchaser of Food	0.0099	0.882	0.0522	0.147	-0.0432	0.504	-0.0005	0.950
Primary Purchaser of Plants	0.0497	0.201	0.0412	**0.057**	-0.0473	0.238	0.0033	0.189

	Cluster 5	**Cluster 6**	**Cluster 7**	**Cluster 8**	**Cluster 5**	**Cluster 6**	**Cluster 7**	**Cluster 8**
Variable	**dy/dx**	**p**	**dy/dx**	**p**	**dy/dx**	**p**	**dy/dx**	**p**
Silent gen	0.1001	**0.018**	-0.0367	0.547	0.1001	**0.018**	-0.0367	0.547
Gen X	0.0074	0.640	0.0466	0.253	0.0074	0.640	0.0466	0.253
Millennial	-0.0204	0.154	0.0887	**0.034**	-0.0204	0.154	0.0887	**0.034**
Gen Z	-0.0036	0.865	-0.0567	0.253	-0.0036	0.865	-0.0567	0.253
Far West	0.0231	0.340	-0.0637	0.128	0.0231	0.340	-0.0637	0.128
Rocky Mountains	-0.0093	0.791	-0.0956	0.243	-0.0093	0.791	-0.0956	0.243
Southwest	0.0005	0.974	-0.0026	0.954	0.0005	0.974	-0.0026	0.954
Plains	0.0210	0.454	-0.1020	0.038	0.0210	0.454	-0.1020	0.038
Great Lakes	0.0100	0.557	-0.0782	**0.033**	0.0100	0.557	-0.0782	**0.033**
Mideast	-0.0066	0.687	-0.0286	0.440	-0.0066	0.687	-0.0286	0.440

New England	0.0009	0.971	-0.0325	0.652	0.0009	0.971	-0.0325	0.652
African American	-0.0502	**0.000**	-0.0019	0.962	-0.0502	**0.000**	-0.0019	0.962
Hispanic	0.0084	0.737	0.0607	0.258	0.0084	0.737	0.0607	0.258
Other race	-0.0011	0.958	-0.0477	0.346	-0.0011	0.958	-0.0477	0.346
Male	-0.0024	0.822	0.0170	0.549	-0.0024	0.822	0.0170	0.549
Republican	-0.0035	0.788	-0.0495	0.121	-0.0035	0.788	-0.0495	0.121
Independent	0.0066	0.645	-0.0445	0.189	0.0066	0.645	-0.0445	0.189
Other	0.0195	0.569	-0.1000	**0.078**	0.0195	0.569	-0.1000	**0.078**
High school or less	-0.0295	**0.084**	0.0842	**0.077**	-0.0295	**0.084**	0.0842	**0.077**
Some College	0.0075	0.724	0.0034	0.954	0.0075	0.724	0.0034	0.954
Associate/trade degree	0.0100	0.601	0.0088	0.861	0.0100	0.601	0.0088	0.861
Greater than bachelor	-0.0083	0.681	0.2577	**0.001**	-0.0083	0.681	0.2577	**0.001**
Mean # of Kids in Household	-0.0025	0.643	0.0099	0.390	-0.0025	0.643	0.0099	0.390
Mean # of Adults in Household	0.0044	0.283	0.0126	0.281	0.0044	0.283	0.0126	0.281
Suburban	0.0246	0.130	-0.0285	0.386	0.0246	0.130	-0.0285	0.386
Rural	0.0288	0.211	-0.0306	0.419	0.0288	0.211	-0.0306	0.419
Median Household Income 2024	0.000	0.386	0.000	0.688	0.000	0.386	0.000	0.688
Primary Purchaser of Food	0.0117	0.561	0.0304	0.658	0.0117	0.561	0.0304	0.658
Primary Purchaser of Plants	-0.0229	0.256	0.0923	**0.005**	-0.0229	0.256	0.0923	**0.005**
Observations	1,220							
Wald chi square	3422.28							
p > chi square	0.0000							

Log pseudolikelihood	-2095.4808
Pseudo R^2	0.0794

Table 3.5 shows how prior experience with propagation differs among clusters. Most clusters had over 50% of respondents reporting that they have propagated before, with the exception of cluster 3 and cluster 8, which reported 46.01% of respondents having propagated before, and 18.99% of respondents having propagated before, respectively. This distinction between the groups indicates that with experience of propagation, individuals will be more likely to view as a beneficial hobby for mental well-being.

Table 3.5 Percent of Previous Propagation Experience by Cluster

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8
I have propagated before	65.67%	75.20%	46.01%	89.29%	73.97%	81.23%	51.65%	18.99%
I have never propagated before	30.97%	22.40%	47.53%	7.14%	23.29%	15.02%	41.76%	74.68%
I am not sure if I've propagated before	3.36%	2.40%	2.40%	3.57%	2.74%	3.75%	6.59%	6.33%

Table 3.6 compares the clusters by their membership in virtual plant forum communities. Such communities can exist on social media sites like Facebook, Instagram, Reddit, or Discord. Stronger levels of affiliation were observed in clusters that reported higher on recognizing the benefits of propagation. Clusters that reported that they socialize through indoor plants (Table 3.6), have a higher percentage of respondents who claim that they are in plant forum

communities. This is especially evident with clusters 2 and 6, which both have over half the respondents reporting that they are members of such communities. In contrast, clusters who report that they do not socialize over indoor plants report that they are generally not a part of plant forum communities, such as clusters 7 and 8.

