

Final Assessment: Tree Biomechanics Week of Research

by

Andrew K. Koeser
ISA Science and Research Manager
Biomechanics Week Project Manager

Executive Summary:

- Thirteen teams from Australia, Europe, and North America met at the Davey Research Farm site and conducted research associated with seventeen projects. These researchers were fully supported by 5 volunteer climbing technicians selected through a formal call for proposals; a small, but extremely active contingent of local arborists; and numerous Davey Tree Expert Company personnel.
- Thanks to an estimated \$62,000 in in-kind support (labor, equipment, overhead), expenses associated with hosting the week of research and public symposium were limited to approximately \$35,000 (or about \$2,000 per research project).
- A public symposium gave practicing arborists an opportunity to visit the research site and learn from leading experts in the field. A DVD proceeding of this event will feature video recordings of the presentations, pdf versions of the slide presentations, and additional information regarding the event.
- The work conducted at *Biomechanics Week* will be thoroughly captured in a series of trade and peer-reviewed articles. A biomechanics-themed issue of *Arborist News* is slated for February 2011. A similar edition of *Arboriculture & Urban Forestry* is expected after data have been analyzed and manuscripts are sent in for review. Additional articles are currently being released in the various publications produced by the partner organizations.
- Several collaborative research efforts have developed thanks to working relationships fostered during *Biomechanics Week*. This helps perpetuate the mission of this research opportunity for months and years to come.
- The “Week of Research” model developed for *Biomechanics Week* was an extremely effective and novel approach for supporting arboricultural research. It warrants further consideration for other topics such as pruning and tree vitality assessment where the majority of measurements can be made in the course of a week.
- Biomechanics Week was deemed a resounding success by those planning, hosting, and participating in the event. As such, a second *Biomechanics Week of Research* is tentatively scheduled for August 2013

Acknowledgements:

A special thanks goes out to our partner organizations: The Davey Tree Expert Company; TREE Fund; BioCompliance Consulting, Inc; Utility Arborist Association, Arboricultural Research and Education Academy; Busy Bee Services, Ltd; SherrillTree; Stihl; the Ohio Chapter of the International Society of Arboriculture; and USDA Forest Service

Event Background and Overview

Biomechanics Week started humbly as a casual dinner conversation among a handful of speakers and attendees at the 2009 ISA Conference in Providence, Rhode Island. Noting similarities in the research presentations given during the educational sessions at the meeting, Ward Peterson, John Goodfellow, Andreas Detter, Greg Dahle, and others in the group schemed to bring biomechanics experts together on a common site to conduct experiments, compare techniques and equipment, share ideas, and connect with one another. Over the course of few months, the ideas generated at this gathering gained significant industry and organizational backing and a formal call for proposals was released. The researcher response to this call helped to further propel the event and garner additional support from the arboriculture and urban forestry communities.

The Davey Tree Expert Company, BioCompliance, and ISA were the first organizations to pledge full support of this scientific undertaking. The former offered up a unique research site with an uncommon array of mature trees planted in uniform blocks. These trees were made available for destructive harvest and served as research fodder for a series of concurrent projects. In addition to the site, Davey provided significant logistical and on-site support, equipment, technicians, and safety personnel. ISA, with help from BioCompliance and Davey, agreed to take the lead in the planning and administration of the project. This significant in-kind support and was soon matched with generous contributions from the Arboricultural Research and Education Academy (AREA) and the Utility Arborist Association (UAA). Over time, the list of project partners grew to include the Tree Research and Education Endowment Fund (TREE Fund), Busy Bee Services, the Ohio Chapter of ISA, USDA Forest Service, SherrillTree, and Stihl.

Thirteen research teams from Australia, Europe, and North America were sponsored to conduct scientific inquiry as part of the ISA *Biomechanics Week of Research*. Academics were encouraged to bring their students to assist in the research and interact with other leading experts. Also, five arborist climbers were selected from a pool of applicants to work with the research teams as funded climbing technicians.

The week of research concluded with a morning of field demonstrations highlighting the various research methods employed at the research site. In addition, a researcher symposium showcased past and current works from 16 leading biomechanics experts (comprised of those attending the week of research and 2 invited presenters). Presentations were video recorded and will be included as part of a DVD proceedings of the event.

The model developed while planning and hosting *Biomechanics Week* proved to be remarkably successful and may be applied to other arboricultural topics, such as pruning and vitality assessment. This report serves as a self-assessment of lessons learned while planning and conducting the event. Many aspects of the project worked well and should be adopted for future use. Other areas were lacking and suggestions have been made for their improvement. This report will likely be most beneficial to those planning and hosting *Biomechanics Week 2013*, which is slated to be a continuation of the work started at the Davey Research Farm this past August.

