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Conservation awareness program at school (Anurag Dhyani)

PLANT HUNTING TALES

BACK FROM THE BRINK: *BUCHANANIA BARBERI* IN INDIA

The beginning of the journey

The story began when I joined the Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI), the biggest conservatory garden in Asia, in March 2016. The beautiful botanical garden is located in Thiruvananthapuram district of Kerala. The garden was opened 42 years ago with the aim of setting up a botanical garden for the tropical plant resources of Kerala and India. The Institute's mission is to promote the knowledge, enjoyment and conservation of plants through excellence in biodiversity research management, horticulture displays and educational programmes. During my first few days at JNTBGRI, I visited the different sections of the garden - ornamental plants, arboretum, anthuriums, orchids, ginger germplasm collection, carnivorous plants, medicinal plants, palm collection, ficus collection, bromeliads, cacti and succulents, fernery, gymnosperms and bambusetum and was hugely impressed by the dedication of the organisation's horticultural and scientific staff. This 300-acre garden has always been a magnet for plant conservationists as the institute preserves more than 50,000 accessions of 5,000 plant species, among the highest number of plant species conserved by botanical gardens in Asia.

Being a scientist in the garden provides a marvellous window for me to study the abounding diversity of the Western Ghats - a renowned UNESCO World Heritage site and one of the eight most biodiverse hotspots in the world. It covers an area of 164,280 km^2, five percent of the total area of India. The Ghats stretch into six states, namely Gujarat, Maharashtra, Karnataka, Kerala, Goa and Tamil Nadu. The Western Ghats is home to more than 7,402 species of flowering plants, 1,814 non-flowering plants, 139 mammals, 508 species of birds, 179 amphibians, 6,000 insects and 290 species of freshwater fish. For conservationists, the Western Ghats is habitat to 325 globally threatened species, among these 51 species are Critically Endangered, 145 are Endangered and 129 are assessed as Vulnerable. Among tall evergreen trees, approximately 352 species are endemic to the region and make this place special for tree enthusiasts.

Finding my species

To begin my conservation efforts, I started searching for and reading literature on threatened plants of the region and flora of Kerala. I invested weeks turning pages of research papers, books and conservation magazines. After several months, I encountered an engrossing article on the priority list of endangered plants.

The author holding Buchanania barberi *seedling and interacting with students (Anurag Dhyani)*

The piece highlighted herbs, shrubs and tree species that urgently require recovery, otherwise they will face extinction. I scribbled the species' names in my record book and rushed to my computer screen to examine the conservation status of each species on the IUCN Red List of Threatened Plants. Later I rechecked it with a List of Threatened Endemic Trees of India provided by BGCI. The screening brought to light a 15-meter tall tree seeking the attention of a conservationist. As if it was saying: *"I am on the verge of extinction and surviving with only two trees in the wild, I am* Buchanania barberi*."* My immediate questions was: *"but where are you"?* My fingers on Google showed me the destination and my heart decided to meet this rare tree in the wild and take action to conserve it.

The next morning, I paid a call to Dr. E. S. Santhosh Kumar, the plant taxonomist who rediscovered *Buchanania barberi* after a gap of 97 years, and who has been exploring the Western Ghats for over 30 years. He told the story of accidentally finding the tree in 2002 and described salient identification features and the natural habitat of the species. While displaying the digital herbarium specimen he said *"Dr. Dhyani, the tree is locally known as Malamavu and is growing near Palode, just 6 km from our institute"*. He could see the spark of happiness in my eyes. We decided to visit Palode the next day for a first look at this rare tree.

At 9 am sharp, we packed our bags for the location, Dr. Santhosh rented a jeep and I grabbed my Sony DSLR camera to capture the rare tree. After 20 long minutes, we reached the species location and got down from the jeep. I saw reserve forest on the one side of the road and the Vamanapuram river on the other. Dr. Santhosh pointed his index finger towards a medium size tree and said *"here it is"*. He asked me to follow and took me to the middle of road, telling me to take a closer look at the tree's smooth bark and crowded leaves on the tips. He walked towards the tree and lifted a few leaves from the road, and showed me the identification feature of this species. What is that, I asked eagerly? He replied: *"please see and feel the soft hairs beneath the leaves"*. While touching the hairs I was pondering about the future of the tree: would road expansion lead it to extinction or would I be able to collect seeds of hope?