Table 3.6 Results of Clusters' Membership of Virtual Plant Forum Communities

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8
In them and active	24.63%	32.80%	18.25%	7.14%	8.22%	38.91%	17.58%	2.53%
In them but not active	21.64%	20.80%	22.05%	7.14%	10.96%	15.36%	10.99%	0.00%
Not in them	51.12%	44.80%	52.09%	82.14%	79.45%	44.03%	70.33%	89.87%
Not sure	2.61%	1.60%	7.60%	3.57%	1.37%	1.71%	1.10%	7.59%

Table 3.7 reports on the social importance of propagation activities for the respondents. Clusters that strongly endorsed propagation also tended to assign higher values to discussing plants with friends, family, and coworkers than other clusters. Notably, clusters 7 and 8, which reported minimal desire to participate in plant propagation or to be a part of social media groups that discuss the hobby, had 28.57% and 18.99% of respondents that said they would be interested in joining a garden club, respectively. Cluster 4 is another group that, while having no desire to be a part of plant forum communities, would be somewhat interested in joining a garden club, with 35.17% of respondents having an interest.

Table 3.7 Results of Social Importance of Propagation

Variable	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8

Discusses plants at work	17.16%	27.20%	12.17%	14.29%	15.07%	31.40%	18.68%	8.86%
Talks about plants to friends/ family	48.51%	51.20%	31.18%	42.86%	36.99%	54.61%	30.77%	32.91%
Willingness to volunteer in gardens	22.76%	26.40%	19.77%	28.57%	9.59%	27.65%	13.19%	5.06%
Wants to socialize over houseplants in public places	19.03%	21.60%	17.11%	3.57%	5.48%	20.48%	10.99%	5.06%
Wants to socialize over houseplants in private	19.03%	16.80%	14.83%	10.71%	12.33%	22.87%	12.09%	12.66%
Would be in a garden club	18.66%	24.00%	18.63%	35.71%	36.99%	26.28%	28.57%	18.99%
Follows houseplant social media influencers	7.46%	7.20%	9.89%	17.86%	10.96%	14.33%	5.49%	18.99%

Cluster 1 (n = 268):

Cluster 1 rated propagation benefits moderately high across most categories, with an average mean of 66 (Table 3.3). Over 65% of the respondents reported previous propagation experience

(Table 3.5), and around 46% of respondents reported membership with online plant forum communities (Table 3.6). Social importance of this group was relatively strong, with around 48% discussing plants with friends or family and 23% willing to volunteer in a public garden (Table 3.7). Demographically, this group is significantly represented by Gen Z's (dx/dy = 0.1095, p = 0.068). They are significantly not likely to be Hispanic (dx/dy = -0.0874, p = 0.044). They are likely to be Male (dx/dy = 0.0499, p = 0.070), and their education levels are not likely to be greater than bachelors (dx/dy = -0.1045, p = 0.040).

Cluster 2 (n = 125):

Cluster 2 reported the benefits of propagation high, means averaging around 76 (Table 3.3). Prior experience with propagation was high with around 75% of respondents stating that they have propagated before (Table 3.5). Organizational membership was higher than cluster 1, with 52% of respondents stating that they are a part of a plant forum community (Table 3.6). Social importance of propagation was at the highest when they talk about plants with their friends and family (Table 3.7). This group is not represented by Silent Gen (dx/dy = -0.0839, p = 0.000) or Gen Z (dx/dy = -0.0491, p = 0.009). They are also not likely to be located in the Plains region (dx/dy = -0.063, p = 0.010). They are, however, significantly represented by Hispanic individuals (dx/dy = 0.0905, p = 0.055), and are female. The education levels for cluster 2 will likely not be high school or less (dx/dy = -0.0424, p = 0.097) or associates/trade degree (dx/dy = -0.0399, p = 0.075). Cluster 2 are likely to be the primary purchaser of plants for their household (dx/dy = 0.0412, p = 0.057).

Cluster 3 (n = 263):

The third cluster reported moderate benefits of propagation, with an average of 49 across all categories (Table 3.3). Around 46% of respondents reported that they have propagated before

(Table 3.5). 40% of respondents reported that they are in some sort of propagation online community (Table 3.6). Socially, this cluster will be most likely to talk about plants to their friends and family, with around 31% (Table 3.7). Cluster 3 is primarily made up of individuals with an Independent (dx/dy = 0.0744, p = 0.046) or Other (dx/dy = 0.1355, p = 0.073) political leaning. They will not generally have an education level greater than a bachelors (dx/dy = -0.01181, p = 0.013).

Cluster 4 (n = 28):

Cluster 4 reported high benefits ratings, but generally do not socialize through indoor plants, with a mean of 21 (Table 3.3). This is the highest group of respondents who have experience of propagation, with 89% of them reporting that they have propagated before (Table 3.5). This group, however, is not generally present online, with 82% stating they are not in plant forum communities (Table 3.6). Maintaining this trend, they have a generally low percentage of social importance of propagation, but some do enjoy talking about plants with their friends and family, with 43% (Table 3.7). Cluster 4 is significantly not represented by Gen Z (dx/dy = -0.0051, p = 0.070), or Hispanic individuals (dx/dy = -0.0174, p = 0.001). They will generally have adults in the household (dx/dy = 0.002, p = 0.003).

