

# Survival of endemic species in megadiverse campos rupestres and on oceanic islands in Brazil

*During the 59<sup>th</sup> Symposium of IAVS in Pirenópolis, Brazil, I met a botanist with a very strange name - Ruy José Válka Alves. Although his affiliation is the Laboratory of Island and Mountain Floristics and Biogeography, National Museum of the Federal University in Rio de Janeiro, Brazil, he was able to speak Czech with me. After several minutes of talking I found his personal story and his scientific interests to be so interesting, that I asked him to introduce himself to a wider community of vegetation scientists through an interview in the IAVS Bulletin. Here is his response to some of my questions and the message he would like to share with the IAVS members.*

**Monika Janišová (MJ):** Hello Ruy. You were born in the Czech Republic, but you studied in Rio de Janeiro and most of your scientific career is also bound to this city. How did this happen? I also wonder, why have you decided to be a botanist and who or what affected most your development as a scientist?

**Ruy Alves (RA):** Hello Monika. It was an honour meeting you at my first IAVS symposium. I have been interested in all natural sciences since my early childhood, and my parents always stimulated these interests by taking me to museums and giving me books. I was born in Znojmo, Moravia, in 1965 and lived in Prague up to the age of 15. My father is Brazilian so I have both nationalities. I graduated as a biologist in Rio de Janeiro and ultimately defended my PhD in Geobotany at the Botanical Institute of the Czech Academy of Sciences, working with the vegetation of a small mountain range with campo rupestre in Minas Gerais, Brazil. In the mid 1980s I began doing field work with the late Prof. Johann Becker from the Entomology Department of the Rio National Museum. He was a true universal naturalist and further inspired my interests. I have worked at the National Museum since 1996 and am currently Full Professor and the herbarium curator. Of course there were many other colleagues who influenced my development and current work, and I have collaborators from many countries and continents. A short answer to who or what influenced me as a scientist is curiosity!

**MJ:** You cooperate with many Brazilian as well as Czech vegetation scientists during the preparation of scientific publications. Do you see some differences between Brazilian and the Czech botany? I mean for example in favourite topics, style of work, basic approaches or techniques, access to the studied ecosystems, etc.

**RA:** Thanks to the recent electronic revolution, botany has become a more cooperative science on



Ruy Alves with *Sinningia cooperi* in Serra Negra, Minas Gerais.

the global scale. We are able to solve taxonomic questions almost instantaneously, whereas 20 years ago it took months or even years to communicate through regular mail. For instance, we knew that one of our most recent taxonomic novelties from Trindade Island in the South Atlantic, *Sporobolus nesiotioides*, was a new species on the day it was collected because a specialist evaluated our photos using e-mail. I do perceive some differences in botanical practice. The less diverse flora and long winters give European botanists more time to read literature and develop theoretical work. On the other hand, in the Neotropics, vegetation is always available and we have barely described half of the megadiverse flora: currently we know 35,000 vascular plant species





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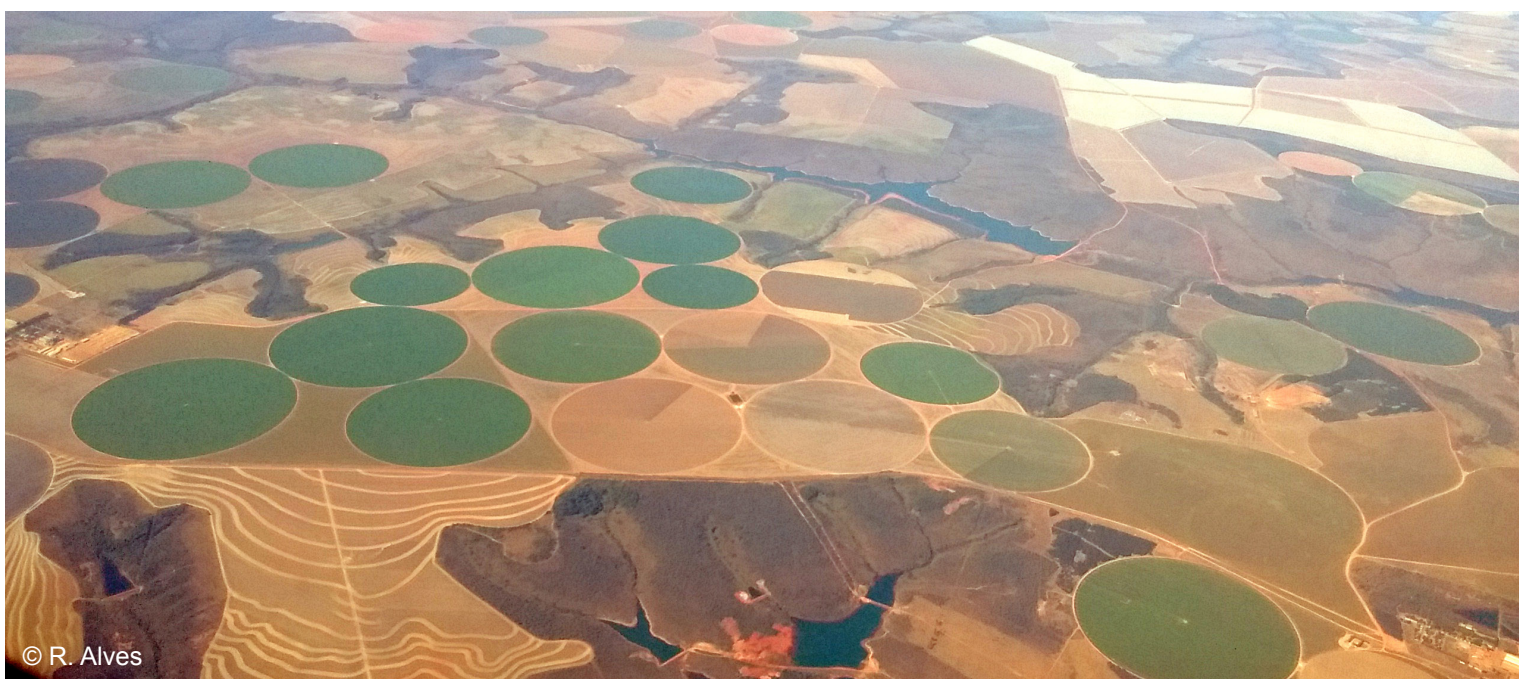
Vast areas of Brazilian central plateau are recently transformed to agricultural land.  
Aerial view during the flight from IAVS Symposium to Rio de Janeiro (above and below).

