

NEXT-GEN POPLARS PROJECT

Extension Program Evaluation

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Introduction

The Next-Gen Poplars project was a collaboration between University of Minnesota Extension (Extension) and the Natural Resources Research Institute University of Minnesota Duluth (NRRI). This project embedded an Extension staff member within NRRI's hybrid poplar research team with the goal to advance hybrid poplar utilization through education and other efforts to expand and strengthen a network of people who work with hybrid poplar. This report summarizes our activities, what we accomplished, and what we learned.

Network Weaving

An initial network analysis survey identified a network of 33 connected individuals working with hybrid poplars, in some capacity, as a baseline. We expanded this network to 86 people through network weaving, a process by which we intentionally add new members and strengthen key relationships in the network to improve capacity for utilization of hybrid poplar. We did this by facilitating conversations and meetings, and by creating opportunities for relationship-building within our educational programming. We communicated with Network Members and other interested

individuals through a project website and emails to address specific comments or concerns. We responsively made critical connections that were unanticipated at the beginning of the project, such as inviting a well-connected Department of Natural Resources Timber Utilization Consultant to collaborate in our programming, working with tree nurseries to grow hybrid poplar, and discovering large U.S. carbon market projects utilizing *Populus* spp.

Responsive Extension Education

The purpose of Extension education within the project was two-fold: to disseminate research and commercialization knowledge to the network, and to facilitate relationship-building within the network. The primary channels for education were webinars, workshops, and collaborative learning sessions. Rather than having predetermined educational plans, content, or targeting predefined audiences, our goal was to develop an adaptive structure that would allow us to responsively flex and adapt our plans to suit the network's need for information.

Webinars and Workshops

- Twenty-seven online webinars and in-person workshops were held.
- Total attendance at these events was 1,047.
- Topics that generated the largest attendance were phytotechnologies and wood products.
- Most attendees (55%) identified themselves as having a research and development role, though this role as a percentage of attendees across all events ranged widely from 21%-100%.

- Evaluation surveys were administered after most educational events. Survey results showed strong behavioral impacts; when asked about planned actions after event participation:
 - 66% planned to contact someone they met to ask more questions.
 - 55% planned to contact someone they met to discuss collaborating.
 - 85% planned to talk about or teach others what they learned.
- Survey results also showed strong knowledge gains and application of information (Table 1).

Table 1: Percent of positive responses to core Extension survey questions.

| Question | Percent of respondents with a positive answer (higher than neutral) |
|---|---|
| To what extent do you agree the(se) speaker(s) provided you with a deeper understanding of (TOPIC) | 100% |
| To what extent do you generally feel you have situations in which you can use what you learned in the tour/webinar? | 92% |
| To what extent will you do something new or different based on what you learned in the tour/webinar? | 77% |

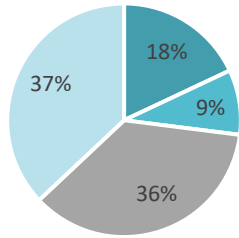
Short Rotation Woody Crops Virtual Conference

The pandemic shifted workshops and events to a virtual format in 2020, and we were able to pivot quickly because of our responsive Extension approach. When the 2020 International Short Rotation Woody Crops Conference was postponed, the organizers

partnered with our Extension team to create a virtual conference that began in August and ended in December. We facilitated five monthly webinars and five regional updates. A conference evaluation survey was administered in December 2020.

- Average attendance at the 10 sessions was 36 (minimum 29; maximum 43).
- Sixty percent of attendees identified themselves as having a research and development role.
- Survey results indicated that communication, networking, and collaboration increased because of the virtual conference. As an example, see Figure 1, which shows that 63% of respondents planned to begin a new collaboration because of conference participation.
- The conference benefitted our project team through new national and international connections, important learnings from regional SRWC updates, and an opportunity to share learnings from our research and outreach activities.

Contacting Someone to Begin Collaborating



- I am already taking this action.
- Yes. I plan to take this action in the next 1-6 months.
- Yes. I plan to take this action in the next 1-2 years.
- No. I do not plan to take this action.

Fig. 1: Responses to this post-SRWC survey question: “I plan to call or email someone I met during a webinar to begin collaborating.”

Collaborative Learning

Extension convened three online collaborative learning sessions with NRRI researchers and other stakeholders to explore the limits and barriers to the planting, management, and use of hybrid poplar. Collaborative learning is an educational technique that facilitates the active sharing of knowledge and experience between participants. Thirty-one people participated in one or more of the three collaborative learning sessions that were held in March 2020. The process engaged practitioners and researchers, building connections that otherwise would not have been made. This approach generated new knowledge and understanding that resulted in an action plan for Extension and NRRI researchers.

Final Project Evaluation

Thirty people completed a final project evaluation survey that was sent out in December 2021. The purpose of the survey was to gather information about the impacts of our work and to test our assumptions about what we feel we learned through the project.

- Responses showed strong results for learning, behavior change, and increases in network connections built.
- Results showed a positive shift in participants’ perceptions of the business potential to use hybrid poplar as a raw material for energy and other bioproducts. There was a 25% increase from a survey at the beginning of the project (41 responses) to the final project evaluation survey (30 responses). See Figure 2.
- Seventy-four percent of final project survey respondents agreed that participating in this project contributed to changing their perceptions of the business potential of hybrid poplar.