Biomechanics Week Goals

Several overarching goals were outlined early during the founding of *Biomechanics Week*. Those planning the event thought that it must accomplish the following in order to be considered a successful research endeavor:

- Support meaningful research in the field of biomechanics.
- Encourage collaboration with participants both at the site and afterward.
- Allow participants to learn new techniques and test out new equipment that will enhance their future research efforts.
- Generate new ideas for biomechanics research.
- Give practicing arborists an opportunity to conduct research with industry experts.
- Allow arborist interested in biomechanics research to attend a public symposium, visit the research site, and learn from participating researchers.
- Generate key research “deliverables” including:
 - DVD proceedings
 - *Arboriculture & Urban Forestry* manuscripts and short communications
 - *Arborist News* and newsletter articles
 - internal project reports and summaries

The goals listed above served as the basis for communicating expectations to *Biomechanics Week* partners and participants. In addition, these objectives ultimately shaped the planning and logistical efforts listed below.

Planning Considerations

Dozens of conference calls and countless emails amassed while planning this event. Key topics of consideration during the pre-planning of *Biomechanics Week* include:

- Site opportunities and limitations
- Call for proposals and selection process for researchers and climbers
- Identification of partner organizations
- Communication (with partners, sponsors, participants, and symposium delegates)
- Equipment rental and procurement
- Climber technician selection and travel support
- Travel and on-site logistics (flights, car rentals, shipping, hotel, meals, on-site transportation)
- Safety
- Symposium
- Proceedings development

Site Opportunities and Limitations

Open access to the uniform planting blocks at the Davey Research Farm made the site ideal for a variety of studies. Aside from this major selling point, the site did pose numerous logistical challenges that needed to be addressed.

A lone gravel road served as the main access route through the center of the site. As such, any rain which was sufficient to soften the ground would severely limit access for large vehicles (i.e., bucket trucks). Given this constraint, the event was planned for August – typically a dry month for the area. The proposed time-frame also put the event after the ISA Conference. This was a top request from the ISA staff involved with the project as the months preceding the Annual Meeting are extremely hectic. Finally, late summer appeared ideal for most researchers and academics, as it fell before the onset of the fall semester and teaching obligations.

Another potential limitation was actually linked to the site's key selling point - its trees. Most had developed in close proximity to one another and were more representative of forest-grown trees than open-grown urban specimens. This made it difficult to complete some of the projects proposed (i.e., projects primarily concerned with multi-stem, crown biomechanics). Two projects were modified and three scrapped after the site walk-through on the first day. However, the majority of projects were carried out as planned. Aside from this limitation, some blocks offered both edge and interior trees which allowed researchers to compare differences in adaptive growth (a major advantage).

Earlier and more detailed communication of the trees available would be an asset to any newcomers to the site for *Biomechanics Week 2013*. A full inventory of available trees (with height and diameter) and corresponding pictures of blocks should be provided prior to the next call for presentations. Many pictures showing the site and trees were posted in the weeks leading up to *Biomechanics Week 2010*. However, participants had largely committed to their experimental designs by the time these images were released.

Finally, aside from a well and workshop with a small office, the site was largely devoid of facilities. A large tent was placed at the center of the site to provide a home base near the individual work zones. Additional pop-up canopies were provided for researchers with electronic equipment. One generator was stationed at the main tent and others were distributed as requested to the research teams. Two portable toilets were rented and strategically located at the front and rear of the site. The arrangements made the site quite functional and should be replicated for future events at the site.

Call for Proposals and Participant Selection

Two *Biomechanics Week* Call for Proposals (Call) were released in Spring of 2010. The first Call targeted researchers and research teams interested in conducting biomechanics experiments on the Davey Research site. Each team leader was required to submit a proposal detailing the research to be conducted, past experience in the field of biomechanics, and any relevant qualifications or biographical information. Those selected were awarded travel assistance, on-site logistical support, and full access to the trees present at the site.

The inclusion of student research assistants was highly encouraged and separate funding to support student travel was made available. To qualify for this funding, advising researchers were required to include a brief biographical statement for each of their students, as well as a short explanation of how participating in *Biomechanics Week* would benefit their advisees.

