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## Survey of University of California Academics' Attitudes Regarding the Impact of Escaped Horticultural Introductions on Wildlands

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## Survey of University of California Academics' Attitudes Regarding the Impact of Escaped Horticultural Introductions on Wildlands

### Abstract

In order to investigate whether there were differences in attitudes and perceptions within the University of California regarding the impact of introduced ornamental plants, we conducted a survey of academics with assignments in natural resource programs or ornamental horticulture. In general, the ornamental horticulture academics did not view the problem of invasive species as severely as the natural resource academics, but the both groups recognize that non-native landscape ornamentals now occur and can affect California's wildlands. These data can be used to provide training to academics on this issue and help facilitate discussion between the different groups.

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## Introduction

In the United States, 85% of purposeful introductions of non-native plants have been for ornamental plants, creation of wildlife habit, and mitigating soil erosion (Reichard, 1996). The majority of these plants have been environmentally benign, but significant numbers have become invasive. Of the 78 plants considered the most invasive in California (Bossard, Randall, & Horshovsky, 2000), 41 were introduced as ornamentals. Invading non-native plants displace the native flora, which then reduces or eliminates the habitat for wildlife, birds, and insects, and can alter physical properties of invaded habitats (Bossard et al., 2000).

Ornamental plants sold by nurseries have marketable aesthetic qualities and agronomic characteristics that make them commercially successful for nursery production and landscape use. These traits include ease of propagation, rapid growth and spread, and disease tolerance. While these characteristics are valuable for horticultural production, they also increase the propensity of

plants to survive without human assistance and become established in natural habitats. Plants that are well adapted to local conditions may become invasive.

Many land grant institutions have academic fields supporting ornamental horticulture and natural resources. There may be different and possibly incongruous philosophies between academics wanting to introduce new plants and those trying to control invasive plants and restrict their introduction. For example, within the University of California (UC), Agriculture Experiment Station (AES) and Cooperative Extension (CE) academics conduct research and extension programs to evaluate new ornamental varieties and promote urban forestry. However, academics in weed science, forestry, rangeland management, and natural resources are increasingly focusing their efforts on managing invasive species.

To investigate this issue within UC, we conducted a survey of academics with assignments in natural resource (NR) programs or ornamental horticulture (OH) regarding perceptions and attitudes about invasive plants of horticultural origin. These data can be used to facilitate discussion between the different groups.

We selected four plant species or plant groupings to focus the survey questions: Pampasgrass (*Cortaderia selloana*), Tasmanian blue gum (*Eucalyptus globulus* Labill.), fountaingrass (*Pennisetum setaceum*), and brooms (Scotch broom [*Cytisus scoparius*]), (French broom [*Genista monspessulanus*]), (Spanish broom [*Spartium junceum* L.]). We selected these species because they were: 1) originally introduced for landscape use, 2) with the exception of French broom, can still be purchased from nurseries or catalogs, and 3) are considered invasive by the California Department of Food and Agriculture or by the California Invasive Plant Council.

## Materials and Methods

A 12-question survey was distributed to members of the UC Natural Resources (NR) Workgroup and the Floriculture and Nursery (OH) Workgroup. These workgroups include AES faculty, specialists, and farm advisors. Sixty-one surveys were sent to the OH workgroup and 60 to the NR workgroup. Questions were designed to determine respondents' awareness of invasive plants in California and their attitudes regarding the risks of invasive ornamental plants. Responses were anonymous. Data were tabulated and analyzed using Chi-square test of independence (CoHort Software, Pacific Grove, Ca).

## Results and Discussion

### Demographics

A total of 42 surveys were returned, 27 (45%) from NR and 15 (24.6% response) from OH. The majority of the respondents (82.5%) have 100% CE assignments. Ten percent of the respondents have appointments that include both CE and AES research or education. The remaining respondents (7.5%) are AES faculty. Because the surveys were distributed via workgroups and the bulk of workgroup members have CE appointments, the sampled population is skewed towards CE.

Most (61.9%) are county-based, 33.3% are campus-based, and 4.8% are located on a natural reserve. There are three UC campuses that are part of the Land Grant System (Berkeley, Davis, and Riverside). The state is also divided into three regions, Central and South Coast, Central Valley, and North Coast and Mountain, for the purpose of administration of the county-based advisors (Figure 1).

