

Project Update: October 2023

Introduction:

I am pleased to present a comprehensive update on the progress of my research project, which was initiated following the generous grant received from the Rufford Foundation in August 2022. The project focuses on assessing public perceptions of invasive alien species (IAS) and developing an ornamental plant screening weed-risk assessment tool suited for India. The outcome will be the categorisation of ornamental plants into lists of potentially invasive (black list) and safe (green list) species, which currently do not exist in India.

Overall, this would help build capacities of stakeholders by (a) enhancing buyers' (gardeners, landscapers) and sellers' (nursery owners') awareness of IAS, and (b) equipping nursery owners and regulators to conduct risk assessments of potentially invasive ornamental plants.

Research Objectives:

1. Assess public perceptions of IAS to comprehend the general awareness about concerns associated with these species.
2. Develop a weed risk assessment tool to identify potentially invasive ornamental plants, that could aid in proactive prevention.
3. Create lists of potential invasive ornamental species of India using the finalised ornamental plant screening method.
4. Utilize species distribution modelling to predict invasion patterns of potentially invasive species, enabling prioritisation for management.

Progress Update on Objective 1: Fieldwork for objective 1 has been successfully completed, involving 268 interviews with various respondents. Transcription of all interviews has been concluded, setting the stage for subsequent analysis.

Among the surveyed stakeholders, less than 30% of buyers indicated familiarity with the term "invasive species." However, a more in-depth exploration of their knowledge showed that even among those familiar with the term "invasive species," there was a lack of comprehensive understanding regarding the potential consequences and impacts associated with these species. A mere 5% of sellers reported awareness, while a staggering 95% of sellers were unaware. A minimal percentage from both groups chose not to respond. The data strikingly reveals a pronounced lack of awareness of invasive species among sellers compared to buyers, emphasising an urgent need for targeted educational campaigns or capacity building for both groups, especially sellers, regarding invasive species.

However, when enlightened about the detrimental impacts of invasive species, particularly those introduced through gardening practices, a significant 90% of respondents expressed a willingness to opt for slightly more expensive but environmentally safer plants (Fig.2).