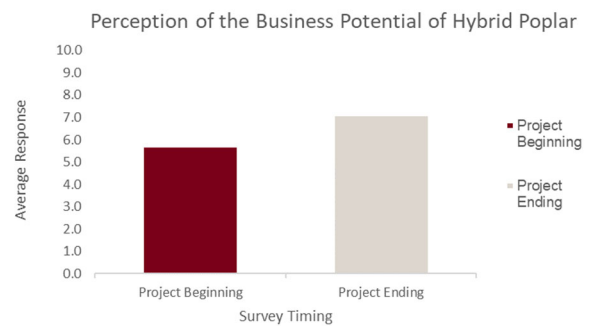


Fig. 2: Perceptions of the business potential of hybrid poplar increased from 5.7 to 7.1 on a 10-point scale.

- In the survey we asked for levels of agreement with a list of six assumptions that we had developed through our work

on this project. There was strong agreement by respondents about Extension's role in the advancement of hybrid poplar:

- Significant advancement towards large scale use of hybrid poplar can only happen through active networks of people (i.e. researchers, growers, end-users) working together to solve complex problems.
- The most important role Extension can play to support the use of hybrid poplar is to help people establish connections with others to solve complex problems.
- Another important role for Extension is to help the public overcome misconceptions about hybrid poplar that create opposition to large-scale plantations.

Eighty-nine percent of 30 survey respondents agreed or highly-agreed with these statements, which validated these assumptions. This supports our contention that the adaptive Extension learning model developed as a part of this project has credibility in helping us hone our role in advancing hybrid poplar utilization, as well as applicability to other complex supply-chain issues.

Adaptive Extension Learning Model

Through our work on this project, Extension developed an adaptive learning model that we named the *Social Ecological Innovation in Action Model*. See Figure 3. This model assumes that advancing hybrid poplar utilization is a complex problem, and that we did not necessarily know the best way forward to build a hybrid poplar supply

chain. Therefore, we intentionally treated our programming theories as open for improvement, and used strategies that helped us to continually improve our approach.

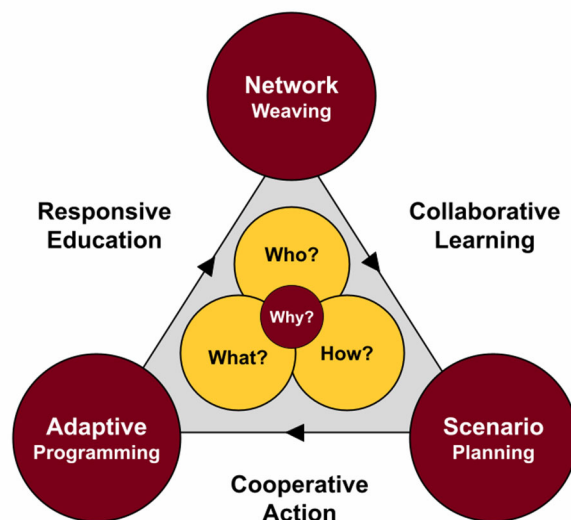


Fig. 3: A graphic illustration of the Social Ecological Innovation in Action Model. To address a complex problem, we kept our programming theories about target audiences, desired changes, and education strategies as open to improvement. We used collaborative learning, cooperative action, and responsive education strategies to be more responsive to needs and opportunities for Extension as these arose.

InnovaTree™ Commercialization

In response to our collaborative learning feedback, Extension partnered with NRRRI researchers to begin the commercialization of NRRRI's top geo-robust hybrid poplar clone, named InnovaTree™. This "cottonless" male tree is fast-growing and disease-resistant. In Minnesota field trials its volume growth was 64% faster than commercial standards NM6 and DN5, and 93% faster than commercial standard DN34. It is now registered with the International Commission on Poplars and Other Fast-Growing Trees (IPC), and a U.S. plant patent application will be submitted soon. Five Midwestern U.S. tree nurseries are

currently evaluating it for potential commercial sale.



One of the authors (Jeff) growing hybrid poplar in the NRRI greenhouse.

Other Impacts

There were several other notable impacts from Extension's work on this project. Perhaps the most important is that working together with other hybrid poplar network members, we built connections with both nurseries interested in growing hybrid poplar and 12 private companies exploring different end-uses. These types of connections are critical to the commercialization and advancement of hybrid poplar. The quote below from Darrel Fry, CEO of Advanced Biocarbon 3d, shows the depth of this impact:

"I feel very thankful for the service and education that Jeff and his team have provided with their series of seminars. Because of their impactful topics and the resulting networking opportunities ABC has hired world class expertise in the field of phytoremediation and created an entire new division of our company that utilizes hybrid poplars to address environmental challenges while supplying biomass for our biorefinery process that converts wood into sustainable plastics."

Next Steps

Though we are wrapping up this phase of the project, U of M Extension and NRRI will continue to work to advance the use of hybrid poplar as well as expanding to collaborate on advancing other promising forest bioproducts. As we develop plans for the next phase, we will keep our project website active and updated:

<https://sites.google.com/umn.edu/hybrid-poplar>.

Thank you for your support of this project. We are grateful for new friends and new partnerships, as we work together to advance the use of hybrid poplar.

Acknowledgement

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