Cluster 5 (n = 73):

The next cluster also reported moderate benefits of propagation, with a belief that it builds their self-confidence (mean = 61), and fills them with pride (mean = 70), but are skeptical of therapeutic benefits of propagation (mean = 46), however, they are generally not socializing through indoor plants, with only a mean of 17 (Table 3.3). Most have propagated before, with 74% reporting experience (Table 3.5). They are not generally present in plant forum communities, with 80% reporting non-membership (Table 3.6). They have slight interest in

talking about plants to friends and family (37%) and joining a garden club (37%) (Table 3.7). This group is demographically made up of Silent Gen individuals (dx/dy = 0.1001, p = 0.018). They are significantly not likely to be African American (dx/dy = -0.0502, p = 0.000), and they will not come with an education level of high school or less (dx/dy = -0.0295, p = 0.084).

Cluster 6 (n = 293):

Cluster 6 has the highest overall mean when reporting the benefits of propagation, with an average of 93 (Table 3.3). 81% of respondents report having propagated before (Table 3.5). 54% of respondents are in some sort of plant forum community (Table 3.6). Additionally, they are likely to talk about plants with their friends and family (Table 3.7). Demographically, cluster 6 is made up of Millennials (dx/dy = 0.0887, p = 0.034). They are not likely to be from the Great Lakes region (dx/dy = -0.0782, p = 0.033). Their political beliefs are generally not going to be Other political affiliation (dx/dy = -0.1000, p = 0.078). They have an education of either high school or less (dx/dy = 0.0842, p = 0.077) or greater than a bachelor's (dx/dy = 0.2577, p = 0.001). They are the primary plant purchaser for their household (dx/dy = 0.0923, p = 0.005).

Cluster 7 (n = 91):

Cluster 7 reports low means for the benefits of propagation, with an average of only 24 (Table 3.3). A little over half the respondents have propagated before (Table 3.5). Over 70% of respondents are not in any plant form communities (Table 3.6). They are generally not socializing over indoor plants (Table 3.7). Demographically, this cluster will not be made up of Millennials (dx/dy = -0.0455, p = 0.010). They are generally from the Plains (dx/dy = 0.0886, p = 0.078). Cluster 7 will likely neither be Hispanic (dx/dy = -0.0644, p = 0.000) or Other Race (dx/dy = -0.0283, p = 0.074). They have children in the household (dx/dy = 0.0101, p = 0.046), and are not the primary purchaser of plants for their household (dx/dy = -0.0593, p = 0.027).

Cluster 8 (n = 79):

The final cluster has the lowest means when considering the benefits of propagation, with an average mean at only 3 (Table 3.3). They have little experience with propagation, with 75% reporting that they have never propagated before (Table 3.5). They are overwhelmingly not involved in online plant communities, with 90% saying they are not in them (Table 3.6). They also do not have any strong opinions on the social importance of propagation (Table 3.7). This cluster is statistically not likely to be Millennials (dx/dy = -0.0502, p = 0.00, or Gen Z (dx/dy = -0.0544, p = 0.000). They are also not likely to be from the Far West (dx/dy = -0.0382, p = 0.003), or Mideast (dx/dy = -0.0261, p = 0.042). They are significantly not likely to be Hispanic (dx/dy = -0.0425, p = 0.003) and are not the primary plant purchaser for their household (dx/dy = -0.0571, p = 0.019).

The cluster analysis revealed many differences between clusters and their beliefs on the benefits of propagation, experience with the hobby, and social importance to them. Clusters 6 and 4 were the most enthusiastic, reporting the highest mean benefits score and the highest level of experience with propagation, while clusters 7 and 8 were the most critical of the hobby, assigning the lowest overall benefits ratings, and showing minimal experience and engagement with propagation activities.

Prior experience with propagating acted as a central dividing line for the clusters. Most of the groups reported that over half of the respondents have propagated before, but clusters 3 and 8 fell below this benchmark. Membership in plant forum communities also reflected this divide. The clusters that had stronger support for propagation, such as clusters 2 and 6, reported the highest levels of online involvement. On the other hand, clusters 7 and 8 reported no such membership. These two clusters also placed the least value on the social importance of propagation. Although

some respondents in clusters 7 and 8 expressed interest in joining garden clubs, it was not significant enough to define the clusters by this desire.

Demographic differences were able to further characterize the cluster membership. Gen Z respondents were most represented in cluster 1, and Millennials were most present in cluster 6. Both of these groups were supportive of the propagation benefits. Silent Generation can be seen most often in cluster 5, which showed moderate support for propagation. Race, education levels, political affiliation, and regional factors all had significant value for varying clusters. Hispanic respondents were most likely to belong to cluster 2, and were absent in clusters 4, 7, and 8. High education levels were found in both the highly supportive groups, such as cluster 6, and the slightly less supportive groups, such as cluster 3, suggesting that propagation attitudes are not entirely related to education levels. Regions such as the Great Lakes were less likely to appear in the supportive clusters, and respondents from the Plains were less likely to be in the supportive groups and significantly present in the non-supportive groups, such as cluster 7 (Table 3.3).

All these findings show that consumer perspectives on propagation are shaped by numerous factors, such as prior experience, desire for community engagement, and demographic backgrounds. The diversity of these clusters shows us that while respondents may find propagation to be a meaningful hobby, there are still individuals that have no experience with propagation and subsequently state that there are little to no benefits to the task.

Discussion

This study identified eight distinct clusters of consumers based on their reported mean response to the benefits of propagation. Each unique cluster represents segments of consumers, ranging from those who strongly believe propagation is a source of self-confidence, pride, and therapeutic benefits (Hefley, 1973), to those who believe propagation does not help oneself at all.

