Field Trip to Illinois Beach State Park

On June 19th, the Morton Arboretum Fellows joined interns from the Chicago Botanic Garden to spend the day exploring Illinois Beach State Park. Located in Zion, Illinois, it is the only remaining beach ridge shoreline left in the state, and includes dunes and swales, marshes, and forests of oak.
Dense stands of cattail, grasses, big bluestem and sedges can be found in the swale marshes. The sandy ridges are topped by open, black oak forests, and the Dead River is full of aquatic plants and fish, even though it is blocked by sandbars for much of the year.
Field Trip to Illinois Beach State Park

According to the Illinois Department of Natural Resources, "more than 650 species of plants have been recorded in the dune area alone". You can find prickly pear cactus in the dry areas, and a variety of grasses and sedges in the wet prairies.
Field Trip to Illinois Beach State Park

We were also fortunate enough to meet with Dr. Timothy J. Bell, who explained the work that he and others are doing with Pitcher's thistle (*Cirsium pitcheri*), a short-lived, monocarpic herb endemic to western Great Lakes sand dunes.

Our thanks to Dr. Bell and the Chicago Botanic Garden for a fun and informative day.

- Christine Carrier
Hi everyone! I’m happy to say that my first week at the Morton Arboretum has been a fun and busy one. My research mentor and I are still working out the fine details of my project for this summer, but I know that I’ll be focusing on understanding isoprene emissions from different oak species. Isoprene is a biological volatile organic compound (BVOC) that is emitted from certain plant species and reacts with nitric oxides in the air and can lead to the formation of ozone. A lot of my work will involve taking measurements of leaves using a LI-COR (pictured below), then analyzing the samples in the lab with a gas chromatograph. Although it has been pretty rainy lately, I was able to get some great samples thanks to the beautiful weather this morning. The photo on the right is a hybrid 'Crystal' oak (Quercus K.B. Crystal) leaf adjusting in the chamber.

-Mary Babiez
Step 1: Weigela cultivar collecting: Erin Pfarr

This summer, under the supervision of the arboretum’s plant breeder Joe Rothleutner, I will be sizing the genomes of different weigela cultivars and species. Weigela is a very popular ornamental shrub.

There is one weigela cultivar that is a triploid, which means it has three sets of chromosomes instead of two. We suspect that there may be more triploids and even tetraploids among the numerous weigela cultivars. It is likely that plant breeders have been unknowingly selecting for polyploids (plants with more than two sets of chromosomes). In other plant species polyploids have been linked to ornamentally important traits such as reblooming during the growing season.

Weigela 'Kosteriana variegata'

Weigela 'Bokrashine'
Step 1: Weigela cultivar collecting:
Erin Pfarr

Recently, Joe and I took a trip up to Chicago Botanic Garden to take samples of weigela cultivars. With the help of Andrew Bell and his intern Frank we located and took cuttings from 25 different cultivars. I rooted the cuttings and will use them as sampling material in my experiment this summer along with cultivars from the Morton Arboretum and wild collected weigela from the Arnold Arboretum.

The diversity of size, foliage color, flower color, and adaptability of the cultivars is incredible to see!

- Erin Pfarr
Hello everyone, it's only been two weeks but we've done so much already, crazy weeks, I would say. I've been working, with Jake's supervision, in a project that we are starting to call "Testing the accuracy of imaging software to measure tree root volumes". We started by measuring the Ash root's volume using the water displacement method. We also weighed each part of the roots systems.

At this point we're oven drying the roots at approximately 100 °C for 24-72 hours, this way we'll obtain the dry mass and refine our data for future analysis. Jointly the measurements I'm working with the 3D models from pictures previously taken of the same roots. The models will start to look like roots soon and then I'll be able to show you some great pictures. Our main goal is to compare the results from the water displacement with the values found in the program (AgiSoft), and verify how accurate the AgiSoft is when measuring volume.