**Figure 1.**

Regional Breakdown of Campuses and County-Based Cooperative Extension Advisors



### Awareness of Non-Native Ornamental Plants in Wildlands

Nearly all (97.6%) of the respondents recognized that non-native ornamentals occur in California's wildlands. One hundred percent responded that non-native landscape ornamentals are problematic in some manner in California's wildlands, although there is a nearly equal split between those who

believe that the problem is widespread and those who believe non-native ornamentals affect wildlands in fewer areas

Participants were asked to indicate their level of agreement on whether the plants in question are significant problems. The majority felt that brooms and pampasgrass are significant problems, with over 90% of the respondents either agreeing or strongly agreeing with the statement (Table 1). The majority (62.8%) of the respondents also agreed or strongly agreed that fountaingrass is a significant problem. Only a slight majority (52.5%) agreed or strongly agreed with the statement for eucalyptus. This may be due to the long ornamental history of eucalyptus in California and its slower speed of invasion in relation to the other species.

**Table 1.**  
Level of Agreement to the Statement "These plants are regarded as significant problems in California wildlands" for Eucalyptus spp., Brooms, Pampasgrass, and Fountaingrass

	<b>Strongly Agree</b> %	<b>Agree</b> %	<b>Neither Agree nor Disagree</b> %	<b>Disagree</b> %	<b>Strongly disagree</b> %
Eucalyptus spp.	12.5	40.0	25.0	20.0	2.5
Brooms	53.9	38.5	7.7	0.0	0.0
Pampasgrass	50.0	42.5	7.5	0.0	0.0
Fountaingrass	25.7	37.1	34.3	2.9	0.0

Respondents who agreed or strongly agreed with the previous statement were asked to indicate their perception of the geographical impact of these plants. It was interesting to find that none of the species were perceived by most respondents to be widespread problems in California (Table 2). For each species, the majority of the respondents indicated that these plants were problematic in several or fewer areas in California. This shows that the respondents feel that the negative impact of the species on California wildlands is regionalized.

**Table 2.**  
Geographical Impact of Eucalyptus spp., Brooms, Pampasgrass, and Fountaingrass as Perceived by Respondents who Agreed or Strongly Agreed that These Plants Are Significant Problems in California Wildlands (percent of respondents)

<b>Plants Regarded as Significant Problem in CA Wildlands</b>	<b>In Limited Areas of CA</b> %	<b>In Several Areas of CA</b> %	<b>In Most Areas of CA</b> %	<b>In Nearly All of CA</b> %
Eucalyptus spp.	26.7	53.3	20.0	0.0
Brooms	0.0	62.9	28.6	8.6
Pampasgrass	2.6	73.7	23.7	0.0
Fountaingrass	30.8	57.7	3.8	7.7

However, when asked about the rate of non-native plants moving into wildlands, 73.8% felt that the rate was increasing, and 14% were not sure. Therefore, there is the perception that non-native plants are spreading more rapidly in wildlands. This may be due to increased awareness of the presence of non-native plants in natural areas of California.

The majority of the respondents indicated that there should be some limits to plant importation into California (Table 3), with 84.7% disagreeing or strongly disagreeing to the statement that "Plant importation should not be limited."

A similar percent (83%) also disagreed or strongly disagreed with the statement "All new plant species should be excluded from being used in California landscapes." It is interesting to note that 7.3% of the respondents agreed or strongly agreed to that statement, while 12.9% felt that plant importation should not be limited. Although the numbers are small, they do indicate that there are members of ANR who have strongly opposing viewpoints regarding the importation of non-natives into California.

**Table 3.**  
Level of Agreement with Statements Related to Potential Risk or Concern About Importation of New Plant Species into California (percent)

<b>Statement</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neither Agree nor Disagree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
Plant importation should not be limited	2.6	10.3	2.6	38.5	46.2
All new plant species should be excluded from being used in California landscapes	2.4	4.9	9.8	41.5	41.5

The majority of the respondents (83%) indicated that California landscapes should not be limited to planting native species, but they also felt that plants should have a minimal risk of escaping from the planted area (Table 4). From the responses regarding the impact of invasive plants, it was surprising that high percentages of the respondents indicated that non-natives could or should be grown near sensitive areas and that they felt that non-natives contribute to the aesthetic value of wildlands.

