



Research Paper

Attractive, climate-adapted and sustainable? Public perception of non-native planting in the designed urban landscape



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HIGHLIGHTS

- 75.3% participants positive about climate-adapted non-native planting.
- Climate change identified as major driver of acceptance of non-native plants.
- Acceptance also related to aesthetics, context, perceived invasiveness.
- Perceived attractiveness not related to perceived nativeness.
- Contradictions in perception of non-native plants identified.

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ABSTRACT

Throughout Europe climate change has rendered many plant species used in contemporary urban planting design less fit for use in public greenspaces. A growing evidence base exists for the ecological value of introducing non-native species, yet urban policy and practice guidance continues to portray non-native species negatively, focusing on their assumed invasiveness. In this context there is a lack of research focusing on the cultural relevance of non-native species in the urban landscape. To address this gap we surveyed 1411 members of the UK public who walked through designed and semi-natural planting of three levels of visual nativeness: “strongly native”; “intermediate” and “strongly non-native”, whilst completing a site-based questionnaire. Semi-structured, in-depth interviews were then carried out with 34 questionnaire participants. A majority (57.6%) of our respondents would be happy to see more non-native planting in UK public spaces, rising to 75.3% if it were better adapted to a changing climate than existing vegetation. Respondents recognised the three broad levels of nativeness, yet this was not a factor driving perceptions of the attractiveness of the planting. In addition to climate change, we identified four key factors driving acceptance and rejection of non-native planting: *aesthetics*; *locational context*; *historic factors and inevitability*; and *perceptions of invasiveness and incompatibility with native wildlife*. Our research indicates that in the context of a changing climate, focus should be placed on the potentially positive role of non-invasive, climate-adapted, aesthetically pleasing species within urban planting schemes as these could be well-received by the public.

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1. Introduction

In much of contemporary urban policy and practice non-native plant species are presented as being of little value at best or harmful at worst. These positions feed an overriding presumption within many planners, landscape architects, local authority officers and

conservation practitioners that the sustainable urban green infrastructure of the twenty first century should consist exclusively of native planting (Davis et al., 2011; Hitchmough, 2011). Policy guidance such as *BREEAM UK New Construction non-domestic buildings technical manual (2014)* reinforces this stance, advocating the exclusive use of native plant species in order to ‘minimise impact on existing site ecology’. At the local level in the UK, biodiversity action plans highlight ‘reducing the impact of non-native species’. The main argument used in defence of this position is the assumed invasiveness of all non-native exotic plant species (Pollan, 1994) yet many of the claims which drive this perception of the aggressive invasive alien are not backed by data (Davis et al., 2011).

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Scientific, and ultimately much wider public concerns about non-native plants can be traced back to Elton's (1958) *The Ecology of Invasions of Animals and Plants* that led to the discipline of Invasion Ecology, yet recent findings indicate that agriculture is profoundly more harmful to biodiversity than even the most aggressive, invasive non-native plant species (Burns et al., 2016). A clear body of evidence now exists that invasiveness is not a fundamental property of non-native plant species but rather a characteristic of both native and non-native species possessing certain ecological traits (Didham, Tylianakis, Hutchinson, Ewers, & Gemmill, 2005; Gurevitch & Padilla, 2004; Sagoff, 2005; Thomas & Palmer, 2015; Thompson et al., 2003) and a growing minority within ecology now see hostility towards non-natives as a diversion from the real issue of maintaining diversity in ecosystems, a role towards which non-native species can make a positive contribution (Davis et al., 2011). Gleditsch and Carlo (2010), Owen (1991) and Smith et al. (2006) have shown that non-native plant species are equally valuable as food sources for many native animals and more so in some cases than native species. Non-native plants can also provide specific benefits to native invertebrates such as the extension of pollen and nectar availability beyond the flowering season of native plant species (Salisbury et al., 2015).

Another important factor in hostility to non-natives is the idea that they do not belong; that they are brought here by people, are not fit for the environment and hence lie outside what is "natural". This idea is rooted in the notion that the past was like the present, which is clearly not the case. Within our own time climate change has already had a profound impact on the distribution of plant and animal species throughout the world, with species migrating polewards or to higher elevations as temperatures rise (Hickling, Roy, Hill, Fox, & Thomas, 2006; Parmesan, 2006; Parmesan & Yohe, 2003) fashioning new ecosystems. It is unrealistic and impractical to attempt the restoration of habitats to 'some "rightful" historic state' (Davis et al., 2011) consisting exclusively of currently native species, because climate change will render some of these (such as *Betula pendula* in Southern England) increasingly poorly fitted. Within designed urban landscapes there is a need to incorporate new species with potential utility in terms of 'fitness' to a warming climate, but this raises questions of what is culturally acceptable (Hitchmough, 2011).

