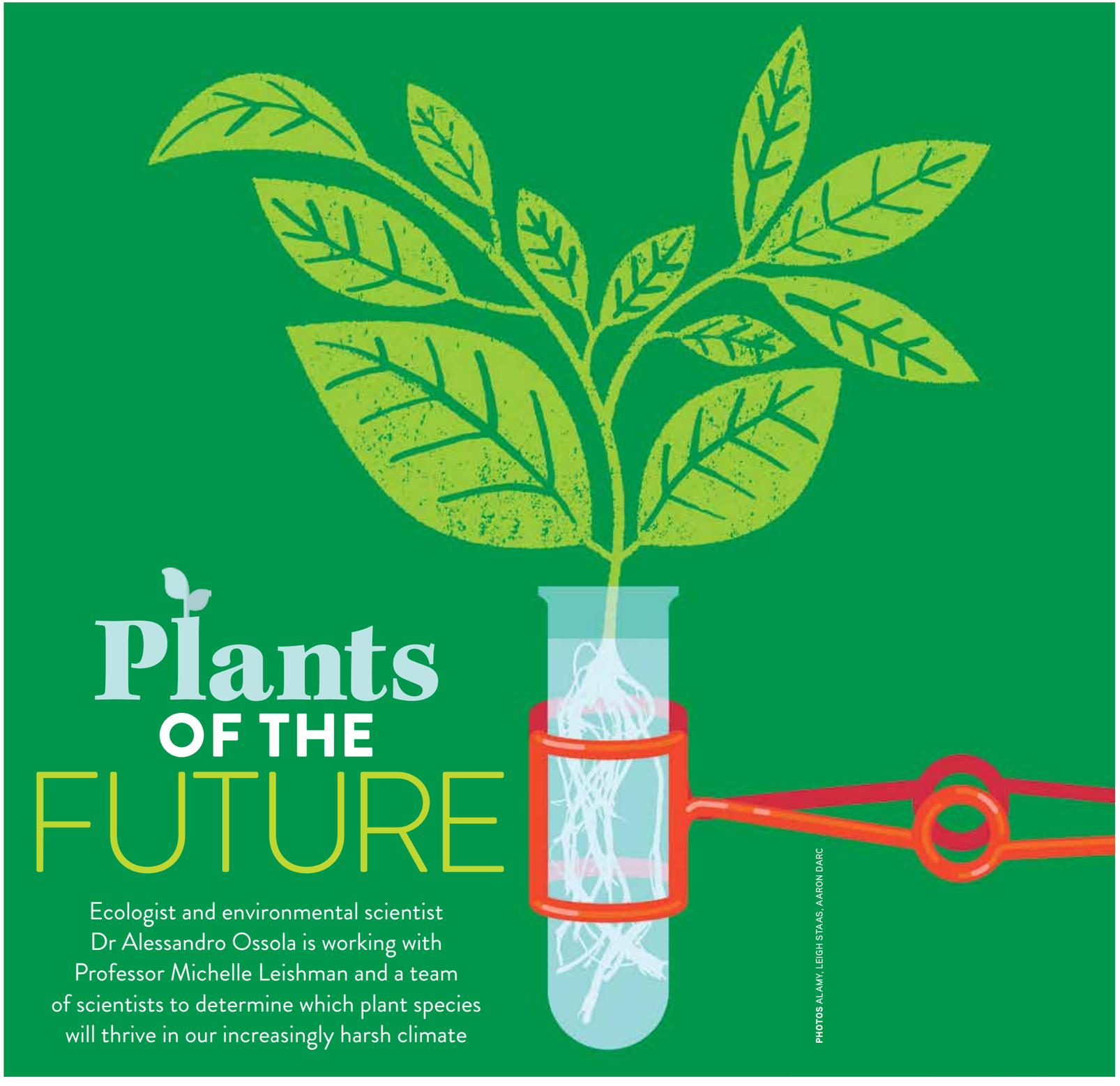


Plants OF THE FUTURE

Ecologist and environmental scientist Dr Alessandro Ossola is working with Professor Michelle Leishman and a team of scientists to determine which plant species will thrive in our increasingly harsh climate

PHOTOS ALAMY, LEIGH STAAS, AARON DARC

Every summer sees new climate records being set in Australia. Droughts and heatwaves are becoming more frequent and intense. Some Australian cities and towns saw maximum daily temperatures this year soaring to almost 50°C. Others have been blanketed under sleepless summer nights, exceeding 35°C. Rephrasing Shakespeare's *A Midsummer Night's Dream*, heat and drought are rapidly becoming Australia's worst summer nightmare.

