

versatilidade. Neste trabalho, foram avaliados dados biométricos de *Guadua weberbaueri* (popularmente conhecido como taboca) que se desenvolveu em borda de floresta (ambiente antropizado) e no interior da floresta. Valores de DAP (diâmetro na altura do peito) foram usados para calcular a biomassa de acordo com modelos específicos para a espécie e região. Observou-se que os tabocais que cresceram na borda obtiveram menores valores de biomassa em comparação aos tabocais crescendo no interior da floresta, observando-se uma média de 1,76 kg vs: 4,59 kg por indivíduo, respectivamente, o que mostra um efeito negativo do estresse abiótico causado por diversos fatores antrópicos característicos da borda da floresta (desmatamento, danos mecânicos, efeitos do vento etc). Além dos dados biométricos, este trabalho irá correlacionar a biomassa com as características anatômicas dos colmos e raízes de bambu de forma a entender como esses fatores de estresse abiótico interferem na anatomia do bambu.

### Flowering phenology and pollen characteristics of *Quercus* species growing in Korea

Myeongja Kwak<sup>1</sup>, Jongkyu Lee<sup>1</sup>, Hunsong Kim<sup>1</sup>, Yeaji Lim<sup>1</sup>, Sanghee Park<sup>1</sup>, Sinyoung Woo<sup>1</sup>

<sup>1</sup>University of Seoul, Seoul, Republic of Korea (016na8349@hanmail.net; gp190@naver.com; blasterkhd92@gmail.com; oxll2l@naver.com; arksanghee0930@gmail.com; wsy@uos.ac.kr)

Recently, the incidence of major allergic diseases has increased by the conversion of coniferous forests to deciduous broad-leaved forest in Korea. Oaks such as *Quercus serrata*, *Q. acutissima*, and *Q. mongolica*, which are typical broad-leaved species of Korea, are allergen-inducing pollen species. Furthermore, identification of the dynamics between the flowering time and pollen dispersal under elevated CO<sub>2</sub> is very important in the establishment of health monitoring system. The present study aimed to assess bud development stages and pollen dispersal of *Q. acutissima* according to elevated CO<sub>2</sub>. The pollen dispersal and production of oak species can be predicted by the interaction between temperature and other climatic factors as well as the complexity of overlapping plant seasonality. The pollen production increased in *Q. acutissima* grown under elevated CO<sub>2</sub> compared with the atmospheric CO<sub>2</sub>. The pollen dispersal of *Q. serrata* tends to be different depending on the climatic factors, and the climate change due to the increase of CO<sub>2</sub> concentration is expected to increase the air pollen dispersal. Climate change and global warming are the main cause of plant phenology, but these phenological patterns can also affect by other factors including precipitation and CO<sub>2</sub> concentration. Plant phenological patterns are an important biomarker of ongoing ecosystem changes and can provide a general idea that future climate change can be a key driver of biodiversity changes. This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (No. 2013R1D1A1A02044683).

### Effects of potassium/sodium fertilization and water availability on wood properties of *Eucalyptus grandis* trees

Roger Chamblé-Legoas<sup>1</sup>, Gilles Chaix<sup>1</sup>, Mario Tomazello-Filho<sup>2</sup>

<sup>1</sup>Escola Superior de Agricultura "Luiz de Queiroz", Universidade de São Paulo, Piracicaba, Brasil; <sup>2</sup>CIRAD, UMR AGAP, Montpellier, France (rogerchl@usp.br; gilles.chaix@cirad.fr; mtozamel@usp.br)