Gaining support

Considering the dire need of conservation, I submitted a proposal to BGCI's Global Seed Conservation Challenge (GSCC) Fieldwork Fund. In July 2016, we received an award letter for a project to collect and store seeds of six endemic and threatened trees of the Western Ghats (as identified on the IUCN Red List). The project supported regular monitoring of *Buchanania barberi* trees for flowering and fruiting in Palode region. During an October visit, I spotted small young buds on a few branches and creamy-white flowers on the top of the tree. The sunshine on the small flowers made me hopeful for upcoming fruits. I clicked some images, collected some buds and flowers, and brought them to the laboratory to observe the pollen morphology under the microscope. Next morning, while sipping tea and looking at the pollen images on the desktop, I was imagining the seeds of this tree. After few months, I again visited the site, got down from the jeep and caught sight of a few red mature fruits hanging down from the branches. The number of fruit on the tree was very low compared to the bumper flowering. Suddenly a bird appeared and plucked the red fruits, before flying away . The birds were eating these tasty fruits and reducing the availability of seeds and also, consequently, lowering the seed bank under the canopy. Other mature seeds were falling on the road where the chance of germination is nil. Luckily, we managed to hire a tree climber to reach the top of the tree and prune small branches of these fruits. We also collected seeds from the roadside, packed it in zipped bags, and returned with a great sense of satisfaction. The GSCC fund supported us to conduct several field visits to observe these trees in the Palode region. One day while surveying in the region we noticed two additional trees but unfortunately, neither has produced flowers or fruits to date. We have been continuing our observations on these individuals and I believe they will soon produce flowers and viable seeds to continue its survival.

Conservation assessments

During 2018, I received an invitation to review the assessment of *Buchanania barberi* for the IUCN Red List of Threatened Species. Based on our field experience, published information and the limited species range in the region, we reassessed *Buchanania barberi* as Critically Endangered. This red list category assigned to a species means it is facing an extremely high risk of extinction in the wild and is in need of urgent action. The current population trend of this species is also declining.

Right: Team collecting fruits of Buchanania barberi *(Anurag Dhyani)*

Mature fruits of Buchanania barberi *(Anurag Dhyani)*

I further noticed other species of the genus in the IUCN Red List. For example, *Buchanania vitiensis, B. lanceolate* and B. *platyneura* are categorized as Vulnerable and *B. obovata* and *B. insignis* as Least Concern in the IUCN Red List. The overall picture inspired me to develop a conservation action plan for *B. barberi*, which could also help to conserve other species of genus *Buchanania*.

Expanding the work

In 2019, I submitted a proposal *'Conservation of endemic and Critically Endangered Buchanania barberi in India'* to The Mohamed Bin Zayed Species Conservation Fund, UAE. The fund board members decided to support our work. Our team again visited the natural habitat of target species and recorded the associated species with *Buchanania barberi*. During the fruiting period, we collected maximum seeds, brought these to the laboratory, and placed them in open trays. To germinate the seeds, we removed the pulp from the seeds and placed them in petri dishes. The seeds take approximately 20-30 days to germinate. The germinated seeds were then transferred to growing media in polybags. These polybags were placed in a plant nursery, nurtured for a few months, and then transplanted. Our project team visited schools near to the natural habitat of *Buchanania barberi* and conducted awareness activities to conserve the tree. We shared information about the identification features of the tree, characters of flower, fruits, and major threats. Conservation awareness material viz., cotton bags, water bottles, coffee mugs and posters were distributed among students to raise their enthusiasm and love for rare trees.

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Seedlings ready for transplant (Anurag Dhyani)

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Buchanania barberi is an evergreen tree belonging to family Anacardiaceae and endemic to the South Western Ghats of India. Dr. C. A. Barber was the first person to collect specimens of this tree in Nadarai, Thiruvananthapuram in 1904. Twelve years later, in 1916, Dr. J. S. Gamble described the species. Due to its rarity and limited distribution, the species was assessed as Endangered in the Red Data Book of Indian Plants in 1990. Subsequently it was published as Critically Endangered on the IUCN Red List of Threatened Species in 1998. JNTBGRI researchers rediscovered the species in 2002 (Kumar *et al*., 2002) and we reassessed the species with new data as Critically Endangered in 2018 (Dhyani and Anilkumar 2017; Barstow, 2018). JNTBGRI is continuing its efforts to save rare trees of the Western Ghats.

Team after fruit collection (Anurag Dhyani)