- Angelica Bannwart Lopes
Getting started on my invasive tree research:
Jake Berger

Hey everybody! This summer, I will be studying the effects that different species of large canopy trees can have on the trees that are growing underneath them. I am working with Christine Carrier and Robert Fahey, and we are interested in three different invasive tree species (Amur Corktree, Norway Maple, and Siberian Elm) and two native species (Sugar Maple and White Oak). We have several fully grown trees of these species here at the arboretum, and we recently planted lots more of them in the understory for our research on their interactions.

So far this summer, I have been measuring the size of the leaves on the young plants to see how well they are growing. Later, I plan to measure sunlight levels and total plant mass. This information will be very helpful to see the bigger picture of how these plants are responding to their specific canopy conditions, and how the native plants are fairing against the invasive species. - Bruce Jake Berger

Measuring the surface area of the seedlings' leaves, underneath a cork tree. Only a few thousand more leaves to count and measure this summer!
This summer Dr. Scharenbroch and I will be researching how soil and soil amendments affect urban trees. We are looking at two different amendments, the first being biochar (Chard wood) and the second biosolids (Organic material from sewage treatment plants). Both of these amendments are considered residual waste from industry, so are hope is that we can re-purpose these materials to grow a healthier urban tree.

Up to now we have constructed 72 pots with varying soil types and amendments, planted trees in each pot, collected water samples to test for nutrient leaving the soil, performed a soil respiration test and started to collect Japanese Beetles for a future part of this project. If you are interested or have any question please feel free to comment, I would be happy to tell you more. - Jacob Cerminar
Field Trip to the Chicago Botanic Garden

On Friday, July 10th, Fellows from the Morton Arboretum were given a tour of the Chicago Botanic Garden islands and gardens in the morning, and spent the afternoon learning about the research being done by interns in the Plant Science Center.

We started our day learning about the shoreline enhancement program, which has restored more than three-fourths of the Garden's shoreline since 1999. In November 2011, the North Lake was drained of nearly 54 million gallons of water, and in the following months, more than 120,000 native plants and shrubs, representing 197 native taxa, were added to anchor the eroding shoreline. This effort encourages lakeshore residents to embrace native landscaping principles, provides a living laboratory for researchers to study, and improves water quality in the downstream Skokie Lagoons, Chicago River, and beyond (www.chicagobotanic.org/shoreline/).
Field Trip to the Chicago Botanic Garden

Our next stop was the Regenstein Fruit & Vegetable Garden, with nearly 400 edible plants arranged in beautifully landscaped beds. This garden demonstrates the best plants for the Chicago region and how to take care of them (www.chicagobotanic.org/gardens/fruitandveg).

No visit would be complete without seeing the Bonsai Collection, as well as the Arid, Tropical, and Semitropical Greenhouses. Nearly 200 Bonsai are on rotating display, to capture them at their peak beauty throughout the season, and the greenhouses showcase beautiful plants from around the world.
Field Trip to the Chicago Botanic Garden

After lunch, we toured the Daniel F. and Ada L. Rice Plant Conservation Science Center, which "provides laboratories and teaching facilities for more than 200 Ph.D. scientists, land managers, students, and interns" (www.chicagobotanic.org/research/building). Interns discussed their projects & the importance of this research for the Chicago area & beyond.

The 16,000-square-foot Green Roof Garden is open to the public, as well as a viewing area to witness the work being performed in the laboratories on the lower level. The Rainwater Glen is a sunken rain garden which temporarily pools rainwater in a shallow depression, surrounding the building. The plants and soil filter the water as it is absorbed into the ground and delivered back to the Chicago Botanic Garden’s 60-acre lake system.

Our thanks to everyone at the Chicago Botanic Garden for an amazing day! - Christine Carrier
Field Trip Hosted by the Morton Arboretum

On Friday, July 17th, the interns from the Chicago Botanic Garden were invited to tour the Morton Arboretum’s Research Center, the Sterling Morton Library, and the May T. Watts Reading Garden. The Research Center houses laboratories, greenhouses, staff and offices for the Arboretum.