Analysis and preliminary findings from objective 1

Awareness of invasive species

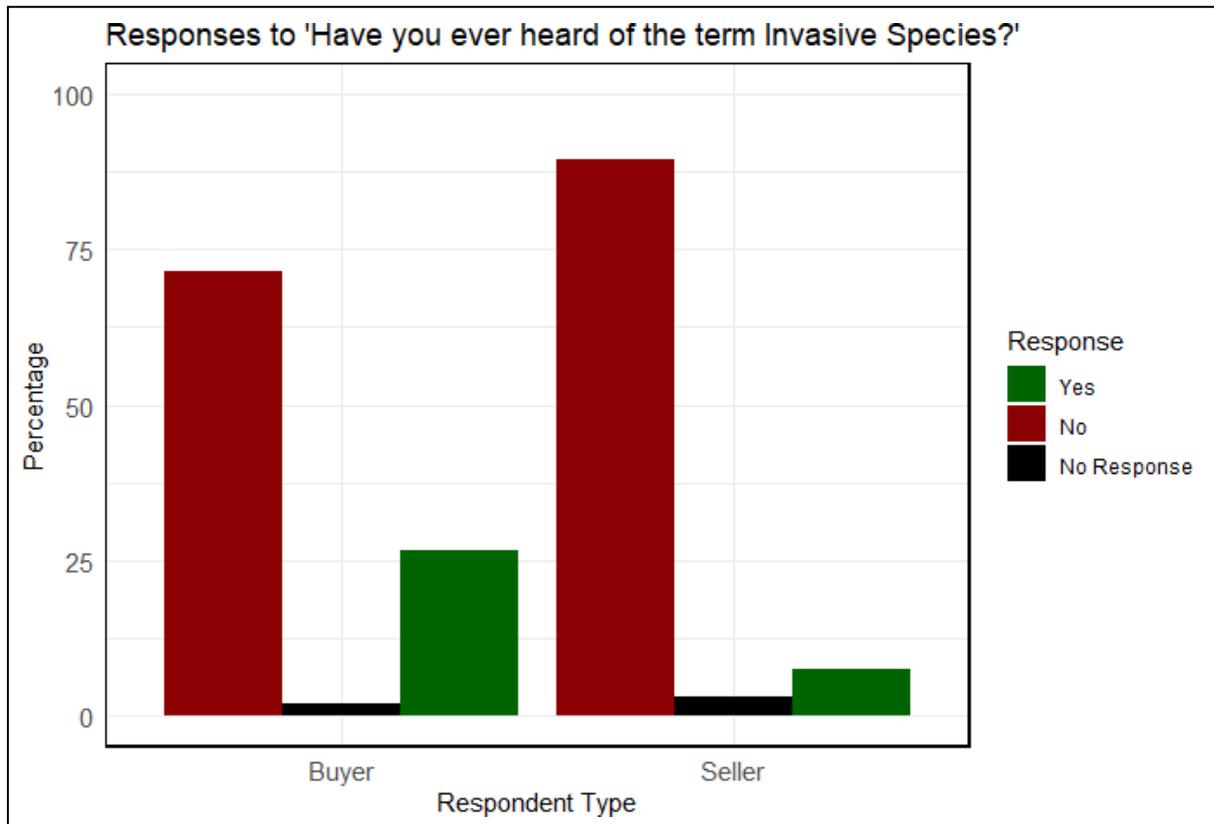


Fig.1 Awareness levels of 'Invasive Species' among buyers and sellers

Conversely, only 9% remained indifferent to the distinction, and 1% demonstrated a preference for safer plants but expressed reservations about paying a markedly higher price. This data suggests a commendable inclination towards environmentally responsible choices among consumers once they are adequately informed.

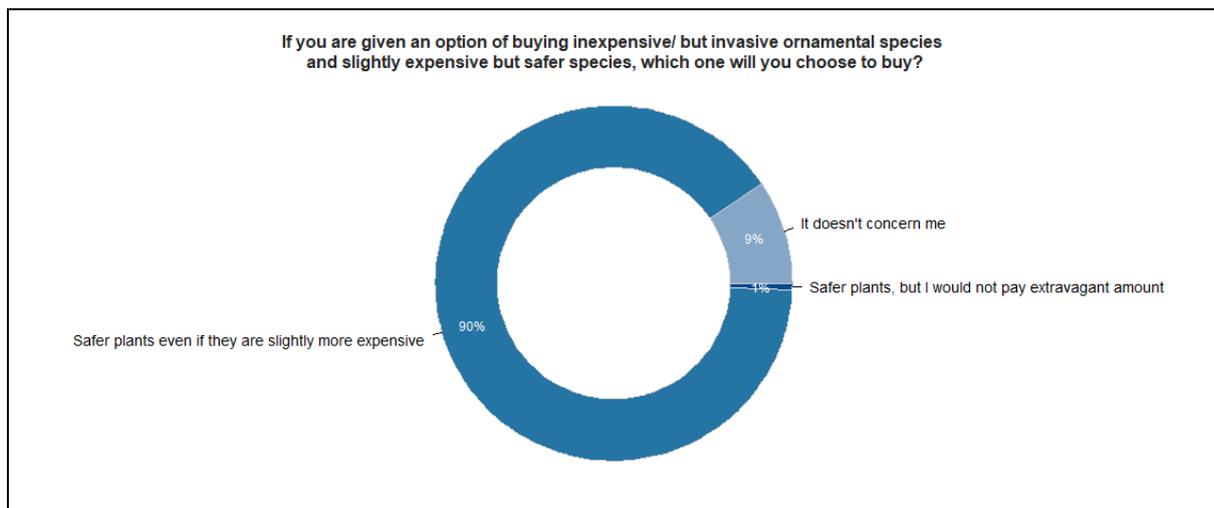


Fig. 2 Buyer Preferences: Choosing Between Inexpensive Invasive Species and Pricier Safe Alternatives.

and aesthetic appeal.