Prior experience emerged as one of the most consistent factors of an individual's positive association with propagation. Clusters 7 and 8, for example, stood out with their lower means of propagation benefits and lowest experience levels with propagation. Online community engagement showed its own unique trend. Some individuals that are avid propagators have no interest in engaging with similar hobbyists, such as the individuals from cluster 4. Meanwhile, other propagators, like cluster 2, are more likely to be a part of plant forum communities. The more skeptical groups of clusters such as clusters 7 and 8 still found some interest in structured forms of community, such as community gardens (Ohmer et al., 2009). This suggests that some people may be interested in doing the task if there were formal and planned events that focused on propagation. Demographic factors further shaped cluster membership, with many groups defined by both older (Silent Gen) and younger (Gen Z) generations, indicating that this hobby is not limited by age (Fletcher, 2024).

These findings hold several practical implications for horticultural professionals, extension educators, and horticultural therapists. Clusters that strongly endorse propagation may be particularly receptive to programming that emphasize community volunteering, propagation workshops, or club meetings (Dolley, 2019). In addition, negative or skeptical clusters were not completely turned away by the idea of social engagement through propagation. People in this cluster may change their mind about propagation if they are given the chance to learn about and practice it for themselves. Marketing towards these individuals could include messages that highlight the accessibility of propagation, including its role in mental health (Mourão et al., 2021), environmental stewardship (Upitis et al., 2013), and low-cost activities. Professionals may consider participating in online communities to increase engagement and interest with

propagation by using digital platforms to spark interest in individuals and provide resources for propagation that are easy to access and understand (Burke et al., 2022).

Several limitations should be acknowledged when interpreting these findings. This study relied entirely on self-reported data, which may be subject to social desirability effects (Grimm, 2010). Respondents may have overstated or understated their recognition of the benefits in order to align with perceived norms. Because this survey was conducted online, this sample may overrepresent younger and more technologically engaged respondents, while underrepresenting older populations or people who do not have readily available access to internet (Bethlehem, 2010). Some individuals may also have chosen answers randomly, and though we had measures in place to prevent this, it cannot be guaranteed that they worked with every respondent.

Future research can build on these findings in several ways. By observing groups similar to clusters 7 and 8, there could be studies that track how attitudes towards propagation develop over time. Following individuals from no experience to beginner or intermediate levels would allow for clarification on how engagement leads to more positive views. Additional research could be in the form of interviews or focus groups to better understand why some individuals may reject the benefits of propagation while others highly agree with all internal and social benefits. Cross-generational comparisons could further reveal how opinions might be more solidly developed in older respondents or may be more flexible in younger respondents. Comparative studies with other horticultural hobbies, such as outdoor gardening, patio gardening, or vegetable gardens could reveal similar trends of well-being and benefits within consumer-plant relationships.

Conclusion

This study has found that consumers do not view propagation uniformly but instead may fall into one of 8 clusters. These clusters range from enthusiastic supporters to critical skeptics.

Clusters 2, 4, and 6 represent the strongest endorsement for propagation benefits. These individuals have high prior experience and strong opinions that propagation benefits them on a number of self-directed therapeutic levels. Clusters 1, 3, and 5 reflect a more moderate approach to propagation, recognizing some benefits but possessing less experience that may reflect skepticism. Clusters 7 and 8 show the least recognition of benefits. These people report limited experience with minimal desire to create community ties through plants.

Together, these 8 clusters provide perspectives on propagation that are diverse and may be characterized heavily by experience, desire for community, and an openness for supporting personal well-being. While many respondents see propagation as their personal hobby that is meaningful and beneficial, many other people in the population remain neutral or skeptical. Many horticultural and therapeutic programs market towards those who are explicitly looking to grow their collection of plants or are searching for alternative therapeutic practices. However, the complexity of the clusters that have emerged with this study shows that future efforts can increase engagement with plants by teaching others about the benefits of propagation and allowing them to try it themselves.

References

Abadi M. 2018. Even the US government can't agree on how to divide up the states into regions. Business Insider. https:// www.businessinsider.com/regions of-united-states-2018-5?op=1.

Bethlehem, J. (2010). Selection bias in web surveys. *International Statistical Review*, *78*(2), 161–188. https://doi.org/10.1111/j.1751-5823.2010.00112.x

Burke, R., Sherwood, O. L., Clune, S., Carroll, R., McCabe, P. F., Kane, A., & Kacprzyk, J. (2022). Botanical boom: A new opportunity to promote the public appreciation of botany. *PLANTS, PEOPLE, PLANET*, *4*(4), 326–334. https://doi.org/10.1002/ppp3.10257

Chen, J., & Henny, R. J. (2015). Commercial production of ornamental tropical foliage plants: Micropropagation: ENH1259/EP520, 5/2015. *EDIS*, *2015*(5), 4–4. https://doi.org/10.32473/edis-ep520-2015

Diamant, E., & Waterhouse, A. (2010). Gardening and belonging: Reflections on how social and therapeutic horticulture may facilitate health, wellbeing and inclusion. *British Journal of Occupational Therapy*, *73*(2), 84–88. https://doi.org/10.4276/030802210x12658062793924

Dolley, J. (2019, May 31). *Third places and social capital: case study community gardens*. ElgarOnline. https://www.elgaronline.com/edcollchap/edcoll/9781786433909/9781786433909.00016.xml

Fletcher, K. (2024, April 29). A brief history of houseplants (and humans) — Plant Savvy. *Plant Savvy*. https://www.plantsavvy.com/blog/a-brief-history-of-houseplants-and-humans

Greenhouse Grower, & Wilcox, A. (2023, December 5). *Why tropical plants are on the rise*. Greenhouse Grower. https://www.greenhousegrower.com/crops/why-tropical-plants-are-on-the-rise/