In Brazil, most *Eucalyptus* plantations are located in regions experiencing periods of water shortage where fertilizers such as potassium (K) are intensively used to achieve high productivity. Recently, sodium (Na) has also been considered a potential nutrient. As well as tree growth, wood properties are also an important factor to consider in order to measure the impacts of silvicultural practices and water deficit on forest productivity, since they are determinants for quality and yield of pulp and paper. In a split-plot experimental design with 4-year-old *Eucalyptus grandis* trees, located in São Paulo State, Brazil, we evaluate the effects of K and Na supply compared with a control treatment, under two water supply regimes (37% throughfall reduction versus no throughfall reduction) on stem volume, heartwood proportion, basic density, fiber, and vessel properties. K and Na fertilization increased stem volume 2.7 and 1.9 fold, respectively, with a non-significant effect of 37% throughfall reduction. Na fertilization was more detrimental to wood properties than K fertilization, affecting heartwood proportion, basic density, and fiber wall thickness. K fertilization affected only heartwood proportion and basic density. The 37% throughfall reduction only affected wood basic density, increasing it. Effects of fertilization treatments did not change regardless changes in water supply. Despite the detrimental effects of fertilizers (stronger with Na supply) in wood properties there is a large beneficial effect on stem volume (stronger with K supply), even under a water availability reduction, that would compensate the loss of wood quality for pulp and paper production.

### Urban and industrial air pollution effects on a native species of Atlantic Rainforest

Daniel Rodrigues da Silva<sup>1</sup>, Luzimar Campos da Silva<sup>1</sup>, Sílvia Ribeiro de Souza<sup>2</sup>, Larisse de Freitas Silva<sup>3</sup>

<sup>1</sup>Plant Anatomy Laboratory, Department of Plant Biology, Federal University of Viçosa, Viçosa, Brasil; <sup>2</sup>Ecology and Physiology Research Center, Botanical Institute, São Paulo, Brasil; <sup>3</sup>Federal University of Recôncavo da Bahia, Center for Agricultural, Env (silvabiadaniel@yahoo.com.br; luzimarcampos@yahoo.com.br; sonzasrd@gmail.com; larisse\_bio@yahoo.com.br)

The large Brazilian urban centers are located in the Atlantic Rainforest domain, an important global biome, and urban air pollution contributes to forest decline. In the Ipatinga's city, Minas Gerais - Brazil, exist a steel mill and a circulating fleet of vehicles responsible for atmospheric pollutants emissions that contribute to the reduction of environmental quality. The objective was to evaluate the urban and industrial air pollution effects of Ipatinga in *Joannesia princeps* Vell. (Euphorbiaceae), a native Atlantic Rainforest specie. For this, we analyzed the visual foliar damages and the anatomical and micromorphological effects in extrafloral nectaries (EFNs) of this species. During 126 days, *J. princeps* seedlings were exposed in stand systems at Bom Retiro, Caruru, Cidade Nobre and Veneza points in the Ipatinga's city. The leaf symptomatology was evaluated monthly. For the anatomical analysis, EFNs were collected and processed for analysis in light microscopy and scanning electron microscopy. At Bom Retiro and Caruru points, the highest concentrations of NO, NO<sub>x</sub>, SO<sub>2</sub>, O<sub>3</sub>, benzene and naphthalene were recorded. The highest concentrations of hydrocarbon pollutants were recorded in the Cidade Nobre and Veneza points. In plants exposed at the Caruru point, more visual damage was observed. Regarding the anatomical and micromorphological damages in the EFNs, tissue necrosis, wound healing formation and cell hyperplasia, intense superficial damage such as epidermal rupture, fungal colonization, disarrangement and trichome fall were observed. Thus, our data suggest that the urban air pollution of Ipatinga's city promotes changes in the morphology and micromorphology of native plant species.

### Mangrove species of *Rhizophora apiculata* BL. and *Avicennia alba* BL. in responses to the changes in sediment condition impacted by processes of deposition and erosion in coastal areas, Vietnam

Linh Nguyen Thuy My<sup>1,2</sup>, Pil Sun Park<sup>2</sup>

<sup>1</sup>Vietnamese Academy of Forest Sciences, Hanoi, Vietnam; <sup>2</sup>Seoul National University, Seoul, Republic of Korea (linh.ntm@rcfee.org.vn; pspark@snu.ac.kr)

Mangrove forests are one of important estuarine ecosystems, controlling the formulation, stabilization and development of coastal muddy banks. Mangrove species are naturally adaptive to normal disturbances but sensitive to stressors. *Rhizophora apiculata* BL. and *Avicennia alba* BL. are the most abundance mangrove species distributed in the South areas of Vietnam. Unbalance in the deposition and erosion processes within this area have been strongly affecting