A plant risk evaluation tool for assessing the invasive potential of ornamental plants

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INTRODUCTION

Weed Risk Assessment (WRA) methods for screening potential new plant introductions through the horticultural industry have evolved rapidly in the last decade. To be accepted as a tool to evaluate current plant inventories and new plant introductions within the industry, it is critical that a pre-screening tool not only accurately predict invasive potential of a species, but also accurately predict non-invasiveness without falsely categorized them as invasive. In this study, we developed a new, abbreviated and highly accurate Plant Risk Evaluation (PRE) tool specific for plants originating from the ornamental industry.

U.S. New Plant Introductions
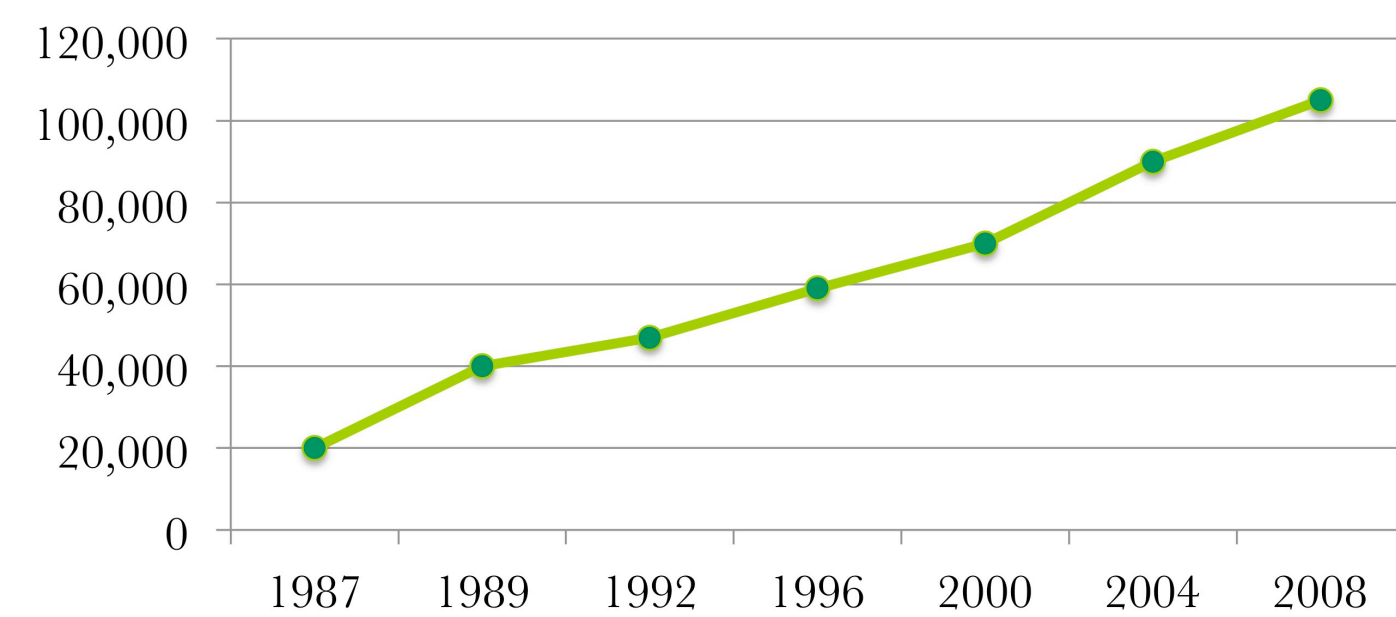
Global Comparison – WRA

Low accuracy for non-invasive plants
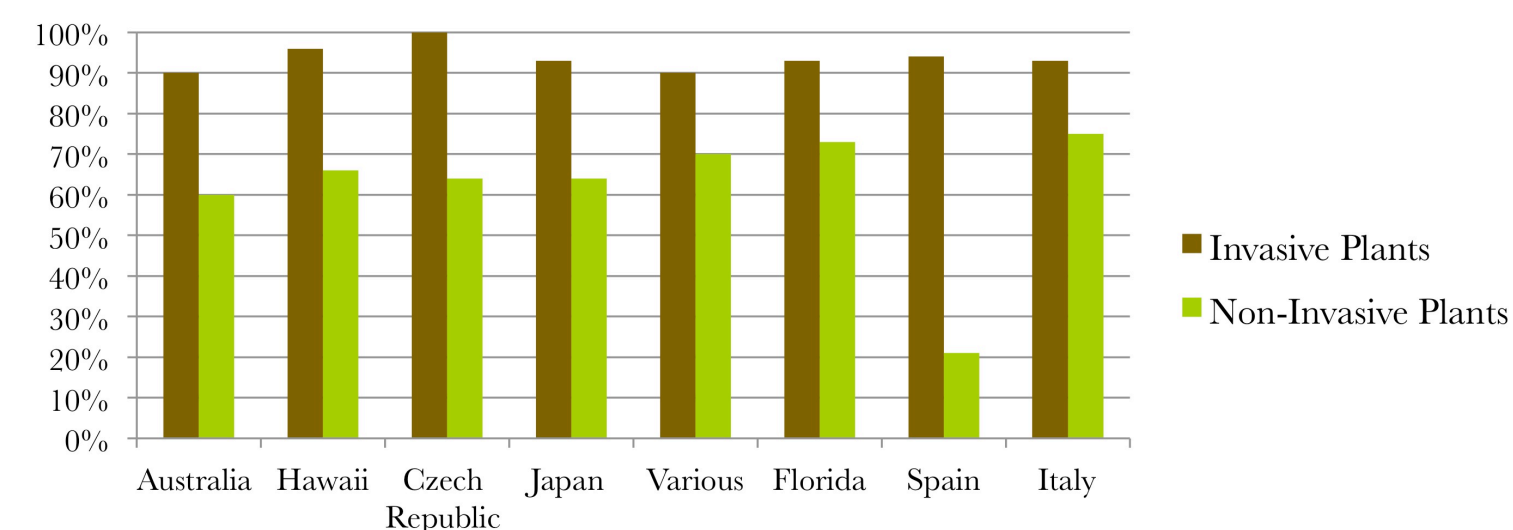
PRE Features