It is well known that all of this poses a great threat to the Australian people and public health, but what about our beloved plants? Plants are much like us. Some tolerate heat and lack of water surprisingly well, while others struggle as biological limits are met. This happens despite our passion and best gardening care.

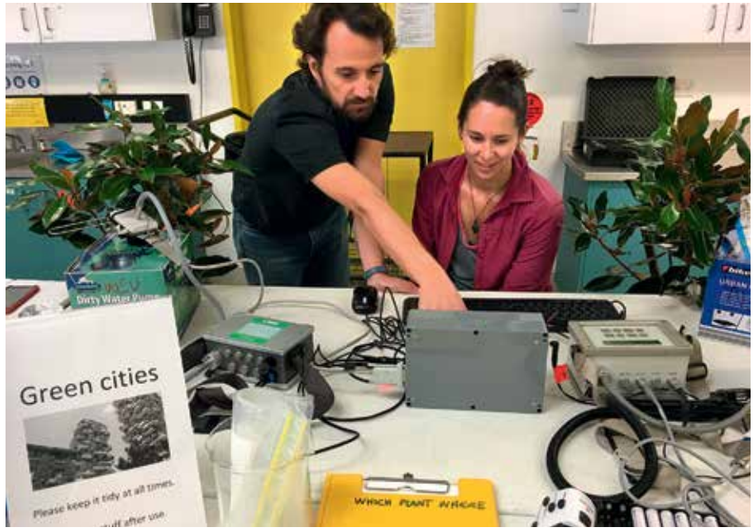
Thus, the key issue is to understand which plant species will cope best with future climatic conditions, and in which planting contexts species should be used to increase their chance of success.

See more on Friday, Feb 15 at 7.30pm on ABC TV or catch on iview

SEEKING SURVIVORS

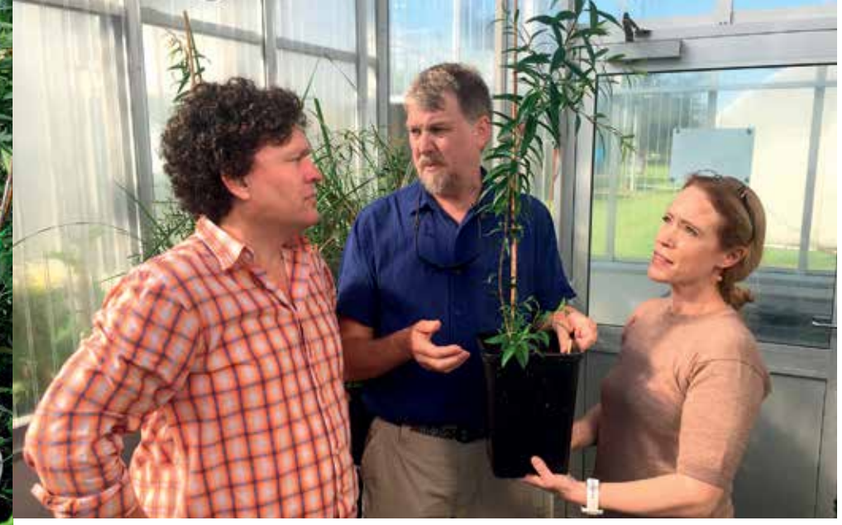
The issue of our changing climate keeps Australian scientists and horticulturists up at night, as we ask ourselves which species can safely be planted in our cities so they will survive climate change with minimal input of precious resources, such as water and fertilisers.