The Sterling Morton Library contains scholarly and general information resources about plants to staff and the public. The new exhibit, *Plant Hunters*, explores the practice and history of plant exploration and collecting, with rare photos and artifacts from the Library's special collections.
Field Trip Hosted by the Morton Arboretum

The Morton Arboretum fellows gave informal presentations on their research projects, both in the lab and in the field. Topics ranged from "Testing the accuracy of imaging software to measure tree root volumes" to "The correlation between basal isoprene emissions and climate of the native range within oak species".
Field Trip Hosted by the Morton Arboretum

A tram tour highlighted the Arboretum’s 1,700 acres, and we were all lucky enough to catch a glimpse of the new, Nature Connects exhibit, featuring 13 larger-than-life Lego sculptures by artist Sean Kenney.

We thank the Chicago Botanic Garden for coming out and sharing such a beautiful, science-filled day.

- Christine Carrier
Continuing the research and data collection on invasive canopy trees: Jake Berger

It has been a very busy July here at the arboretum. Over the last few weeks, I have been able to gather all of the data on the seedlings' leaf surface area, and how much sunlight they are getting. I also was able to do some really specialized testing on a smaller portion of my seedlings, to see how their individual rates of photosynthesis change in response to varying amounts of light. By combining all of this information, I will soon be able to clearly see how much the seedlings are totally photosynthesizing, and use this as a measure of their health and productivity. That way, seedlings of the same species that are under different canopy trees can be compared. Those differences will show us how they are being affected by the type of canopy tree under which they are grown. It has been really exciting to see all of this data come together and to see the bigger picture of this project.

- Bruce Jake Berger

My fully portable work station. Air conditioning not included.

Measuring sunlight levels with a ceptometer, to see how much of the available light is reaching the seedlings.

The mean, green, LI-COR 6400 photosynthesis machine. Here, it is clamped onto a leaf, and it records the changes of carbon levels inside the chamber. This is how we measure photosynthetic activity.
The data collection phase: Jacob Cerminar

For several weeks I have been very busy testing water samples and taking soil respiration reading. The last thing to do is analyze my data and come to some conclusions about biochar and biosolids as urban soil amendments.
Finalizing Sample Collection and Measurement Analysis: Mary Babiez

The past few weeks at the arboretum have consisted of many field days. We have taken advantage of the hot and sunny weather early in the morning to collect bags of isoprene. When we got back to the lab, we could already see a difference; the photosynthesis levels from the oaks have jumped since the beginning of summer.

This past week concluded going outside to take measurements. In these last two weeks of the fellowship I am analyzing my data, creating graphs, and looking for correlations. I’m glad to finally be able to put all of the information together, and begin looking at what the final product can tell us. -Mary Babiez

This is what the sample bags look like. The one on the left is empty, and the one on the right contains a sample of leaf emissions.
August 31, 2015

Wrapping up my summer internship at Morton: Erin Pfarr

This summer I worked on 'Genome Sizing and Ploidy Estimations of *Weigela* Cultivars and Species'. I enjoyed the opportunity to present my research at the Undergraduate Research Symposium with my fellow interns. I was also able to present my research poster at the International Trials Conference in Portland, OR on August 25. I have had an amazing experience this summer and would like to thank Joe Rothleutner and Christine Carrier for their support! You can see my poster [here](#), to learn all about my project. - Erin Pfarr

The mighty flow cytometer - the device I used to estimate the genome sizes of the plants

One of the lovely weigela I worked with this summer
The Center for Tree Science held the 2nd Annual Undergraduate Research Symposium in Morton Arboretum's Cudahy Auditorium, on Friday, August 14th. Each participant prepared a 15 minute presentation for the event, and answered audience questions regarding their research project.
2015 Center for Tree Science - Undergraduate Research Symposium

The occasion attracted Arboretum members and staff, mentors, as well as family and friends of the undergraduates. View the 2015 Undergraduate Research Fellows’ presentations here. At the conclusion of the symposium, we enjoyed a delicious lunch in the Chestnut Room, overlooking Meadow Lake.

Congratulations to everyone on a successful symposium!
- Christine Carrier