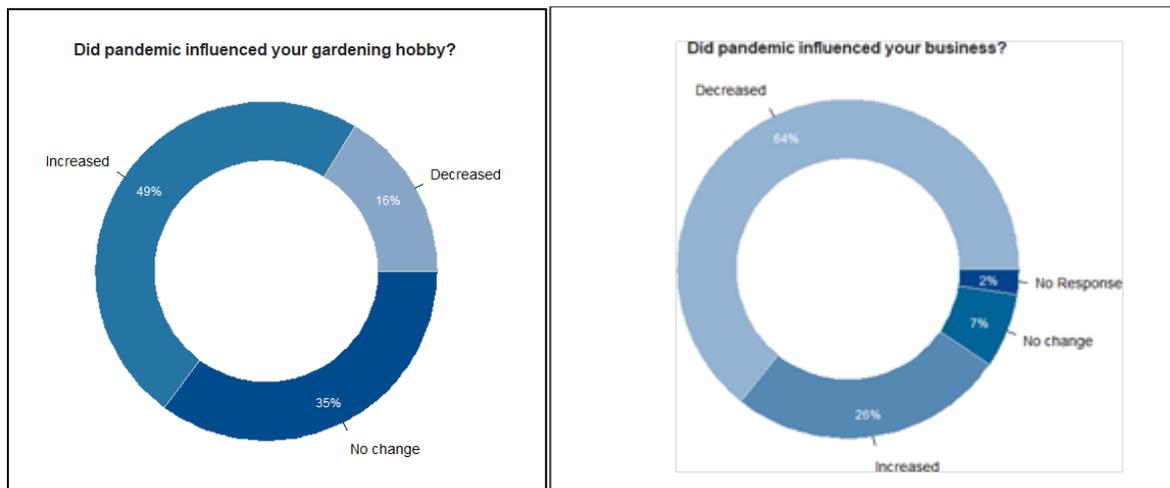


Fig. 5 Pandemic's Dual Impact: Seller Business Decline vs. Buyer Gardening Surge.

The global pandemic has left an indelible mark on numerous sectors, and the gardening industry is no exception. A comparative analysis of its impact on sellers and buyers reveals some telling trends.

From the sellers' perspective, the influence of the pandemic has been largely negative. A significant 64% reported a decrease in their business operations. This could be attributed to disruptions in the supply chain, reduced workforce, or diminished purchasing power among consumers. Meanwhile, 26% of sellers observed an increase in their business. This subset could represent niche segments of the industry that managed to capitalise on specific pandemic-induced trends. Interestingly, 7% of sellers did not notice any change in their business dynamics, indicating a level of resilience or adaptability to the challenging environment. However, 2% chose not to respond, suggesting potential uncertainty or indifference to the question.

In contrast, the impact on buyers, particularly in relation to their gardening hobby, presents a different picture. A plurality of 49% reported an increased investment of time in gardening. This is consistent with the widespread narrative during the pandemic of individuals seeking solace and a productive pastime in gardening to combat the boredom and anxiety of lockdowns. 35% of buyers said there was no change in their gardening habits, while only 16% reported a decrease. This decrease could be due to various reasons, such as health concerns or prioritising other activities.

The reason behind this exploration into the influence of the pandemic on gardening stems from a multitude of articles published during the crisis. Many pieces highlighted the growing trend of people gravitating towards gardening as a therapeutic and engaging activity to counter the monotony and stress of prolonged confinement. The juxtaposition of these two charts not only underscores the dichotomy of the pandemic's impact on sellers and buyers but also reaffirms the enduring appeal of gardening as a source of comfort during trying times.

Currently, I am actively engaged in the further analysis of data corresponding to Objective 1 of my research. Alongside this, I am in the process of drafting the

associated research paper. Both of these activities are progressing well, and I am on track to complete the final draft by the end of December 2023.

Progress Update on Objective 2 and 3:

I've developed a preliminary weed risk assessment (WRA) tool tailored for evaluating the invasive potential of ornamental plants in India. The tool is built around a 16-question questionnaire, each question having an assigned score ranging from -1 to 3. These scores serve as a first-pass screening to gauge the invasive risk of a given species.