All researcher submissions were scored independently by a panel of academic and practicing arborists presiding on the ISA Science and Research Committee. Scores were then compiled, averaged, and ranked from high to low. Selection was determined by contacting the teams ranked highest on the list, projecting their travel costs, and working down the list until budgeted travel funds were depleted. Given the unique nature of this project, serious effort was made to make this selection process as inclusive as possible. However, several teams were not accepted based on assessment scores and available funding.

The selection process noted above was adapted from past assessments conducted by the Science and Research Committee. It worked well with this event and can be effectively applied for future collaborative research endeavors.

A second call for proposals was established to give arborist climbers with research interests the opportunity to actively contribute to the science of arboriculture. Applicants were required to submit a brief proposal detailing qualifications, past research and work experiences, and interest in biomechanics research. Proposals were evaluated by a team of arborists and academics with climbing experience. The top five applicants (of ten) were selected and received travel support to participate in *Biomechanics Week*.

Both Calls for Proposals were very well received by researchers and climbers. Academics from North American, Europe, and Australia submitted application materials. Included in the pool of submissions were several proposals from experts in fields outside of arboriculture and urban forestry (e.g., forestry management, mechanical engineering, soil engineering, and wind engineering). In addition, the climber technicians selected to participate brought with them a wealth of professional and technical expertise. This wide range of cultural and professional backgrounds ultimately served to enrich the dialog and ideas generated during *Biomechanics Week*.

The Calls for Proposals were advertised on the ISA website, in *Arborist News*, in the AREA Newsletter, and through direct email correspondence. This appeared sufficient in attracting a sizable pool of participants. However, a future biomechanics week of research might benefit from earlier collaboration with partnering organizations.

In addition, widening the pool of applicants beyond those currently engaged in arboricultural research may be possible by working with the International Union of Forest Research Organizations (IUFRO). One group within IUFRO, Unit 8.01.11 – *Impact of Wind on Forests*, may be particularly interested in a future *Biomechanics Week* event. This unit is headed by Steven Mitchell, Ph.D. (a 2010 *Biomechanics Week* participant) of the University of British Columbia. The group will be hosting a wind and trees conference at the University of Georgia in Athens, GA, this coming year (July 31-August 4, 2011). An oral presentation or poster at this event may be an effective marketing tactic for a future Biomechanics Week in 2013. A future Call should be sent to this group's mailing list as well.

Partner Organizations

The success of *Biomechanics Week* was directly tied to the overwhelming support offered by the event's partnering organizations. The time, talent, equipment, funds, and personnel generously supplied by Davey, the TREE Fund, and others were used to create a supportive environment, which fostered scientific inquiry and creative collaboration. One participant quipped that the event allowed him to relive his childhood days—a time in which all he needed to worry about was staying outside and playing with his toys. This freedom allowed the researchers to accomplish a great deal in a relatively short amount of time.

The original project budget depended heavily on income generated from a two-day research symposium. As support poured in from our partnering organizations, reliance on this revenue stream lessened. However, partner support was not enough to completely cover the projected costs of the event.

While use of a public symposium as a funding model can be quite successful (it worked extremely well during a Trees & Risk Researcher Summit in 2009), its success is linked to paid registrations. This dependence on an uncertain revenue source makes budgeting rather difficult. The value of a

symposium and field day as an educational opportunity for the large public of practicing arborists should not be understated

Fund raising efforts for *Biomechanics Week 2013* should be channeled through the TREE Fund's *Arborist Safety and Techniques Program* with any excess revenue collected being left to help the grant reach its \$100,000 endowment objective. This arrangement would also serve to reduce concerns regarding the donation of funds from 501.C3 charities (such as the Ohio Chapter of ISA) to ISA (a 501.C5 labor and agricultural organization).

Communication

Information was passed on to the various stakeholders as soon as it was formalized by the core planning committee. The majority of this information was posted online prior to the event using the Google Docs online document sharing application. Posted references ranged from a listing of participating teams and their project abstracts to soil and site surveys. Use of Google Docs varied among research teams, but appeared to increase significantly once it was made accessible without having to log-in or create a Google account (one can create an url address that gives all who possess it open access to a folder or document). As with all online resources, use was influenced by user familiarity with the system and perceived barriers. Having an open-access hosting site served as an acceptable means of gathering and distributing non-sensitive information to the partners, researchers, climbers, and volunteers.

In addition to passive distribution of information through the Google Docs site, a mandatory conference call and slide presentation was held several months prior to biomechanics week. Each research team was required to select at least one representative to attend the call. Information on the site, available equipment, schedule, symposium, safety, lodging, and technicians were provided. After the presentation, the slides were updated to capture any new information discussed during the question and answer session. This updated presentation was then placed online for future reference.