Accuracy	• 95%< for non-invasive
Regionality	• Evaluates risk for any region
Specificity	• Species (Wildtype) or Subspecies (Cultivars/Hybrids)
Sterility	• Sterile & Non-sterile Species
Proactive	• Early in R&D
Fast	• Quick results

METHODS

Types of Questions

- Taxonomy
- Cultivar names
- Global and regional invasive history
- Climate match
- Difficulty of control
- Environmental impacts
- Reproduction
- Dispersal
- Growth

PRE Process

- Literature review for plant species and/or cultivar
- 19 questions individually weighted
- Answer questions
- Calculate score, % of questions answered
- Compare to PRE rating scale

Q Predictability

Screen Species	• IP • non-IP
Data Analysis	• Score ranges • % Q answered
Q Elimination Criteria	• Fischer's (two-tailed) *P<0.05* • *Answered <20%* • Irrelevant/Biased
Result	• Remove non-predictive Q's

PRE Accuracy

Screen Species	• IP • non-IP
Data Analysis	• Score ranges • % of Q answered • Fischer's Exact Test (two-tailed)
Tool Performance	• Misclassification (false +/-) • Accuracy • Sensitivity/Specificity

RESULTS

56Q Predictability

Screen 35 Species	• 21 IP • 14 non-IP	• Cal-IPC • Plant-Right
Data Analysis	• Score ranges • % Q answered	• IP 21-44 • Non-IP 5-14 • Range 5-100%
Q Elimination	• Fischer's *P<0.05* • Answered <20% • Irrelevant/Biased	• Removed 27 Q's
Result	• Reduced from 56Q > 29 Q	

19Q PRE Accuracy

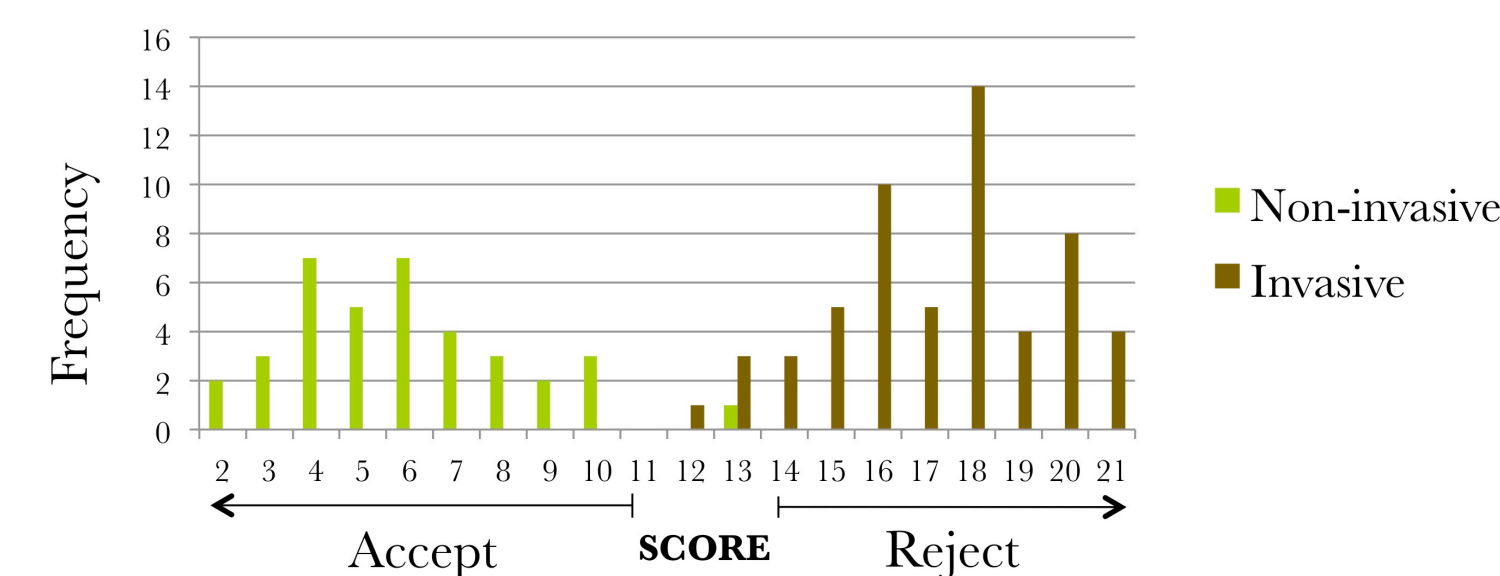|		
Screen 94 Species	• 57 IP • 47 non-IP	• Cal-IPC • Plant-Right
Data Analysis	• Score ranges • % of Q answered • Fischer's	• IP 12-21 • Non-IP 2-10 • Range 54-100% • Avg 97% • 16 Q w/ *P>0.05*

