

Plant This Not That: A Tool for Improving Invasive Species Identification and Expanding the Use of Sustainable Alternatives in Florida, USA, Landscaping

S. Brooks Parrish¹, Tina McIntyre², Morgan G. Pinkerton², and Sandra B. Wilson³

KEYWORDS. extension, native plants, outreach, sterile cultivars

ABSTRACT. The newly released “Plant This Not That: A Guide to Avoiding Invasive Plant Species in Florida” booklet emerges as a crucial tool in cultivating a comprehensive understanding of invasive species, facilitating informed decision-making in plant selection. Its unique focus on illustrating alternatives to invasive plants, coupled with its accessible format, can empower individuals to contribute to the preservation of Florida, USA, ecosystems. The booklet’s impact was displayed through an in-service training for 58 University of Florida/Institute of Food and Agricultural Sciences extension personnel. Following the in-service training, attendees demonstrated statistically significant improvements in their perceived knowledge of four key invasive species concepts. This study highlights the booklet and accompanying training’s potential as a valuable resource for mitigating the impacts of invasive plant species.

Sustainability of the natural environment in Florida, USA, is becoming increasingly important amid ongoing climactic and ecological changes. Ensuring the longevity of our ecosystems involves making informed choices in landscaping, including plant selection, water conservation, proper fertilization,

and integrated pest management (Sorvig and Thompson 2018). One critical aspect of sustainability is the management and prevention of the spread of invasive plant species.

The diverse climate in Florida, USA, allows many invasive organisms to thrive year-round, posing significant threats to human and environmental health. Invasive plants, defined by the Florida Department of Agriculture and Consumer Services (FDACS) as self-sustaining plants expanding their range into and within Florida, USA, ecosystems, can degrade natural resources, pose management challenges in agricultural fields, and incur substantial costs (Fantle-Lepczyk et al. 2022). Invasive plants not only impact Florida, USA, ecosystems but also cost the state \$45 million annually for management on conservation areas alone, with these invasive species estimated to affect ~1.5 million acres (607028.5 ha) (Hiatt et al. 2019).

The ornamental plant industry serves as a significant conduit for the global movement of invasive plants, with these species contributing substantially to inventory and revenue

(Bechtloff et al. 2019). The scarcity of accessible resources to assist homeowners and landscapers in identifying invasive species and choosing sustainable alternatives intensifies the issue of invasive plant spread in Florida, USA (Wilson and Deng 2023).

The “Plant This Not That: A Guide to Avoiding Invasive Plant Species in Florida” extension booklet (McIntyre et al. 2021) was developed to address this issue by educating stakeholders on identifying invasive species and providing sustainable alternatives for planting. This study evaluates the educational impact of this new resource and associated in-serving training on University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) extension personnel, using pre- and post-training surveys to demonstrate improvements in invasive species knowledge and understanding.

Materials and methods

BOOKLET LAYOUT. The “Plant This Not That: A Guide to Avoiding Invasive Plant Species in Florida” booklet was developed to provide guidance on invasive plants and sustainable alternatives in Florida, USA. Within the 63-page booklet, 22 commonly available invasive species are featured and paired with known noninvasive alternatives. Information on each “invasive” card includes the plant’s common and scientific names, its appearance, growth habit, distribution, and range in Florida, USA, and the ecological implications of the plant. Ecological threat terms such as “invasive,” “prohibited,” “cautionary,” and others were sourced from authoritative organizations on invasive species, including FDACS, FL Invasive Species Council (FISC), UF/IFAS Center for Aquatic and Invasive Plants, and UF/IFAS Status Assessment (AS) of Non-native Plants in Florida’s Natural Areas (UF/IFAS 2023) (Fig. 1). Information on each paired “plant instead” card features several noninvasive plant alternatives that share similar ornamental traits as their invasive counterpart, along with UF/IFAS AS approved cultivars and other low to no fruiting species, hybrids, or cultivars evaluated by Wilson and Deng (2023).

Received for publication 21 Jun 2023. Accepted for publication 21 Jul 2023.

Published online 6 Sep 2023.