Grimm, P. (2010). Social desirability bias. *Wiley International Encyclopedia of Marketing*. https://doi.org/10.1002/9781444316568.wiem02057

Hefley, P. D. (1973, January 1). *Horticulture: A therapeutic tool*. ProQuest. https://www.proquest.com/openview/569bc335208ced887123963ad17b6dd0/1?pq-origsite=gscholar&cbl=1819158

Horticulture Connected, & Gilsenan, T. (2020, March 26). *How the humble houseplant became the garden industry's fastest growth category*. HorticultureConnected.Ie. https://horticultureconnected.ie/news/garden-retail/how-the-humble-houseplant-became-the-garden-industrys-fastest-growth-category/

Lee, M.-S., Lee, J., Park, B.-J., & Miyazaki, Y. (2015). Interaction with indoor plants may reduce psychological and physiological stress by suppressing autonomic nervous system activity in young adults: A randomized crossover study. *Journal of Physiological Anthropology*, *34*(1), 21. https://doi.org/10.1186/s40101-015-0060-8

Mourão, I., Mouro, C. V., Brito, L. M., Costa, S. R., & Almeida, T. C. (2021). Impacts of therapeutic horticulture on happiness and loneliness in institutionalized clients with mental health conditions. *British Journal of Occupational Therapy*, *85*(2), 111–119. https://doi.org/10.1177/03080226211008719

Murtagh, F., & Legendre, P. (2014). Ward's hierarchical agglomerative clustering method: Which algorithms implement Ward's criterion? *Journal of Classification*, *31*(3), 274–295. https://doi.org/10.1007/s00357-014-9161-z

Oh, Y.-A., Lee, A.-Y., An, K. J., & Park, S.-A. (2020). Horticultural therapy program for improving emotional well-being of elementary school students: An observational study. *Integrative Medicine Research*, *9*(1), 37–41. https://doi.org/10.1016/j.imr.2020.01.007

Ohmer, M. L., Meadowcroft, P., Freed, K., & Lewis, E. (2009). Community gardening and community development: Individual, social and community benefits of a community conservation program. *Journal of Community Practice*, *17*(4), 377–399. https://doi.org/10.1080/10705420903299961

Parkinson, S., Lowe, C., & Vecsey, T. (2011). The therapeutic benefits of horticulture in a mental health service. *British Journal of Occupational Therapy*, *74*(11), 525–534. https://doi.org/10.4276/030802211x13204135680901

Parmar, B., Rathva, H. M., & Subba, S. (2024, December 24). *Propagation methods and techniques*. ResearchGate. https://www.researchgate.net/publication/387368977_Propagation_Methods_and_Techniques

Pennisi, S. (2022, July 21). *Growing indoor plants with success*. CAES Field Report. https://fieldreport.caes.uga.edu/publications/B1318/growing-indoor-plants-with-success/

Rajaveräjä, H. (2020). *CARE IN HUMAN-HOUSEPLANT RELATIONSHIPS* (pp. 3–4) [Master's Thesis, Tampere University]. https://trepo.tuni.fi/bitstream/handle/10024/119892/Rajaver%E4j%E4Hilla.pdf?sequence=2

Sempik, J., Rickhuss, C., & Beeston, A. (2014). The effects of social and therapeutic horticulture on aspects of social behaviour. *British Journal of Occupational Therapy*, *77*(6), 313–319. https://doi.org/10.4276/030802214x14018723138110

Terrarium Tribe, & Jones, D. (2023, March 27). *Houseplant statistics & trends 2024 [+ original search data]*. Terrarium Tribe. https://terrariumtribe.com/houseplant-statistics/

Upitis, R., Hughes, S., & Peterson, A. (2013). Promoting Environmental Stewardship through gardens: A case study of children's views of an urban school garden. *Journal of the Canadian Association for Curriculum Studies*, *11*(1), 92–135. https://doi.org/10.25071/1916-4467.36544

U.S. Census Bureau QuickFacts. (n.d.). Census Bureau QuickFacts. Retrieved October 7, 2025, from https://www.census.gov/quickfacts/fact/table/US/PST045221

CHAPTER 4

DISCUSSION

Overview

This thesis examined two dimensions of plant consumer behavior: the ethics of proplifting and the benefits derived from propagation. Both studies used survey and hierarchical cluster analysis to understand how people morally and emotionally engage with plants. Together, the results reveal that plant propagation operates as both a moral and restorative practice, and is shaped by experience levels, personal ethical boundaries, demographics, and attitudinal factors. The discussion of this thesis will go over each study's findings, synthesize their shared themes, and explain how they have broader horticultural and therapeutic implications.

Ethics of Proplifting

The proplifting study identified eight distinct clusters, ranging from highly accepting to strongly critical of taking plant material without permission. Clusters 1-3 represented the most accepting groups and reported the highest prior engagement in proplifting behaviors. Most of the approved proplifting locations from these groups were from public gardens, individuals, and grocery stores. Contrasting this are clusters 6-7, which showed a general trend of non-participation in proplifting. Clusters 7 and 8 were the most critical group, with cluster 8 having minimal approval, unless it is proplifting from an individual, where there is instead a 30% approval. Situational and selective groups such as clusters 4-6 reveal that many consumers base ethical judgement on context rather than fixed beliefs.

Demographic variation played a role in ethical alignment. Younger generations such as Millennials and Gen Z were concentrated in the moderate and situationally supportive clusters,

while Gen X were found in the highly accepting cluster. Males are more accepting of proplifting than females. Democrats are more likely to be accepting of proplifting than Republicans. Independents; people with other political affiliations generally make up the disapproving clusters. These results indicate that life stage, political affiliation, and gender influence how consumers frame plant ownership and moral responsibility.