from Brazil. We still need to do a lot of field work. Over the last decade almost every field expedition of my lab brought back at least one vascular plant species new to science. I have two full boxes of future types and almost no time to do the actual taxonomic work. In terms of vegetation studies, you can imagine that Brazil, with so many species still being described, is using coarse physiognomic classification. The entire framework of associations, based on relevés, diagnostic species, well studied soil types, etc., as used in Europe, is an almost impossible task in Brazil. And at the current rate of destruction of native

vegetation, it would be an almost paleobotanical practice. Vast areas of Cerrado, Pantanal and other formations are currently being transformed into agricultural land, mountains are being ground into iron ore and cement (photo above and below).

**MJ:** Which are your favourite topics in botany?

**RA:** I like to think of myself as a naturalist. That is why we chose a broad title for the Laboratory. My interests in vegetation science totals over 1,000 vegetation relevés to date, mainly from the campos rupestres. I have permanent campo rupestre plots



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Nílber Silva and Ruy Alves examining the recovered population of *Asplenium beckeri*, Trindade Island, 2013

monitoring vegetation changes since 1989. We are monitoring growth rates of several species of *Vellozia*, some individuals of which turned out to be over 1000 years old. Ironically we could not publish the growth rate monitoring data yet because one of the species of *Vellozia* turned out to be new, so we had to describe it first. My geobotanical training brought a new species of *Philcoxia* (*Plantaginaceae*) currently being published. Analysing satellite images, we pinpointed what seemed to be the right habitat for this sand-dwelling carnivorous genus in Goiás state. And when we arrived at the coordinates, we found a small population which turned out to be a new species.

**MJ:** Which ecosystems have you studied and which of them do you consider to be the most interesting?

**RA:** The mountaintop vegetation of Brazil is by far the most compelling to me. Small mountaintops on quartzite, called campo rupestre, often have over 1000 species of vascular plants, and easily 20% of those are narrow endemics. Even though campo rupestre occupies less than 1% of the area of Cerrado, about 1/3 of the 12,500 vascular plant species are restricted to those quartzite mountaintops. When the bedrock is sandstone instead of quartzite, the floras are a bit less rich, say 800 species per mountain, and on igneous bedrocks there would typically be over 500 species. The poorest, but still very interesting in terms of narrow endemism are the limestone and iron ore outcrops, very common in Minas Gerais, Bahia and Goiás. However, the latter are under extreme pressure from mining operations. And then there is a peculiar and unique forest on Trindade Island, dominated by the tree fern *Cyathea copelandii*.

**MJ:** Your project on regeneration of vegetation on Trindade Island in the Atlantic was very successful. You cooperate with the Brazilian Navy. Could you tell us this story in more details, e.g. how has this interesting cooperation started, how has it developed and what is the main success of your project?

**RA:** Even though I am a plant taxonomist and geobotanist, the main success of my career so far has been the vegetation recovery of Trindade Island, South Atlantic, as a response to the eradication of feral goats. When I arrived there in 1994, most of the Island looked like Mars: red dirt, no vegetation. Eight hundred goats roamed the Island freely and kept vegetation from regenerating. This goat population were the survivors of the first pair introduced to the Island by the famous astronomer Edmund Halley in 1700. Together with Becker, we wrote a report to the Brazilian Navy, which administrated Trindade, predicting that the Island would eventually run out of fresh water if nothing were done with the goats. It took the Navy 11 years of hunting, many months of sniper work, but finally the last goat was felled in 2005. By that time vegetation regeneration was visible all over, and water returned to several streams which had been dry for centuries.

**MJ:** I suppose that many of your publications focus on endemic species. What do you consider to be the main challenge for future studies on endemism?

**RA:** In fact we have published several rediscoveries of narrowly endemic species, mainly of vascular plants but also two land snails, which had been considered extinct. In a way these are more exciting to me than species new to science! The main challenge for studies of endemism on Brazilian



mountaintops is currently bureaucracy. We are required to have several licenses on the federal, state and municipal levels, we are obliged to file endless reports and even to disclose our results before they are published. The other challenge in Brazil is the effect of global warming on montane vegetation. Brazilian mountains are relatively low. The summit endemic species have nowhere to climb as a response to the warming climate. Alternatives aimed at ex-situ conservation must be sought in higher latitudes to emulate the altitudes. And each Neotropical mountain is unique: we compiled 15

montane floras from eastern Brazil which gave us a list of 16,500 species. The highest Sørensen similarity between two neighbouring mountains was 0.2! Our mountains are virtually islands.

**MJ:** How did you like the IAVS Symposium in Pirenópolis? Was it useful for you as a home-country participant?

**RA:** As a geobotanist I felt at home at my first IAVS meeting. It was intense and I left Pirenópolis inspired, with contacts with several new collaborators from across the globe, and many new ideas.



Ruy Alves examining a stand of *Chusquea riosaltensis* in Serra Negra, Minas Gerais.