The questions are as follows:

1. Is the species or cultivar invasive elsewhere? (Y/N: 3/0)
2. Is it naturalised in similar climates? (Y/N: 2/0)
3. Cultural or historical significance? (Y/N: 1/0)
4. Does it reproduce or spread? (Y/N: 2/0)
5. Are propagules easily dispersed? (Y/N: 2/0)
6. Is it shade-tolerant? (Y/N: 1/0)
7. Ecological impact? (Y/N: 2/0)
8. Soil versatility? (Y/N: 1/0)
9. Allelopathic? (Y/N: 1/0)
10. Hosts for pests or pathogens? (Y/N: 1/0)
11. Is it sterile? (Y/N: -1/0)
12. Herbicide resistance? (Y/N: 1/0)
13. Requires specialised care? (Y/N: -1/0)
14. Previous eradication attempts? (Y/N: 1/0)
15. Natural enemies present? (Y/N: -1/0)
16. Affects garden maintenance? (Y/N: 1/0)

I've also completed data collection on the biological traits of known invasive species in India (193) to make the assessment more comprehensive. Each question in the questionnaire is assigned a score (Yes/No: Y/N), which is added to calculate a cumulative score for each species. The scoring is as follows: "Yes" answers vary from 1 to 3 points depending on the question's significance. "No" answers are scored as 0.

In some cases, a "Yes" answer could be negatively scored as -1 if it indicates a lower risk. When a species racks up a high cumulative score, it serves as a flag for more detailed examination and their potential distribution will be modelled (Objective 3). The aim is to do a robust evaluation by integrating standard questionnaire data with biological trait information. Looking ahead, I plan to validate this WRA tool through field trials and update it periodically based on new findings and expert opinions. In essence, my tool is designed to efficiently identify and manage potentially invasive ornamental plants, thereby contributing to biodiversity conservation efforts across India.

Progress Update on Objective 4:

Species distribution modelling (SDM) will be used to map the potential spatial pattern of invasions for the species that are identified as high-risk ornamental species (Objective 3), which will further enable us to categorise the riskiest species from amongst them, according to their invasion potential in India. The sample size of species to carry out distribution modelling will depend on the output of Objective 3.

All high-risk (black list) species obtained from the previous objective will be subjected to SDM. The outcome of the previous objective will be the list of 'safe' and 'risky' ornamental plants (green list and black list, respectively). With the help of SDM, another list of species (priority List) will be created to further categorise riskier species from amongst the black list species. The species in the priority list and the vulnerable habitats potentially prone to invasion from these species should be prioritised.

Awards and conferences:

- In October 2022, I was honored to receive the National Fellowship for Scheduled Tribes (NFST) from the Ministry of Tribal Affairs, India. This prestigious scholarship is specifically aimed at supporting the academic components of my research project in invasive biology, although it's worth noting that the fellowship does not extend to fieldwork or other ancillary elements of my study.
- Preliminary findings of objective were presented at the British Ecological Society conference held in December 2022, providing an initial platform for feedback and discussion.

Budget:

As of now, 24% of the allocated budget has been allocated to cover the expenses related to fieldwork. The remainder of the budget will be dedicated to facilitating stakeholder workshops and acquiring supplementary data for the accomplishment of Objective 2 and 3.

The final report encompassing all project outcomes, analyses, and recommendations will be submitted by May 2024.

Conclusion:

In summary, progress includes the successful completion of objective 1 fieldwork, transcribed interviews, and preliminary findings shared at a conference. Although the pace of progress was hindered due to some personal situations that arose, data analysis and research paper preparation are in progress for both objectives, aiming for submission by December 2023. The comprehensive strategy of the project holds its potential for providing important insights into managing invasive alien species (IAS) and engaging the stakeholders effectively. I sincerely appreciate the support from Rufford Small Grant. My commitment remains strong, and I aim to complete objective 2 by February 2024, with a final report due by May 2024.



Interviews.



Lantana for sale in a nursery.