19Q PRE Accuracy Data

	w/EF		w/o EF	
	IP	*Non-IP*	*IP*	*Non-IP*
True +	53%	-	53%	-
True −	-	36%	-	36%
False +	-	1%	-	-
False −	4%	-	-	-
Accuracy	93%	97%	100%	100%

EF = evaluate further

PRE Scoring Scale

Invasive>13
Non-invasive<11
Evaluate Further = 11-13

CONCLUSIONS

Accuracy: PRE vs. Global WRA

Highest accuracy for non-invasive plants
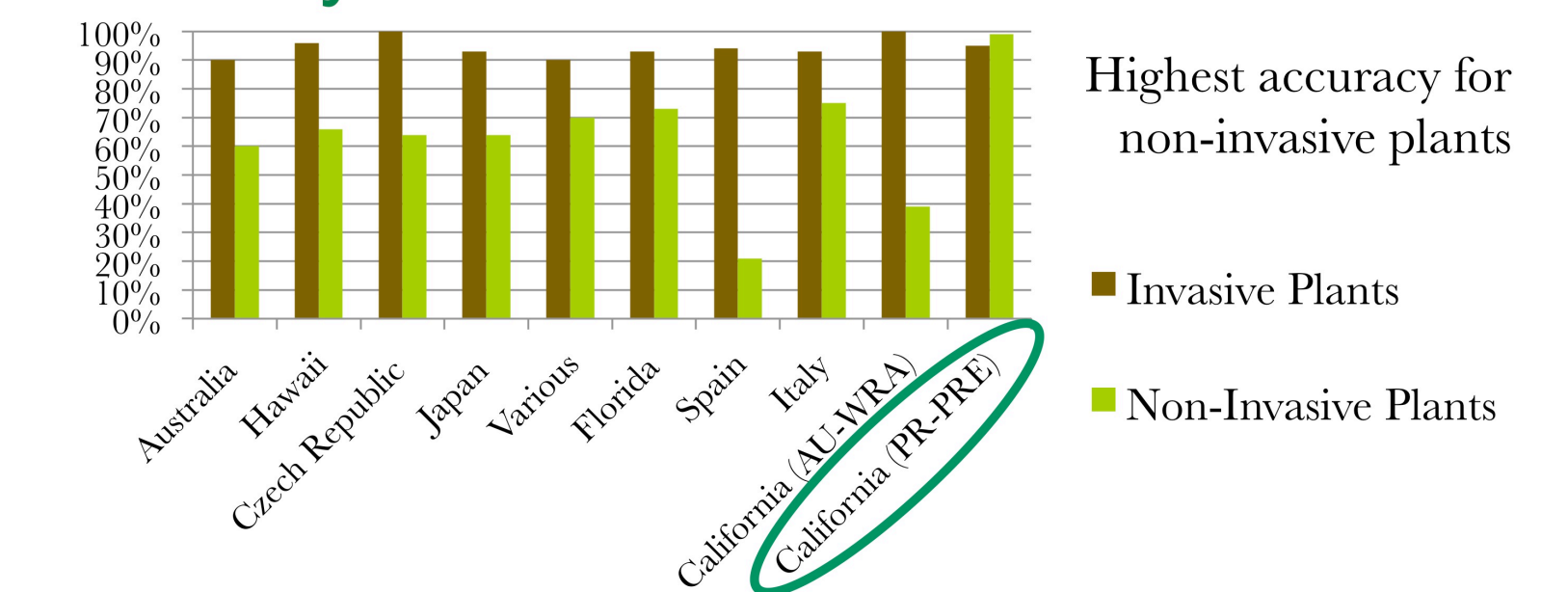
Next Steps

- Scientific validation of model (in process)
- Beta-test PRE for industry-wide deployment
- Launch online PRE tool and database
- Climate modeling for more regional accuracy
- "Rapid Screening" for bulk inventories

Collaborators

PRE Screeners

Funding