Biological concerns about the invasiveness of non-native plants and their incompatibility with native wildlife seem to have morphed in some cases into the belief that these plants are less attractive or culturally relevant to people than native plants (Hitchmough, 2011). Indeed, attitudes to non-native plants are heavily constructed within cultures (Coates, 2006; Head & Muir, 2006; Kurz & Baudains, 2012; Zagorski, Kirkpatrick, & Stratford, 2004) and have fluctuated widely in Britain and many other countries over past centuries (Chew, 2009; Starfinger, Kowarik, Rode, & Schepker, 2003). In parts of the world most recently colonised by Europeans such as Australia and New Zealand native plants were initially viewed negatively as 'common' and 'aggressive' for the first half of the 20th century, while northern hemisphere plants from North America, Europe and Asia were valued as rare and out-of-the-ordinary (Aitken, 2016). Towards the end of the 20th century native plants became fashionable, in parallel with Australia and New Zealand's growing identity as Australasian-Pacific nations (Jay, 2004). In these parts of the world, where cultural and institutional disdain for non-natives is particularly high and attitudes to natives are politically contested due to these historic factors, non-native plants remain popular with many gardeners who are free to choose what they plant, (Kendal, Williams, & Williams, 2012; Zagorski et al., 2004). Landscape preference studies in Australia and New Zealand (Head & Muir, 2006; Jay & Stolte, 2011; Kendal et al., 2012; Kurz & Baudains, 2012; Zagorski et al., 2004) have considered 'nativeness' as a specific plant or garden trait. Kendal et al. (2012),

found clear patterns of preference for both visual plant traits such as leaf colour and flower size, and 'nativeness'. The response to native plants was polarised, however, with some people reacting very positively to them, and others strongly disliking them. In Australasia, plants imported and popular during the colonial past typically had larger flowers and more luxuriant leaves than many highly xeric native species, suggesting that preference was as much to do with morphology and fashion as nostalgia for the country of origin. Evolutionary habitat theories of landscape preference predict a lower preference for native Australian plants, as their frequently narrow leaves indicate a poor-quality habitat (Williams & Cary, 2002). Social and cultural values may, however, override this evolutionary response, with evidence that higher levels of educational attainment may promote greater acceptance of the aesthetics of native plants due to enhanced environmental knowledge (Kendal et al., 2012). These findings are broadly consistent with those from earlier studies (Head & Muir, 2006; Zagorski et al., 2004). In contrast, other studies conducted in the USA (Nassauer, Wang, & Dayrell, 2009) and in Western Australia (Kurz & Baudains, 2012) concluded that attitudes to native plants were largely related to gardening norms in the neighbourhood. Preference for native and non-native plants is likely to be most polarised where native and non-native species look very different, as in, for example the Southern Hemisphere.

In Europe, historically, non-native plants were positively perceived as novel and interesting (Shephard & Musgrave, 2014; Wulf, 2008) and widely used in landscapes and parks since the Renaissance (Steele, 1793) and in many cases long before this. Here attitudes to non-natives appear to be less polarised (Fischer et al., 2011) perhaps because it is more obvious to all that most landscapes are heavily culturally transformed (Hitchmough, 2011) and that non-native plants are important in these transformations. To date however there appear to be few studies that have examined how important notions of nativeness in landscape planting are to European citizens. An issue central to this is the capacity of lay people to distinguish between native and non-native plants in practice in the landscape. Alien plants have been important in European culture for so long, that public understanding of what is native and non-native have often become very confused (Davis et al., 2011). If this is the case then "nativeness" is little more than an abstract idea. Findings from an extensive (n = 2378) European study (Fischer et al., 2011) suggest that "nativeness" is not an identifiable visible characteristic for the general public, who are most likely to make judgements based on perceived attractiveness of species to themselves. Within this line of reasoning Rodriguez et al. (2004) have argued that plant attractiveness to the public should be a criterion used in biodiversity management. Hitchmough (2011) has suggested that landscape professionals and householders with private gardens in Britain and many other parts of the world chose plants because they found them attractive or useful, rather than because they were native or non-native. This view is supported by research conducted in 61 domestic gardens in Sheffield, (Smith, Gaston, Warren, & Thompson, 2006) which indicated that 30% of garden plants were natives (mostly unchosen garden and lawn weeds) and 70% non-natives (mostly chosen), mainly from Europe and Asia, suggesting an acceptance of and perhaps preference for the use of non-native plant species in these contexts amongst the UK population. This raises fundamental questions about why, outside of landscapes whose primary role is biodiversity conservation, non-invasive, but well-fitted non-native species should be posited as inappropriate within urban landscapes.

The study discussed in this paper focuses on public reaction to actual woodland, shrub and herbaceous planting in designed urban landscapes composed of native and non-native plant species, in an attempt to unpick these complex ideas. The environment is experienced rather than simply looked at (Ittleson, 1973) so in order to inform sustainable and culturally relevant landscape

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