

## Future directions of horticultural research among botanical gardens and arboreta in the United States

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Botanical gardens and arboreta maintain globally important collections for conservation and education with efforts to constantly strive for excellence in propagation, cultivation, and collection preservation. Methods of cultivating plants, learning from successes and challenges, and knowledge dissemination is paramount for improving techniques and outcomes. However, until nowadays the underlying field of horticultural research is not well defined, and results of plant cultivation techniques are often only shared informally rather than published. We explored how horticultural research practitioners perceive the field of horticulture research and excellence, how they are involved, and the most urgent needs of future horticultural research among gardens and arboreta. We conducted an internet-based survey of the status of horticultural research amongst the United States members of the American Society for Horticultural Research (ASHS), American Public Garden Association (APGA), Botanical Garden Conservation International (BGCI), and the Interactive Community of Arboreta (ArbNet), Level II, III, and IV members. A total of 128 respondents from 116 institutions across 34 of the United States completed the survey. As conservation needs, changing agricultural paradigms, and climate change impacts continue to rise, we find future research needs are increasingly holistic and focus on species and variety conservation, ecology, and mitigating pests and diseases. The respondents were variously involved in horticulture research and the main challenges were funding, time, and personnel resources. Horticultural knowledge is largely practical and shared informally, and there is a need for its recognition and means of sharing practical research as well as technical research. This study presents a new framework for horticultural research, supporting strategies for its conceptualisation, communication, and implementation.