Across all clusters, ethical approval varies by setting. Many participants viewed proplifting from chain stores and mass merchandisers as more acceptable than proplifting from federal lands and local nurseries. This trend suggests that consumers have a moral boundary created around the perceived harm of proplifting. Corporate settings seem to be less personal, while small businesses and protected areas may carry greater moral weight. The interpretation of proplifting may also play a part in deciding the ethicality of the task. Clusters 5 and 8 both have higher approval of proplifting from individuals, which may indicate that they believe proplifting is more about trading plants than anything else.

The cluster patterns show us that moral reasoning about plant ownership is flexible and often highly situational. Acceptance of proplifting does not necessarily stem from weak ethics, but rather a form of rescue, reuse, or harmless free addition to a collection. Supportive clusters consider themselves to be social citizens with good morals when asked about their rule-following behavior. This can indicate that they genuinely believe that proplifting is a harmless activity.

Therapeutic Home Propagation

The second study's hierarchical cluster analysis revealed eight groups with distinct perspectives on the benefits of propagation. Clusters 2, 4, and 6 stood out as the most supportive for the benefits of propagation, indicating that they believe home propagation improves self-confidence and pride and offers other therapeutic benefits. Clusters 7 and 8 held the lowest

ratings for the same set of questions, indicating that they had little recognition of any benefits and had minimal experience with propagation. The middle clusters, such as 1, 3, and 5, represent moderate supporters who acknowledged select benefits such as self-confidence and pride but expressed less agreement about propagation's therapeutic benefits or social value. Overall, consumer attitudes toward propagation are generally structured by prior experience and perceived emotional value.

Prior experience emerged as the strongest predictor of positive perception. Between 75% and 89% of respondents in the supportive clusters had propagated before, while only 19% of respondents in the least supportive group had done so. Age also shaped responses, with Millennials representing the most supportive groups, and Gen Z and Silent Gen appearing in moderately supportive groups. Engagement in plant forum communities was most prevalent in clusters 1, 2, and 6; these clusters also have about half of the respondents stating that they like to talk about plants to their friends and family. These findings confirm that propagation experience and community involvement support one another, lending a stronger emotional and social connection to propagating indoor plants.

Across clusters, respondents most frequently associate propagation with pride, relaxation, and self-confidence. The most supportive groups rated these benefits between 90 and 94 on a 0-100 scale, suggesting that many people who propagate find it a calming and empowering hobby. This trend is also visible in the moderate clusters, where social and emotional values are acknowledged. Interestingly, cluster 8, which has the least experience with propagating plants and reported minimal perceived benefits, had a spike in interest for being a part of a garden club in comparison to all other social aspects of propagation. This suggests a willingness to try out new forms of community involvement if it is properly marketed towards them.

The findings from this study align strongly with existing therapeutic horticulture frameworks. Propagation offers participants an opportunity to meet a need, whether it be social, emotional, or physical. The act of taking cuttings, monitoring, and seeing the development of a plant create patience and mindfulness, which are outcomes repeatedly linked to reducing stress and improving mood in horticultural therapy research (Lu et al., 2023). Clusters 4 and 6 best illustrate how individuals may have varying needs, and programs should be prepared to adapt to all participants. Cluster 4, although not interested in the social benefits of propagation, indicated that propagation is a meaningful task that has internal benefits. On the other hand, cluster 6 adds a social component to perceived benefits

Propagation's accessibility is a distinguishing factor when compared to other horticultural practices. It requires minimal cost and space for success and acts as an easy way to get into plant care as a hobby (Lee, 2024), making it an especially meaningful practice for individuals who may require low-barrier forms of self-soothing tasks (Keys, 2020). The high endorsement amongst younger respondents suggests that propagation resonates with generational interest in sustainability and emotionally restorative hobbies.

Implications

The findings from the research conducted during the proplifting survey reveal a notable subset of consumers justify taking plant material under certain conditions. Large retailers, local nurseries, and public gardens are all locations that have the potential to experience plant theft. This suggests that industry outreach should expand on both deterrence efforts and address moral reasoning. Retailers and botanical institutions could incorporate educational signage that clarifies why unauthorized cuttings can lead to harm for businesses and conservation programs. Messaging should frame plants as a living resource, and consumers should acknowledge that

resource with a mindset of stewardship, rather than viewing plants as replaceable commodities. These efforts may be especially effective among the situationally supportive groups who view proplifting as having a low impact. Simultaneously, alternatives should be offered for consumers to redirect proplifting, such as scheduled dates for propagation workshops, cutting exchanges, and propagation stations, where surplus material may be shared. Initiatives like these could reduce theft and validate the motives behind proplifting behavior.

This research supports educational programs that are interested in integrating discussions of ethics, sustainability, and emotional wellness into their horticultural programs. Classroom modules and workshops could combine technical propagation skills with lessons on conservation ethics, intellectual property, and horticultural therapy. By taking an integrated approach to propagation, they can teach it as both scientific and beneficial practice. Educators could equip future horticultural professionals with care-based ethics, which would influence consumer education and treatment.

The propagation study showed that individuals who actively share plants or participate in online communities experience strong feelings of pride and connection. Extension educators and community organizers can build onto this by facilitating community garden workshops, garden clubs, and plant swap events that emphasize belonging and collaboration. These activities can transform propagation from an individual hobby into community practice. Local partnerships including universities, mental health programs, and botanical gardens, can collaborate to expand the therapeutic and educational reach of horticulture while addressing issues of interest to each group.

