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Biodiversity rules at Perth's premium park

Last week we learnt about all the amazing things to see and do in Kings Park. Today we discover some of the important work scientists are doing there.

Tucked away off Fraser Avenue in Kings Park is a two-storey building you've probably never noticed. Yet inside this plain-looking building more than 50 scientists, support staff and students work tirelessly to identify, study and conserve the 13,000 or so species of Western Australian plants. Seeds are germinated; plants are propagated; ideas are tested. This is the Biodiversity Conservation Centre.

The word biodiversity comes from biological diversity, meaning the variety of all living things. It's essential for supporting life on Earth: providing our food and medicine, ensuring clean water and air, controlling pests and disease and maintaining fertile soils.

Native plants growing in the Kings Park Nursery, with the Biodiversity Conservation Centre in the background. Picture: BGPA

GOING GOING . . . GONE

Although most of us are familiar with the concept of endangered animals and the need to save them from extinction, it's important to remember that plants are the foundation of most ecosystems. Just as there are lists of "critically endangered" animals, there are also lists of threatened flora, which are rare plants under threat of extinction or in need of special protection.

SEED BANK

Seed from more than 3500 plant species (especially threatened ones) is collected from all over WA and stored at the WA Seed Technology Centre in the Biodiversity Conservation Centre. Here, seeds are carefully cleaned and dried then stored in freezers at minus 18C. Research by the Seed Conservation Team suggests that many seeds stored this way could live for decades or even hundreds of years.

BACK FROM THE BRINK

One native plant the Kings Park scientists have saved is a small green bush called Symonanthus bancroftii. This type of plant comes in two forms, male and female, both of which are needed for the species to continue. In the 1990s, the bush was considered extinct as only one male plant could be found. However, when a female plant was found in the Wheatbelt in 1997, Kings Park scientists were able to use seeds they had stored in the seed bank to create more Symonanthus bancroftii. Today, the species is growing well at managed sites in the Wheatbelt. One extinction averted!

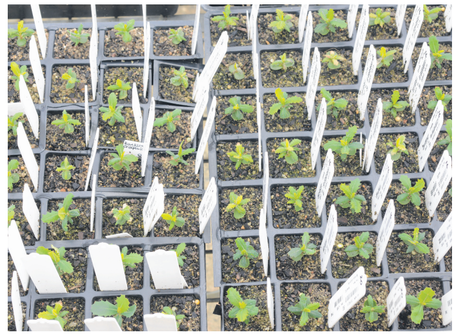
CITIZEN SCIENCE

Want a taste of working as an ecologist in the field? The Botanic Gardens and Parks Authority (BGPA) is inviting all community members to take part in a Citizen Science Project at Bold Park. Find the research site at the southern end of the Zamia Trail, position a smart phone into a frame on the top of the Citizen Science sign, take a photo and get Mum or Dad to upload it to social media using the hashtag **#boldparkfirestudy**. Your photo will help the BGPA researchers studying the impact of prescribed burning on local bushland track the changes in the ecosystem over time.

Tissue culture lab. Picture: Jason Thomas

CRYO-STORAGE

Not only does the Biodiversity Conservation Centre store seeds, it also stores tissue samples of endangered plants in liquid nitrogen. This means that native plants with declining populations could one day be removed from cold storage, grown in the lab and eventually replanted.



Seedlings. Picture: Dave Blumer

AROUND THE WORLD

Not all projects led by the Kings Park science teams are local. One of them involves restoring native vegetation in a Saudi Arabian desert. More than 99,000 acacia plants and 140,000 seeds have been planted in an area of desert near Riyadh since the project began in 2011. The research project has also shown that salicylic acid (a key ingredient in aspirin and anti-pimple creams) helps plants grow and survive in extremely dry climates like Saudi Arabian deserts.

Kings Park scientists measure the effect of salicylic acid on Saudi Arabian desert acacias. Picture: Patrick Courtney

Picture: Getty Images

MEET THE SCIENTISTS

Ryan Tangney. Picture: BGPA

We spoke to Kings Park scientist Ryan Tangney.

How did you end up studying fire?

I was working within the fire ecology sphere for a year and loved it! Here in WA we live in a fire-prone environment. Every year we hear of another fire happening. And I like seeds. Seeds are fascinating!

What research questions are you currently trying to answer?

I'm looking at how seeds survive fire and to what degree prescribed burns damage the seed banks. So basically I want to know how hot the soil temperatures are during fire and what temperature can seeds survive.

What are you doing with ovens and fibre-optic cables?

The ovens are like a proxy for fire. I can manipulate temperature as a single variable and I can control things like moisture. We use optic fibres to measure soil temperature. We send a laser down an optic fibre and we see what comes back. It's cutting edge and I'm really happy to be involved.

You're also assisting with a fire project in Kings Park at the moment?

Yes, we're looking at the biodiversity response to different fire and weed management approaches. We're measuring things like species diversity, weed load and the canopy cover. It's only our second year of the project so we don't have good data yet but the treatment areas with the fire plus weed control are visually looking really good.

Your research has led you to meet Prince Charles. Tell us about that.

That was a really unique experience. Before the visit, we were messing around with the idea of Prince Charles coming to the Biodiversity Conservation Centre and getting to talk to him. And then I found out he wanted to talk about fire and see the work we do here! Prince Charles seemed genuinely enthusiastic and responsive. It was really nice. I don't think I'll ever get another opportunity like that again!

What has been the most surprising discovery in your research so far?

That wet seeds die at lower temperatures than dry seeds during fire events. I suppose it's not that surprising but it's the first time it's been fleshed out in the lab. I suspect it's something to do with the way water acts in a seed. I'll work it out in a couple of years.

We asked Kings Park scientist Emma Dalziell, who has been described as "The Water Lily Hunter":

What triggered your interest in water lilies?

One of the scientists from Kings Park had brought back a heap of water lily seeds from a field trip. We had no idea what to do with them. I looked for days and days on Google. There was nothing. Water lilies are so incredible and yet we know so little about them. So here was an opportunity to do something really important.

What was the goal of your water lily research?

It was basically to understand how water lily seeds germinate and what kind of dormancy they have. Dormancy is like a pause that allows seeds to wait for the conditions to be right to germinate. I also wanted to find out whether we could store water lily seeds in the seed bank. With climate change and rising sea levels, even a 1-2cm rise could turn fresh water into mangroves and reduce water lily habitat. Being able to store the seeds for future use would be a bit of a safeguard for them.

Tell us about your trips to collect water lily seeds.

I spent three years doing seed collection all through the Kimberley, where roads often get cut off during the wet season. I worried a lot about crocodile safety, obviously. I remember once we pulled up at the Marlgu Billabong near Wyndham. There was an absolutely spectacular display of water lilies. We got to about 2m out on to the boardwalk, when about 6m away a 4m-long crocodile leapt out of the water, grabbed a duck and they both just completely disappeared.

What do you find most fascinating about water lilies?

They're one of the first flowering plants to have existed. They evolved right back in the Cretaceous period so they're really interesting from that point of view. They're also really important to people around the world: indigenous food and ceremonies, Egyptian hieroglyphs, Indian religions.

What research are you currently working on?

We're trying to understand seed metabolism. Seeds have their own little internal fuel reserve, and a set amount they can burn through. We think this will limit their lifespan. We're one of only two labs in WA to have a Q2 scanner, which is a fantastic resource that lets us calculate the metabolic rate of seeds.

Emma Dalziell. Picture: BGPA