Prior to Biomechanics Week, each team was emailed a pre-event information packet with driving directions, final timeline, and additional information to help them prepare for their travels to Ohio. At the research site, ISA and Davey staff held a formal briefing and walkthrough. Hard copies of the emailed information, site maps, and resource (equipment, trees, climbers) schedules were provided by Davey as a comprehensive spiral-bound reference manual.

Equipment Rental and Procurement:

Large equipment was provided based on the need conveyed in the original proposals. A follow-up email was also sent out closer to the event date to confirm researcher needs. Equipment was secured through the event partners when possible. Rentals were used to fill any needs not met through donation.

Skilled equipment operators were designated by the organizations providing or renting the machinery. Operation of equipment by researchers or students was limited to use of air excavators (following a training session) and electric winches. Similarly, the use of chain saws and climbing and rigging equipment was limited to qualified climbing technicians. Research teams provided their own operators or technicians for any equipment brought on site. Assigning skilled operators to tree care equipment (e.g., bucket truck, aerial lift, stump grinder, and chipper) helped ensure safe and efficient use of machinery. This strategy is highly encouraged for future events.

Equipment use lagged somewhat on the first day as researchers assessed the site and finalized their work plans. As cost of idle equipment and crews can be a concern to those providing them, it may be best to hold them back until the second day of research or provide a more significant researcher walk through prior to the event. Once the research was in full swing, much of the equipment provided ran continuously. However, crews and supervisors should be briefed on the pace of research. One faulty sensor may delay work for an hour while it is repaired and retested.

Climber Technicians

While those planning *Biomechanics Week* felt that giving practicing arborists and researchers an opportunity to work together was very important, there was some concern that the skills offered by the climbing technicians would be underutilized. Ultimately, these fears proved unwarranted. As with equipment, there was some lag in the demand for technicians the first day. However, as projects gained momentum, it became apparent that a sixth climber would have found ample work.

Climbing technicians were extremely helpful when installing probes and sensors and tree canopies, rigging trees for pull tests, and applying various pruning treatments. Beyond performing this work, several climbers were able to pass on their knowledge of tree rigging and practical arboriculture to the researchers they worked with. Dialog between technicians, researchers, students, and volunteers was very engaging and has likely spurred several new research ideas.

On-site Logistics

On-site logistics consisted of several key components:

- Participants transportation to and from the site (i.e., carpooling)
- **Equipment, trees, and technicians allocation**
- **Food and beverage provision**
- Hotel accommodation reservation (i.e., room block)

Only topics in bold are addressed in the following section

Tree, equipment, and technician allocation was one of the most daunting logistical tasks associated with *Biomechanics Week*. Care was taken to limit wasteful harvesting of trees. If a team required only the crown of the tree and another needed only the stem and roots, efforts were made to use the same specimen. In addition, projects were deliberately spaced throughout the site to allow for an appropriate circle of safety. Teams often opted (either conscientiously or subconsciously) to work on an alternative species if it meant alleviating researcher crowding in a given stand without negatively affecting their research.

The equipment and technician support provided seemed to adequately match researcher need. In planning the schedule, we had varied which researchers the climber-technicians worked with in order to expose them to a variety of projects. However, it soon became apparent that both technicians and researchers preferred a more fixed schedule. This proved more efficient and helped forge deeper working relationships among the participants. In the end, the work schedule was scrapped and technicians were free to stick with their original groups. For a future research event, it may be best to adopt a less varied work schedule (as appropriate).

Lunch and dinner were provided at the research farm to allow the teams to work continuously throughout the day. Aside from the first two nights out in the field (the walk-through and an

icebreaker), dinner was not originally scheduled to be served on-site. However, it became quite obvious early on that most teams had no desire to leave the site while daylight remained. With the nearest restaurants and grocery stores nearly 20 minutes away, our local volunteers took the initiative to arrange for dinner on-site on Tuesday and Wednesday. This helped maintain productivity late into the afternoon.

All meals at the research site were prepared by local volunteers. This came as a significant cost savings when compared other options such as a per diem, meal reimbursement, or catered event. Estimates place this savings at nearly \$6,000 when compared to the latter option based on the number of meals served. Furthermore, having meals on site brought the research teams together to talk and interact. Since the initial conceptualization of *Biomechanics Week*, collaboration had been a core objective. However, pressures to finish field work on time left many tied to their individual projects. Luring everyone to the table with a meatball sandwich helped foster interaction that may not have been realized otherwise.