Limitations

Online surveying and self-report bias acts as potential limitations to these studies. Both relied on online survey data collected through Toluna's national consumer panel, and both received sampling distributions which closely mirrored U.S. Census data for major demographics. However, online surveys often overrepresent individuals who are technologically literate and motivated to participate in compensated surveys (Andrade, 2020). Due to this, responses may disproportionately represent attitudes of internet active consumers, rather than the broader population. Additionally, self-reported measures of ethical belief and emotional benefits are inherently subjective and may be influenced by social desirability bias (Askarov, 2024). These factors might have resulted in an inaccurate inflation of the estimates of ethical awareness and propagation related well-being.

Both analyses were conducted with the collection of key demographic features such as age, gender, region, race, political affiliation, education, income, and household affiliation. They did not, however, collect data on cultural and community differences of respondents. Norms surrounding sharing, ownership, and care vary widely across communities. Some of these may view the exchange of plants as a normal and historically embedded practice. Clustering data offers clarity on patterns of behavior, but not on the social or cultural narrative that shapes those patterns. As a result, the interpretations of what may or may not be ethical or therapeutic should be viewed as culturally contingent and should be further explored.

While cluster analysis and multinomial logistic regression provide extremely detailed segmentation of consumer perspectives, these methods simply complex human motivations into discrete categories. Although such methods of categorizing data are popular and valid in this research, individuals may move between attitudinal groups depending on the changing of life stages, social influence, and exposure to new information. Factors such as plant collection habits,

environmental identity, or emotional regulation styles likely play a substantial role in how individuals may end up in different categories.

Future Research

Future research should focus on a direct approach to acquiring information from consumers to better capture the moral and emotional perspectives of consumers when discussing plant care and acquisition. Such approaches could be through focus groups or semi-structured interviews. While this thesis focused on the quantified ethical variability and perceived well-being, qualitative methods would be able to provide a deeper insight into how individuals may rationalize acts such as proplifting and plant propagation. These methods would allow for a deeper exploration of how and why moral reasoning may be influenced by opinions, cultural backgrounds, and opinions towards plant ownership.

Because both studies represent opinions of consumers at a single point in time, further research should use a longitudinal approach that tracks how an individual's attitude may change over time. The results from the home propagation study found that the people who did not believe propagation offered therapeutic benefits were individuals who had minimal experience with the hobby. By using an approach that revisits consumers before, during, and after attempting home propagation, researchers could evaluate whether propagation workshops, education horticulture, or therapeutic horticulture messaging may alter opinions. Tracking participants from this beginner stage to experienced levels could clarify whether increased skill and plant propagation success results in increased self-confidence and other therapeutic benefits.

Lastly, future research could take an anthropological approach and extend beyond the Western context to incorporate cross-cultural perspectives on plant ethics, ownership, and well-being. Many cultural traditions have plant stewardship embedded in their historical practices.

One example of this is through Traditional Ecological Knowledge (TEK) of Indigenous peoples. TEK uses knowledge and practices of plant stewardship that has been passed from generation to generation and is informed by cultural memories and values (Oregon State University, n.d.). By observing alternative perspectives on plant ownership, TEK could provide a valuable addition to the ethics of proplifting and the benefits of propagating and growing plants. This interdisciplinary expansion would also help refine educational strategies to be more culturally responsive to consumers.

Conclusion

This thesis was created to examine how consumers morally and emotionally engage with plants through two interrelated practices: proplifting, which is the unauthorized taking of plant material, and propagation, the reproduction of plants within the home. Together, these studies reveal how plant interactions can occupy complex ethical decisions about ownership, value of life, and building emotional connections. The findings demonstrate that plant consumers can generally be divided into clusters with varying opinions about the acceptance of proplifting, the benefits of propagation, and their desire for social connections through plants.

The proplifting study revealed eight distinct clusters of consumers who have a spectrum of moral reasoning that is shaped by differences in demographics, social influence, and opinions of ownership. While some clusters experienced consistent acceptance of proplifting across all contexts, others viewed it as unethical regardless of circumstances, and several held extremely situational opinions of when proplifting might be acceptable. These patterns reveal moral flexibility in consumers, where actions may or may not be justified by intent and context. Therefore, it has been found that proplifting operates in a space of negotiation between the consumer and their desires.

In contrast, the propagation study revealed how care-oriented practices support emotional restoration and community collection. By expanding on previous work of horticultural therapy, it has been found that individuals who propagate plants report strong feelings of pride, confidence, and satisfaction. Many agreed that plants also strengthen social ties through their community, online forums, and with friends and family. Experience levels proved to be a central factor in shaping these perceptions, with individuals who had previously propagated plants being more likely to identify the benefits of propagation. This research project suggests that engagement with propagation functions both as a personal and social form of self-directed therapy.

The implications of these findings speak to the role of horticulture as being a field of ethics, well-being, and environmental stewardship. By understanding these intersections, the green industry, educators, and policymakers can be guided towards practices that balance personal and ecological responsibility with enjoyment and care.

