Dendroecology Fieldweek Summary Report

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GENERAL COMMENTS

The fieldweek was well organized and an enjoyable program, and I feel both Paul Krusic and Ken Kimball should be congratulated on job well done. The opportunity to work and interact with a diverse group of forest scientists was a pleasant and exciting experience. From the standpoint of an instructor, the planning and implementation of field sampling and laboratory work was as good as could be expected under the circumstances. The difficulties I encountered in implementing my research project were primarily due to the over-ambitious goals I brought to the exercise. My only substantive reservation about the fieldweek program is that the abbreviated nature of the program precluded sufficient discussion and practice of data quality assurance protocols (crossdating, core remeasurements). We were all so rushed to produce results for the poster that I felt quality assurance procedures were neglected. My concern is that the participants now know enough dendrochronology to get into trouble, but not quite enough to avoid or repair problems. My recommendation is that future fieldweeks might reduce the number of presentations and field excursions that are peripheral to dendrochronology and increase the time spent on the various field projects. Alternatively, the fieldweek could be extended to two weeks. I realize this may be more ambitious than many would like, but I think that it is important to get across the fundamental, necessary information for implementing good dendrochronological studies.

FIELDWEEK PROJECT SUMMARY

Title: Analysis of Growth of Young Red Spruce On Mt. Washington, N.H.

Participants: David LeBlanc (Leader)
Mark Bakeman (SUNY Syracuse Coll. Env. Sci. & For.)
Jeff Gove (USDA For. Ser., Durham NH)
Walter Winturri (USDA For. Ser., Gorham NH)
Reiner Worbes (Fed. Rep. Germany)
Yude Pan (SUNY Syracuse Coll. Env. Sci. & For.)

Project Goals

(1) To explore the relationship between radial growth decline in young red spruce (DBH < 15 cm) and exposure to the atmosphere (i.e., % of live crown that is within an opening in the canopy). This exercise attempted to test the hypothesis that young trees exposed to the atmosphere are more likely to exhibit growth decline because the negative influences of atmospheric stresses outweigh the advantages of competitive release.

(2) To introduce the students to various aspects of tree growth by performing detailed stem analysis on a single young red spruce. This exercise was intended to show the students that the selection of a particular growth index may affect the interpretation of historical tree growth patterns.

Methods

(1) Ten young, dominant/codominant red spruce (5 < DBH < 15) were cored at each of three locations (elevations) on the west site of Mt. Washington (approx. 1100, 900, and 800 m). At each location, 5 trees had < 25% of their crown directly exposed to the atmosphere, and 5 trees had > 25% crown exposure.

(2) In addition to obtaining one increment core, each tree was measured for DBH, and total height (using a height measuring pole). Other data collected on each tree included: % fine-twig dieback, % crown exposed to open sky vertically, and % crown exposed to open sky laterally.

(3) Increment cores were used to determine the year of release and sapling DBH at the time of release (the latter was used to estimate sapling height at release using a DBH-height regression equation for suppressed red spruce saplings on Whiteface Mountain, New York).

(4) Using increment core estimates of year of release and height at release and the measured total height in 1990, mean annual height increment since release was computed for each tree. This was the growth parameter of interest for the study of effect of exposure to atmospheric stress.

(5) Mean annual height growth was compared between trees from open vs. closed canopy stands at each of three elevations.

(6) A single red spruce was harvested and the entire stem returned to the Pinkham Notch lodge for detailed stem analysis.

(a) From the apex down, each node (identified by branches and budscale scars) was marked. When nodes could no longer be identified along the lower stem, the stem was marked in 15 cm intervals.

(b) a cross-section (disk) was cut from the middle of each internode and at each of the 15 cm interval marks

(c) ring counts were made on each disk to obtain a height-age curve, and ring widths were measured on one radius on every second disk to derive growth layer profiles and ring number sequences. Ring widths were measured on a disk cut at breast height to obtain the standard radial ring width sequence

(d) height-age and dbh-age curves were compared to demonstrate the differential effect of stand closure on radial and apical growth.

(e) growth layer profiles decadal years were compared to demonstrate ontogenetic trends in radial growth allocation along the stem.

(f) radial sequences from several positions along the stem were compared to demonstrate within-tree crossdating.

Results

(1) At two of three elevations (1100 and 800 m) young red spruce within a broken canopy exhibited diminished apical growth compared to trees within an intact canopy. Trees at the 900 m site were all located within a broken canopy, but the "protected" trees has only 1-4 neighboring trees. There was no difference between open grown and protected trees at this location. These preliminary results support the hypothesis that young, codominant red spruce growing within broken canopies resulting from substantial over story mortality do not grow as well as individuals growing within smaller canopy gaps.

(2) While the students learned much about the various aspects of tree growth from the stem analysis exercise, the particular tree that was analyzed was growing within an open stand and so the differential effects of competition on apical and radial growth were not apparent.

Conclusion

I feel the students learned much from the exercise, but would have learned more if they had been able to spend more time working with the samples and less time going to evening seminars. The goal of having the participants complete a research project from site selection and sampling through measurement and analysis to final poster presentation is a worthy one, but to insure learning of basic dendrochronology concepts and procedures more time must be allocated to the project. The participants felt pressure to complete the analysis and produce a poster, and this resulted in hurried and often shoddy sample preparation, measurement, and analysis. This may in part be due to overly ambitious projects defined by the group leaders. However, to do a project that is both interesting and instructional I feel it is necessary to have more than one and a half field days and a couple days in the lab. We managed to squeeze it all in and produce some interesting posters. However, I feel the instruction part of the fieldweek suffered from the lack of time to go over data quality assurance procedures and basic dendrochronology concepts.

Suggestions For Future Fieldweeks

(1) Focus more on instruction and research and less on recreational activities. If people want to hike or see the sights, they can arrange to do this before or after the fieldweek. Evening lectures should be focused on the subject at hand (dendrochronology) and kept to a minimum as they are very disruptive of any evening work sessions in the lab.

(2) The introductory field trip to acquaint participants with the local ecological situation is a great way to start the week.

(3) Organizers should arrange for group leaders to arrive a full 2 days before the participants so they can work together to select study sites and integrate projects.

(4) The organizers selected a beautiful location for the first fieldweek, and I strongly recommend that similar sites be selected for future fieldweeks. Many participants use vacation time to attend the fieldweek, and I feel more participants will be attracted if the location provides something of a vacation atmosphere.

Final Comments

I feel that the fieldweek concept is a good one and thoroughly enjoyed participating in the first implementation in the U.S. I would be willing to participate and assist in the organization of future fieldweeks.