Safety

Given the nature of the work taking place, safety was a major concern for those organizing the event. Prior to Biomechanics Week, two conference calls were held to establish safety policies and protocols for the various activities outlined in the research proposals (e.g., pulling trees to failure, root pruning, pulling limbs to failure). Following these meetings, a safety packet was produced and distributed to each team. Included in this packet was a list of the finalized policies and protocols, waivers for each participant, a work plan evaluation form for each project, and an incident reporting form. Event insurance was provided as part of ISA's existing coverage. Additional, coverage was secured for climbing technicians.

Davey Tree Experts provided two dedicated personnel to serve as safety officers for the entire week. These officers lead a mandatory safety meeting at the start of the first day of field work. Participants were instructed on proper emergency response, policies regarding equipment operators, circle of safety requirements, and other key concerns. Each following day began with a safety briefing.

Shortly after the initial meeting, there was an incident involving a participant and a piece of power equipment provided by the his research team. The response to this incident was handled in an extremely professional manner that seamlessly adhered to the established safety protocol. Ultimately (and unfortunately) this event reiterated the points covered in the earlier meeting and heightened everyone's general awareness of safety.

Symposium and Proceedings

Symposium attendance was less than half of what was anticipated. In hindsight several factors contributed to this limited turnout – most of which stem from an overconfident belief that Biomechanics Week would be able to replicate the demand enjoyed during the 2009 Trees & Risk symposium (the event sold out in five days after one email announcement). Like *Trees & Risk*, the program for *Biomechanics Week* was exceptionally strong, however, the timing (summer as opposed to winter), proximity to other events (ISA Annual Conference), and subject matter (abstract as opposed to applied) set the two meetings apart.

Beyond these difference,

Marketing efforts for the symposium were timed later in the summer to reduce competition with the ISA Conference. In addition, the registration price was set higher than *Trees & Risk*, to meet budgetary demands associated with the research week. These factors and the issues noted above worked against the plan to underwrite equipment and travel expenses with symposium revenue. However, the *Biomechanics Week* budget was set conservatively, initially offering partial travel reimbursement as opposed to full compensation. Variable costs, such as food and rental fees, were reined in to help close the gap between revenues and expenses. In addition, several partners stepped up and absorbed some additional costs. As such, the event remained successful on all accounts – scientifically, educationally, and financially.

Event summary articles are scheduled to begin showing up in *Arborist News* (a special biomechanics-themed issue is planned for February 2011), chapter newsletters, and related periodicals in the next few weeks and months; however, it will take some time for the actual research results to be analyzed and interpreted. Once ready, many of the works may be included in a special biomechanics issue of *Arboriculture & Urban Forestry* that has tentatively been added to the production schedule. Other research findings may end up elsewhere as several attendees had backgrounds outside of arboriculture and urban forestry and may submit their work to journals more closely aligned with their respective fields. This will help promote ISA, the TREE Fund, and our other partners to a wider range of closely-related academic disciplines. The work completed at *Biomechanics Week* is tied to at least one undergraduate thesis, one master's thesis, and two doctoral dissertations. The experiences gained in Ohio will have a significant impact on the academic and professional careers of those students directly linked to this work.

Conclusion

Biomechanics Week has been heralded as a tremendous success by participating researchers, climbers, attendees, and volunteers. However, beyond simply reiterating earlier displays of general enthusiasm and backslapping, this concluding section will use the original project goals as metrics for gauging the effectiveness of this event.

Support meaningful research in the field of biomechanics: Of the 24 projects originally proposed, 17 were successfully completed. While site (trees) and time constraints ultimately limited the number of studies conducted, the end result is still quite impressive. In addition to the 17 studies which took place during the week, several projects will carry over or spin off as new studies for *Biomechanics Week 2013*. The support and facilities provided undoubtedly contributed to this exceptionally efficient use of resources.

In addition to saving time, *Biomechanics Week* also resulted in a tremendous cost savings. Buying food in bulk, blocking hotel rooms, carpooling, and continuously running equipment to support multiple projects helped create efficiencies that stretched limited budget dollars. To put this savings into perspective, the total *Biomechanics Week* budget (approximately \$48,000) would partially fund five research projects through a \$10,000 seed grant or potentially support two longer term projects with a larger \$25,000 grant. In addition to the supported research, *Biomechanics Week* funding also provided a public symposium for local arborists and will be used to create a video proceedings that will be available to a broader biomechanically-inclined arborist population.