References

Alam, M. N., Ogiemwonyi, O., Hago, Ibrahim. E., Azizan, N. A., Hashim, F., & Hossain, M. S. (2023). Understanding consumer environmental ethics and the willingness to use green products. *Sage Open*, *13*(1). https://doi.org/10.1177/21582440221149727

Bieri, D., Joshi, N., Wende, W., & Kleinschroth, F. (2024). Increasing demand for urban community gardening before, during and after the COVID-19 pandemic. *Urban Forestry & Urban Greening*, *92*, 128206. https://doi.org/10.1016/j.ufug.2024.128206

Bruzzichesi, A. (2025, April 25). *Therapeutic horticulture at NC Botanical Garden*. NC State Extension. https://therapeutic-hort.ces.ncsu.edu/2025/04/therapeutic-horticulture-at-nc-botanical-garden/

DRM. (2021, November 18). *The ethics of the new trend called "proplifting."* What To Do About…Everything. https://medium.com/what-to-do-about-everything/the-ethics-of-the-new-trend-called-proplifting-df8c7d1efb2d

Duda, E. (2024). Urban gardening education: User reflections on mobile application designs. *PLOS ONE*, *19*(9), e0310357. https://doi.org/10.1371/journal.pone.0310357

Garden Center. (2025, February 25). *Florida green industries generate a big economic impact*. GardenCenter. https://www.gardencentermag.com/article/florida-green-industries-generate-a-big-economic-impact/

Giltrap, N., Eyre, D., & Reed, P. (2009). Internet sales of plants for planting – an increasing trend and threat?1. *EPPO Bulletin*, *39*(2), 168–170. https://doi.org/10.1111/j.1365-2338.2009.02283.x

Halleck, L. F. (2025, April 14). Garden library - trends in the houseplant and gardening world for 2025. *Halleck Horticultural*. https://lesliehalleck.com/garden-library/articles/trends-in-the-houseplant-and-gardening-world-for-2025

Haraway, D. J. (2003). *The companion species manifesto: Dogs, people, and significant otherness*. Prickly paradigm press chicago. (2003)

IFAS Communications. (n.d.). *Propagation - environmental horticulture - University of Florida, Institute of Food and Agricultural Sciences*. UF/IFAS. Retrieved October 16, 2025, from https://hort.ifas.ufl.edu/therapeutic-horticulture-activities-database/propagation/

Kingsley, J., Donati, K., Litt, J., Shimpo, N., Blythe, C., Vávra, J., Caputo, S., Milbourne, P., Diekmann, L. O., Rose, N., Fox-Kämper, R., van den Berg, A., Metson, G. S., Ossola, A., Feng, X., Astell-Burt, T., Baker, A., Lin, B. B., Egerer, M., … Byrne, J. (2023). Pandemic gardening: A narrative review, vignettes and implications for future research. *Urban Forestry & Urban Greening*, *87*, 128062. https://doi.org/10.1016/j.ufug.2023.128062

Leopold, A. (2008). The Land Ethic. In *Rethinking Landscape*. Routledge. https://doi.org/10.4324/9781315881409-23

Morrison, R. N., & Driggs, T. D. (2007). An Agricultural Law Research Article Virtue Ethics and Sustainability Policies. *Drake Journal of Agricultural Law*. https://doi.org/https://nationalaglawcenter.org/wp-content/uploads/assets/bibarticles/morrisondriggs_virtue.pdf

North Carolina Botanical Garden. (2023, July 6). *What is Therapeutic Horticulture?* North Carolina Botanical Garden. https://ncbg.unc.edu/engagement/therapeutic-horticulture/what-is-th/

Ogiemwonyi, O., & Jan, M. T. (2023). The correlative influence of consumer ethical beliefs, environmental ethics, and moral obligation on green consumption behavior. *Resources, Conservation & Recycling Advances*, *19*, 200171. https://doi.org/10.1016/j.rcradv.2023.200171

Oregon State University. (n.d.). *What is TEK?* Traditional Ecological Knowledge Lab. Retrieved October 24, 2025, from https://tek.forestry.oregonstate.edu/what-tek

Ramos, G. A., Johnson, W., VanEpps, E. M., & Graham, J. (2024). When consumer decisions are moral decisions: Moral Foundations Theory and its implications for consumer psychology. *Journal of Consumer Psychology*, *34*(3), 519–535. https://doi.org/10.1002/jcpy.1427

Rapisarda, A. (2025, February 21). The value of variegata plants: Why are they so desirable? *Casa Botanica*. https://casa-botanica.com/en/blogs/blog-1/de-waarde-van-variegata-planten-waarom-zijn-ze-zo-gewild?srsltid=AfmBOoppjM1YT8cxra4I8JkB5yvEMokw_EiWJtjKZOXDMTojUxIzqWWe

Reddit. (2019). *Update on rules and standards! What is proper proplifting and what is theft? Come inside and see! : R/proplifting*. https://www.reddit.com/r/proplifting/comments/fq220f/update_on_rules_and_standards_what_is_proper/

Söderback, I., Söderström, M., & Schälander, E. (2004). Horticultural therapy: The ‘healing garden’and gardening in rehabilitation measures at Danderyd hospital rehabilitation clinic, Sweden. *Pediatric Rehabilitation*, *7*(4), 245–260. https://doi.org/10.1080/13638490410001711416

Stimpson, A. (2025, October 19). Welcome to the killer plant club. *The Washington Post*. https://www.washingtonpost.com/home/2025/10/19/allure-carnivorous-plants/

Swain, K. (2022, November 12). *Plants as companion species*. Kathleen Swain. https://kathleenswain.com/2022/11/12/donna-haraway-companion-species-and-plants/

Timeline of American garden history. (2018, December 4). Smithsonian Gardens. https://gardens.si.edu/collections/archives/timeline-of-american-garden-history/

Whitehead, D., Cowell, C. R., Lavorgna, A., & Middleton, S. E. (2021). Countering plant crime online: Cross-disciplinary collaboration in the FloraGuard study. *Forensic Science International: Animals and Environments*, *1*, 100007. https://doi.org/10.1016/j.fsiae.2021.100007