

RES-FOR HIGHLIGHT #4

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Perceived Risks of Genomic Selection Among Forestry Stakeholders

Overview

Controversies surrounding new technologies can often be attributed in part to differing perceptions of the risks and benefits posed by those technologies. A better understanding of perceived risks associated with new technologies prior to implementation can offer managers and decision-makers important information that can be used in planning and communication. While the perceived risks of biotechnologies in agriculture have been the subject of extensive research, reactions to technologies introduced into the forest sector have received less attention. Recently however, researchers have also been exploring the use of genomic tools such as genomic selection in tree breeding. These tools would provide breeders with more information to select desirable traits, provide a more thorough understanding of a trees underlying genome, and in doing so, potentially increase the rate of tree selection compared to current breeding strategies. Because forests support multiple public uses and values, understanding stakeholder perceptions of genomic selection in tree breeding is essential for technology adoption and decision-making.

Methods

This pilot study presents one of the first assessments of stakeholder attitudes toward genomic selection or genomics assisted tree breeding in forestry. Due to the lack of previous research, and the relatively low level of public knowledge regarding this technology, we adopted a qualitative methodology approach. This method allows for identification of the underlying values and levels of understanding that influence perceptions and attitudes. We focused on forest stakeholders, based on the supposition that they would be most likely to be informed, and interested, in the topic (see Table 1 for sample description). Interview participants either worked in the forestry sector (both government & industry) or were involved in a recreational group. An initial list of participants was gathered from the Foothills Research Institute, and additional participants were selected via 'snowball sampling', in which interview participants suggested additional potential interviewees. All participants were first contacted through email, and were offered \$20. Most interviews were audio recorded and conducted in person, although some took place by phone. Each interview was transcribed and imported into a qualitative software program for analysis. Stakeholders were asked how knowledgeable they thought they were and to describe what they thought genomic selection and tree breeding entailed. In each interview, a script was read providing an overview of genomic selection which highlighted potential benefits.

Research Goal

The goals of this research were to understand the attitudes and concerns that forest stakeholders may hold regarding the use of genomic assisted tree breeding, in order to inform planning and management decision-making in a manner that would minimize the potential for conflict, and meet the expectations of stakeholders.

Research Questions

1. What is the relative awareness of tree breeding efforts and genomic selection among those working in the forestry sector and recreational stakeholders living in forest-based rural communities?
2. What are the risks that various stakeholders associate with genomic selection in forestry?

Overview of Sample

Table 1: Overview of Sample Demographics

Location	Number of Participants	Stakeholder Type			Age Class			Gender	
		Forestry Sector ¹	Recreational Group ² + Forestry	Recreational Group ²	<40	40-60	>60	Male	Female
Edmonton	4	4				4		3	1
Hinton	8	5	2	1	2	4	2	5	3
Whitecourt	11	7	3	1	2	8	1	8	3

1. Including ecologists, forest health officers, contractors, and foresters (assistant, planning, operations, silviculture).

2. Recreational users were members of at least one of the following groups: Whitecourt Trailblazers, Whitecourt Fish and Game Association, Hinton Mountain Bike Association, Hinton Nordic Ski Club, and the Hinton ATV Society.

Main Findings

1. Participants were all fairly aware, supportive, and confident they could describe tree breeding. However, stakeholders had many different understandings of what tree breeding actually entails. Participants were less aware and less certain they could describe genomic selection.
2. Some risk characteristics that were most prominent included: uncontrollability of potential outcomes, in-equitability in distribution of benefits, delayed consequences, being unknown to science, and being unnatural.
3. Despite perceiving risks, few participants expressed outright rejection. As such, stakeholders expressed some acceptance of risk, and were supportive of a cautious approach to implementation.
4. Genomic selection was also perceived by respondents as potentially reducing biological diversity, which departs from claims made about this technology in some scientific literature. This presents one potential difference in how experts and stakeholders perceive risks.

Conclusions and Future Prospects

Not all participants were confident in the anticipated benefits of genomic selection, nor accepting of the perceived risks. Some concerns stemmed from participants' familiarity with forests as complex ecosystems, and with forestry's long rotation cycles. Overall, most interview participants expressed cautious support, and none expressed outright objection to genomic selection in tree breeding.

Implications for planning and management:

1. This research identifies a number of topics that warrant attention in stakeholder dialogues, such as the potential impact of genomic selection on biological and genetic diversity, and the current standards in place to maintain that diversity.
2. This research also indicates that stakeholders are not necessarily unwilling to accept risk. Meaningful discussions of uncertainty in current projections of intended and unintended outcomes are warranted.
3. More research is needed to include additional regions and stakeholder groups, and to assess shifts in views over time.

For more information on the RES-FOR project please contact:

Barb Thomas: bthomas@ualberta.ca or Stacy Bergheim: sberghei@ualberta.ca

For more information on this project please contact:

Anthony Fisher: aqfisher@ualberta.ca or Debra Davidson: debra.davidson@ualberta.ca