**Table 4.**  
Level of Agreement with Statements Related to the Use of Native or Non-Native Plants as Ornamental Plants in California (percent)

<b>Statement</b>	<b>Strongly Agree</b>	<b>Agree</b>	<b>Neither Agree nor Disagree</b>	<b>Disagree</b>	<b>Strongly Disagree</b>
Only natives should be grown in California landscapes	2.4	7.3	7.3	48.8	34.2
Only non-natives that have minimal risk of escaping should be planted in landscapes	17.1	56.1	9.8	17.1	0.0
Non-native plants can be grown (planted) near native wildlands if action is taken to reduce their likelihood of spread	2.5	42.5	37.5	17.5	0.0

Only natives should be grown (planted) near sensitive habitats (e.g. freshwater marshes, rivers, shorelines, oak woodlands, etc.)	5.0	35.0	17.5	40.0	2.5
Non-native plants contribute to the natural beauty of California wildlands	4.8	35.7	23.8	26.2	9.5

Respondents were asked to indicate their level of agreement to a series of statements regarding levels of restriction for imports of plants into California. Only the most restrictive statement, "All new plant species should be excluded from being used in California landscapes," had a significant chi-square statistic (0.0028). None of respondents who held a full CE appointment agreed or strongly agreed with the statement, but 20% those with a full or partial AES assignment felt that new plant species should not be allowed in California landscapes (Table 5).

**Table 5.**  
Frequency Table for "All new plant species should be excluded from being used in California landscapes" by Assignment

Response	AES (N=6)		Both (N=4)		CE (N=32)	
	Frequency	% of Table	Frequency	% of Table	Frequency	% of Table
Strongly agree	1	2.56	0	0.00	0	0.00
Agree	0	0.00	1	2.56	0	0.00
Neither agree nor disagree	0	0.00	0	0.00	3	7.69
Disagree	5	5.13	1	2.56	14	35.90
Strongly disagree	0	0.00	2	5.13	15	38.46
N=42						

Similarly, when asked to indicate their level agreement with the statement "Only natives should be grown in California landscapes," those with a full CE assignment were more likely to disagree with the statement than those with a full or partial AES assignment (chi square= 0.0127) (data not shown).

### **Awareness of Non-Native Ornamental Plants by Program Area**

There were few significant chi-square statistics when testing for independence between respondents in OH and NR. This indicates that there are similar opinions regarding the impact of non-native ornamental plants on California wildlands.

There was a significant relationship ( $p=0.002$ ) only between "Program Area" and the level of agreement with the statement of eucalyptus as a significant problem. Interestingly, there appears to be more variation in opinion among the respondents in the OH group than between the two programs. Roughly half (47%) of those in OH agreed or strongly agreed that eucalyptus was a problem but 54% also disagreed or strongly disagreed with the statement. Of the NR group, 52% agreed and 40% did not agree or strongly disagreed with the statement.

Both groups felt that eucalyptus was a problem in several areas, brooms in limited areas, and fountaingrass in limited to several areas of California (data not shown).

There was a significant relationship between program area and opinion of geographic spread of pampasgrass ( $p=0.0191$ ). While 100% of the OH group felt that pampasgrass was a problem in several areas of California, 38% of the NR group felt that it was a problem in most of the state (Table 6). This indicates that there is a difference in perception between the two groups in regard to the geographic impact of pampasgrass. Neither group had respondents that felt that pampasgrass was a significant problem in most of California.

**Table 6.**  
Geographical Impact of Pampasgrass by Program Area

Response	Ornamental Horticulture (N=14)			Natural Resources (N=24)		
	Frequency	% of Column	% of Table	Frequency	% of Column	% of Table
Problem in limited areas of California	0	0	0	1	4	3
Problem in several areas of California	14	100	37	14	58	37
Problem in most areas of California	0	0	0	9	38	24
N=38						

## Conclusions

In general, OH academics did not view the problem of invasive species as severely as did NR academics. However, results do indicate that academics, regardless of assignment, recognize that non-native landscape ornamentals occur in California's wildlands.

Responses varied over which species were most troublesome, on the impact of these plants on natural areas, and about what should be done about the problem. These groups should continue to dialog both formally and informally in order to have cooperative, rather than conflicting, goals. As representatives of the university, the message presented to clientele should be consistent rather than confusing.

OH Advisors should continue to work with nurseries to develop production and marketing practices for plants that are less invasive as well as educate nurseries and their customers about appropriate plant selection. NR Advisors should continue to educate stakeholders such as the California Invasive Plant Council about their criteria for deciding which plant are invasive and help them develop appropriate protocols by region for testing or validation.

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