¹Gulf Coast Research and Education Center, Department of Environmental Horticulture, University of Florida, Institute of Food and Agricultural Sciences, 14625 CR-672, Wimauma, FL 33598, USA

²University of Florida/Institute of Food and Agricultural Sciences Extension Seminole County, Sanford, 250 West County Home Road, Sanford, FL 32773, USA

³Department of Environmental Horticulture, University of Florida, Institute of Food and Agricultural Sciences, PO Box 110670 Gainesville, FL 32611, USA

We thank R. Gutner for her assistance in developing the “Plant This Not That: A Guide to Avoiding Invasive Plant Species in Florida” booklet, J. Coole for his statistical expertise, and the Seminole County Florida Friendly Landscaping program for funding this project. A copy of the booklet can be purchased using this link: <http://ifasbooks.ifas.ufl.edu/p-1658-plant-this-not-that.aspx>. This study received exempt Institutional Review Board approval from the Research Division of Operations at the University of Florida, IRB202201154.

S.B.P. is the corresponding author. E-mail: brooks.parrish@ufl.edu.

This is an open access article distributed under the CC BY-NC-ND license (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).

<https://doi.org/10.21273/HORTTECH05277-23>

Units

To convert U.S. to SI, multiply by	U.S. unit	SI unit	To convert SI to U.S., multiply by
0.4047	acre(s)	ha	2.4711
0.3048	ft	m	3.2808



Fig. 1. A representative page from the “Plant This Not That: A Guide to Avoiding Invasive Plant Species in Florida” booklet developed by the University of Florida/Institute of Food and Agricultural Sciences Extension faculty to help Florida, USA, landscapers identify which plants are invasive and suggest sustainable alternatives. The top card provides information about the invasive species, and the bottom card provides research-based alternatives. 1 ft = 0.3048 m. N = North Florida, USA; C = Central Florida, USA; S = South Florida, USA; S. FL = South Florida, USA; IFASAS = University of Florida/Institute of Food and Agricultural Sciences Status Assessment; UF/IFAS = University of Florida/Institute of Food and Agricultural Sciences.

EXTENSION WORKSHOP AND SURVEY ANALYSIS. A virtual in-service training for UF/IFAS extension personnel, titled “Plant This Not That: Recommending Alternatives to Commercially Available Invasive Plants,” was conducted via Zoom (Zoom Video Communications, Inc., San Jose, CA, USA) on 16 May 2022. The training was attended by 58 UF/IFAS employees and industry professionals who were each mailed a copy of the “Plant This Not That: A Guide to Avoiding Invasive Plant Species in Florida” booklet after registering. During the half-day workshop, participants engaged in a webinar that provided 1) an overview of invasive species and affiliated organizations in Florida, USA; 2) ongoing research at UF with invasive species evaluation and sterile cultivar development; and 3) how to promote alternatives to invasive species in extension education. A pre- and post-test assessment was developed to evaluate the training’s effectiveness.

Incomplete survey responses were removed before analysis, resulting in 38 attendees ($n = 38$) who took the assessment before and after the workshop training. Perceived knowledge was assessed using four Likert scale questions, with response options ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). These pre- and post-training means were evaluated using a Wilcoxon signed-rank test. The knowledge assessment comprised eight true/false, yes/no, and multiple-choice questions (Table 1). All statistical analyses were conducted with a significance threshold set at $P \leq 0.05$, using R version 4.2.2 (R Core Team 2021).

Table 1. List of knowledge item questions and participants perceived pre- and post-test content knowledge (based on four questions) means, difference, and significance ($n = 38$) from a University of Florida/Institute of Food and Agricultural Sciences (UF/IFAS) in-service training workshop focused on use of the “Plant This Not That: A Guide to Avoiding Invasive Plant Species in Florida” booklet. Knowledge items used a Likert scale with the following numerical responses: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neutral or undecided*, 4 = *agree*, and 5 = *strongly agree*. Means were compared using a Wilcoxon signed-rank test at $P = 0.05$ (R version 4.2.2, R Core Team 2021).

Tested knowledge item	Correct response			
Camphor tree (<i>Cinnamomum camphora</i>) is a noxious weed and prohibited. (T/F)	False			
All heavenly bamboo (<i>Nandina domestica</i>) cultivars are OK to use. (T/F)	False			
Coral ardisia (<i>Ardisia crenata</i>) is a noxious weed and prohibited. (T/F)	True			
Which lantana (<i>Lantana strigocamara</i>) cultivars are OK to recommend? (M/C)	Bloomify Rose Lantana			
All approved Mexican petunia (<i>Ruellia simplex</i>) cultivars should be used with caution. (T/F)	True			
Some invasive plants OK to recommend if managed in the right way. (T/F)	True			
Some species may be listed as invasive in the northern part of the state but not the central or southern part. (T/F)	True			
How much does the state of Florida, USA, spend on managing invasive plants? (M/C)	\$45 million			
Perceived knowledge item	Pre-mean	Post-mean	Diff.	Sign.
Can define nonnative, established and invasive plant species	3.76	4.47	0.71	<0.001
Can distinguish different invasive plant lists	3.29	4.34	1.05	<0.001
Understands three tools of UF/IFAS assessment	2.61	4.24	1.63	<0.001
Is able to discuss noninvasive plant cultivar recommendations	2.71	3.89	1.18	<0.001