Encourage collaboration with participants both at the site and afterwards: Several of the research teams presented proposals specifically designed to allow for collaboration with other submitting

groups. However, the off-the-cuff collaboration envisioned (e.g. coming up with new research questions, identifying new methods for answering questions, creating a common measurement for tree stability) failed to materialize as expected.

The lending of gear and equipments served as one notable exception to this trend. Ken James spent the latter part of his week moving from site to site, hooking up his strain gauges to trees instrumented with other researcher's equipment. In addition, one Norway spruce (*Picea abies*) was rigged up with instrumentation from numerous teams before it was pulled to failure. It will be very interesting to see what comes of this data.

While spontaneous collaboration during *Biomechanics Week* was limited, we are already hearing accounts of researchers looking to work with the Davey Research Institute and others on future projects. This supports the assumption that most teams had fully committed to their proposed projects early on in the planning process and unwilling to deviate from their plans by the time any meaningful inter-team communications were made.

Allow participants to learn new techniques and test out new equipment that will enhance their future research efforts: Several attendees commented that one of the draws of *Biomechanics Week* was its potential as a "gear fest." In addition to seeing different probes, gauges, and sensors, many participants were exposed to winches and air excavation equipment that they had not used prior. In this regard, *Biomechanics Week* was a success. Teams borrowed equipment freely and were given an opportunity see formal demonstrations throughout the week and during the field day.

Generate new ideas for biomechanics research: An ideas board posted in the main tent was largely ignored over the course of the week. However, there were several positive indications that new research ideas were formed at *Biomechanics Week*. Conversations at lunch and dinner often centered on past works and potential implications for future studies. This dialog dramatically increased once rumors of *Biomechanics Week* 2013 surfaced.

In addition to talk, several researchers actively prepared for future work on the site. Some marked trees they had worked on at this event in the hopes of visiting them again for follow-up studies. Others, quickly laid the groundwork treatments down for completely new scientific inquiries.

Although idea generation may not have occurred as originally intended (as an easily transcribed set of Post-it notes on a blank wall), it was definitely a major outcome of this event.

Give practicing arborists an opportunity to conduct research with industry experts: As a first attempt transdisciplinary research (research which includes academics and non-academics from a variety of disciplines), *Biomechanics Week* went above all expectations. Researchers and climber technicians formed excellent working relationships and were often seen conversing at meals and during free time. Climbers allowed researchers to apply treatments that they may not have been able to do otherwise. Researchers provided climber technicians with insights into the scientific method. Over the course of the week, a sense of mutual respect emerged for the skills, knowledge, professional perspectives each of these two groups provided.

Allow the general public to visit the research site and learn from participating researchers: Numerous individuals have come forward to express their gratitude for being able to attend the *Biomechanics*

Week Symposium. As with the week as a whole, arborists and researchers were able to intermix during a reception and lunch. This made created a comfortable learning environment that fostered questions and speaker-audience interaction.

Both presenters and attendees found the field demonstrations exceptionally valuable. While limited to just 10 minutes per research plot, the researchers were able to show much more than could be conveyed through a slide show twice as long. These demonstrations really made the research “come alive” to the audience.

At least one potential collaboration has spurred from the symposium itself. One attendee represented the Royal Botanical Garden's in Hamilton, Ontario. She is communicating with two presenters from that province regarding the use of trees at the garden to help replicate their work in Ohio.

Generate key research “deliverables”: A DVD-proceedings is in production and will serve to preserve the activities, talks, and research conducted during *Biomechanics Week*. This proceedings will feature video recordings of the symposium talks and copies of the presentation slide in pdf format. Images, video clips, and other extras from the week will be included as well.

To highlight their contributions to *Biomechanics Week* and promote the proceedings, the Davey Tree Expert Company has posted a summary of the event, blog, and photo album on their website. Once videos have been edited, teaser clips from each of the talks will be posted.

An article writing campaign has already begun to capture the various participant perspectives associated with *Biomechanics Week*. Local volunteers, researchers, climbers, TREE Fund Board Members, and other partner representatives are all contributing to this effort. Many of the articles will find a home in a February 2011 biomechanics-themed *Arborist News*. Other articles will be distributed to chapter newsletters, *ISA Today*, and other media outlets.

While it will be some time before any research findings make their way into the academic press, there are already plans for a biomechanics edition of *Arboriculture & Urban Forestry*. This will be an excellent outlet for full length manuscripts and research more suited for a short communication (i.e. exploratory projects developing novel research methods or lacking sufficient replication).