Other important points to determine are which species provide the greatest benefits in terms of cooling, opportunities for local biodiversity and the wellbeing of city dwellers, and if there are any new, neglected or forgotten species that could be used to replace those plants that are destined to fail under climate change. ►



ABOVE
Dr Alessandro Ossola and Dr Renee Prokopavicius use an instrument called a fluorometer to assess the vulnerability of plants to heat.

BELOW & RIGHT
Tree species before being subjected to artificial drought and heat; Professor Leishman and Dr Ossola spend time controlling plant growth and wellbeing for the project.



ABOVE & LEFT
Professor David Ellsworth and Associate Professor Linda Beaumont discuss findings from the *Which Plant Where* project with Josh Byrne for the TV segment; Dr Muhammad Masood measuring photosynthesis on *Hakea laurina*.

To answer these pressing questions, the not-for-profit research and development corporation, Hort Innovation, has teamed up with scientists from Western Sydney University, Macquarie University and the NSW Office of Environment and Heritage in a five-year research endeavour called the *Which Plant Where* project. The project sees the collaboration of more than 30 scientists, students, volunteers, interns, and industry and government partners from a variety of disciplines, ranging from ecology and eco-physiology to horticulture and urban planning.

The scientists are using computer models to predict species distribution based on the plant's natural climate. These bioclimatic models allow the researchers to assess tolerance to future climate for thousands of species, across a wide range of trees, shrubs, grasses, vines and herbs, including Australian natives and exotics.

The models suggest that many plant species will be moving southwards, with tropical and subtropical species more likely to succeed in temperate cities, such as Sydney and Melbourne. Other species, such as jacaranda, might completely disappear from their northernmost urban habitats. Those iconic purple blooms will probably cease tinting our tropical and subtropical suburbs in the future.

Species in the glasshouse are being exposed to artificial five-week droughts and heatwaves, peaking at 41°C, to measure their tolerance to drought and extreme heat. Plants have been sourced from every Australian state and territory to provide the widest possible range of species from different climatic conditions.

RIGOROUS TESTING

The scientists are also testing species in glasshouse experiments and in real-life plantings across Australian cities, in order to understand their climatic tolerance. This is critical to provide evidence that will help the horticultural industry, horticulturists and home gardeners adapt their plant selection in the face of climate change. It will also increase the diversity of species in our urban landscapes by reducing the risk of losing plants in a harsher climate.

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Included in the trials are common plants and trees, such as the native brush box (*Lophosthemon confertus*), which is the most widely planted tree in Australia, and more uncommon species. Some of the well-known exotic plants being tested are the tulip tree (*Liriodendron tulipifera*), Chinese elm (*Ulmus parvifolia*), cherry plum (*Prunus cerasifera*) and London plane tree (*Platanus acerifolia*).

PHOTOS LEIGH STAAS, AARON DARC, ANDREW SULLY

The plants arrive mostly as tubestocks, which are grown on for two months to acclimatise and produce new leaves before being subjected to testing. In a few cases, more mature trees are used, and some plants are germinated from seed.

Not surprisingly, preliminary screening has confirmed that several of the species from Australia's iconic arid rangelands, such as boonaree, or inland rosewood (*Alectryon oleifolius*), will be better off in future hot and dry climates than the rainforest species, such as tuckeroo (*Cupaniopsis anacardioides*).

Australia is blessed with extraordinary native plant diversity which, under future climatic conditions, will provide untold opportunities for smart horticulture. Many of them will supplement tried-and-tested, resilient and commonly used exotic species, such as *Murraya paniculata*. Researchers will need to further explore the horticultural and economic potential of these plants for many years to come, trialling untested species and subspecies found in the great Australian outback.

POSITIVE OUTCOMES

The project will culminate in 2021 with the launch of an innovative plant-selection tool based on scientific data and evidence achieved. It will allow designers, landscape architects, gardeners, horticulturists and environmental managers to select from hundreds of plant species, based on their climatic, ecological, edaphic (influenced by the soil) and physiological traits.

To date, more than 56,000 trait data entries for more than 980 plant species have been collected from about 150 databases and sources from Australia and around the world, complementing our scientists' data from the field, the glasshouse and computer modelling.

Users will be able to personalise their plant selection experience for greater success, and to help Australia in creating greener and more sustainable cities that are resilient to climate change. GA