Results and discussion

The training's effectiveness is clearly reflected in the significant improvements observed in participants' perceived knowledge of all four key concepts covered in the programming (Table 1). The comprehension of UF/IFAS assessment tools witnessed the most remarkable leap, where attendees completing the workshop had 1.63 times greater perceived knowledge of these resources than before attending the workshop (Table 1). Importantly, the training successfully fortified participants' capabilities in recommending non-invasive cultivars, aligning with the central objective of the training and the resource provided.

For participants' tested knowledge (using multiple-choice and true/false response options), the final sample size (narrowed from 58 to 38 participants who fully completed both surveys) prevented, in most cases, significant findings in the binary outcomes. However, modest improvements were revealed in several areas, most notably in the identification of suitable lantana cultivars for landscaping recommendations (Table 1). Interestingly, we observed a decrease in correct responses to whether invasive plants are acceptable to recommend if managed properly. These findings suggest that although the training successfully increased understanding of certain invasive species

issues, the content could be refined to address nuanced aspects of invasive plant management more effectively.

The results demonstrate the effectiveness of the "Plant This Not That: Recommending Alternatives to Commercially Available Invasive Plants" in-service training in improving the knowledge of UF/IFAS extension personnel regarding invasive plant species and sustainable alternatives. This training, along with the use of the "Plant This Not That: A Guide to Avoiding Invasive Plant Species in Florida" booklet, can help extension agents, program assistants, and staff members better educate homeowners, small-scale nurseries, and landscapers on how to avoid purchasing and spreading invasive plants in Florida, USA. Ultimately, by bolstering ecological literacy and promoting sustainable landscaping practices, this booklet can play a pivotal role in mitigating the ecological and economic impacts of invasive plant species.

References cited

Bechtloff A, Adams CR, Wilson S, Deng Z, Wiese C. 2019. Insights from southeastern US nursery growers guide research for sterile ornamental cultivars. *J Environ Hort.* 37: 9–18. <https://doi.org/10.24266/0738-2898-37.1.9>.

Fantle-Lepczyk JE, Haubrock PJ, Kramer AM, Cuthbert RN, Turbelin AJ, Crystal-Ornelas R, Diagne C, Courchamp F. 2022.

Economic costs of biological invasions in the United States. *Sci Total Environ.* 806: 151318. <https://doi.org/10.1016/J.SCI.TOTENV.2021.151318>.

Hiatt D, Serbesoff-King K, Lieurance D, Gordon DR, Flory SL. 2019. Allocation of invasive plant management expenditures for conservation: Lessons from Florida, USA. *Conserv Sci Pract.* 1(7):e51. <https://doi.org/10.1111/CSP2.51>.

McIntyre T, Gutner R, Wilson S, Pinkerton M. 2021. *Plant this not that: A guide to avoiding invasive plant species in Florida.* Univ Florida, Inst Food Agric Sci, Ext Pub Serv, Gainesville, FL, USA. <http://ifasbooks.ifas.ufl.edu/p-1658-plant-this-not-that.aspx>. [accessed 17 Jul 2023].

R Core Team. 2021. *R: A language and environment for statistical computing.* R Foundation for Statistical Computing, Vienna, Austria.

Sorvig K, Thompson JW. 2018. *Sustainable landscape construction (3rd ed).* Island Press/Center for Resource Economics, Washington, DC, USA.

University of Florida, Institute of Food and Agricultural Sciences. 2023. *Assessment of nonnative plants in Florida's natural areas.* <https://assessment.ifas.ufl.edu>. [accessed 16 May 2023].

Wilson SB, Deng Z. 2023. Ornamental invasive plants in Florida with research-founded alternatives. *HortTechnology.* 33:349–356. <https://doi.org/10.21273/HORTTECH05205-23>.