



**Alberta
Barley**

Research Priorities

Updated February 9, 2022

Alberta Barley (AB) directors and delegates, and research committee members provided input on AB's research priorities, current investments and future needs to help direct the investment of producer dollars in future research initiatives. This process outlined overall research priorities, but also areas where AB is under invested and where future investments should be focused.

Between 2012 and 2021, AB invested \$3.74M in breeding (including general breeding and breeding for disease resistance), agronomy, and processing (Table 1). The high proportion of general breeding reflects investments in core breeding agreements with Agriculture and Agri-Food Canada and the University of Saskatchewan and historical investments at the Field Crop Development Centre in Lacombe, AB. Most participants felt that AB's total research budget is sufficient given other competing AB program priorities, such as policy, market development and member communications. However, it is possible that funds available for barley research may increase after the amalgamation with Alberta Wheat Commission.

Table 1. AB's Research Investments from 2012-2021.

Investment Category	AB Funding	Per cent of AB Research Investments
Agronomy	\$ 592,582.00	16%
Breeding for Disease	\$ 34,896.00	1%
General Breeding	\$ 3,098,353.46	83%
Processing	\$ 15,000.00	0%
Grand Total	\$ 3,740,831.00	100%

AB agreed to align their core research themes with the Canadian Barley Research Coalition's [National Barley Research Strategy](#), to provide coordination with national barley research in Canada.

Theme 1. Yield

Theme 2. Lodging

Theme 3. Barley Pests

Theme 4. Harvest and Post-Harvest Management

Theme 5. End use applications/opportunities

Theme 6. Sustainability



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This format for AB's research priorities is new. Some of AB's previous research priorities were very specific solutions to production challenges and this format supports funding of various tools to address these specific challenges and goals. A review of previous AB research priorities identified **lodging**, **resistant wild oat management** and **integrated maturity management** were the priority areas that still require continued investments. The top challenges for AB producers were identified as reduced government funding to research, concerns about farming with reduced access to fertilizer, and adapting production (varieties and agronomy) to withstand climate variability.

Since the contributions to yield is generally agreed to be 50% genetic and 50% agronomy, both are important areas to invest in. However, breeding research tends to be more expensive to conduct relative to agronomy research, due to the long-term nature of breeding programs. AB's directors and delegates indicated that future research investments should target **70% of the budget towards breeding** and **30% of the budget towards agronomy**. However, investing in projects with strong merit is far more important than meeting these budget targets.

Below are specific areas of research needed within each of these larger research themes. Only the top ranked specific areas are listed below.

Theme 1: Yield

Breeding

- a. Breeding for abiotic stress resistance
- b. Breeding for biotic stress resistance

Agronomy

- a. Agronomy to optimize seeding rates
- b. Seeding dates, including ultra early seeding

Note: Seeding rate research would include achieving reduced tillering to increase uniformity of dry down. Seeding rate research could also include reducing emergence mortality to achieve optimum plant stands.

Note: Integration of breeding and agronomy (GxExM) is important for abiotic and biotic stress management.

Theme 2: Lodging

- a. Breeding for improvements in stem strength and root anchorage
- b. Lodging management with N fertilizer rates and timings
- c. GxExM to managing lodging including PGRs

Theme 3: Barley Pests

Weeds

- a. Resistant weed management, with a large focus on resistant wild oats
- b. Strategies to increase crop competitiveness

Note: Top weeds of concern were: resistant wild oats and kochia.



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Note: Fewer herbicide options for barley vs. wheat was noted. It was specifically mentioned that only group 1 wild oat herbicides are available for use in barley (i.e. no group 2 wild oat herbicides are available for use in barley, with Assert® being taken off the market), which makes it challenging to control group 1 resistant wild oats.

Disease

- a. Disease forecasting systems
- b. Fungicide decision making tools

Note: The overlap of these disease research priorities with extension priorities were discussed. However, there is not sufficient research to develop reliable disease forecasting systems/decision making tools. This research would have to be completed first so that a disease forecasting tool/decision making tool could be extended to growers.

Note: Testing of biological products was discussed, but there was no consensus to invest or not invest in product testing or pre-commercialization vs post-commercialization research. Plot2Farm may be a platform for some product testing. With the limited AB research budget for agronomy, and the lack of consensus on this area of research, testing biologicals cannot be justified as an AB research priority. However, if other groups were able to fund research on the efficacy of biologicals, AB would support this work in concept as the information would be highly valuable to barley producers.

Insects

- a. Barley specific economic thresholds for pests like grasshoppers, cutworms, etc.
- b. Short term forecasting tools – i.e. risk maps

Note: Weeds were identified as the top barley pest followed by disease and insects were of least importance.

Theme 4: Harvest and Post-Harvest Management

- a. Breeding for head retention
- b. Breeding to prevent pre-harvest sprouting
- c. Breeding short season varieties

Note: Improvements in head retention are important for rotational considerations, as wheat seeded after a barley crop can have significant volunteer barley plants in the following wheat crop. Head retention is also important for expanding the harvest window for barley.

Note: Discussion followed about the possibility for short-season barley varieties to facilitate seeding winter wheat. However, the concerns with volunteer barley in the following winter wheat crop were once again noted, unless the barley volunteers could be fall germinated, and killed over winter.



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Theme 5: End use applications/opportunities

- a. Breed barley varieties for livestock, pet food and food barley, possibly hulless barley if the yields could be increased to be competitive with hulled barley varieties or higher prices to off-set the lower yields
- b. Feed efficiency for cattle
- c. Malting and brewing end use

Note: For Theme 5a and 5b, it is helpful to consider parallel priorities from the Canadian Beef Research & Technology Transfer 2021-2026 Strategy as cattle feed is a major market for barley. The strategy indicated Feed Efficiency and Utilization, Outcome 1: Improved feed grain and silage yields through plant breeding, agronomic practices and harvest strategies. The research priorities include “Develop new, high yielding feed grain and silage varieties with superior agronomic performance and nutritional quality” and “Investigating agronomic, harvest and ensiling practices to optimize feed and silage yield, nutritional quality and animal health and performance.” It was also noted that forage barley acres are being lost to soft white wheat and corn.

Theme 6: Sustainability

Fertility

- a. 4R Management, N Forms (i.e., enhanced efficiency fertilizers (EEFs) and economics of EEFs)
- b. 4R Management, N Rates including optimal rates for various growing regions and soil types
- c. 4R Management, N Timing

System Health

- a. Crop rotations
- b. Increased crop-livestock integration
- c. Maintaining and managing soil organic matter

Note: Soil Health was discussed as a possible research priority. However, Soil Health is incredibly difficult to define. As such, AB research investments in this area will be focused on factors like maintaining and managing soil organic matter.

Note: The group discussed AB investments in variable rate (VR) and the impact of VR’s impact on profitability. There may be a role for producer funds to validate the profitability of this technology, but it is also a space where other groups are working, and AB cannot afford to duplicate efforts given our limited research budget.

Note: The importance of split N applications as a risk management tool was discussed. Previous research in this area has been conducted in wheat, but not barley. Research in wheat showed little economic benefit; however, this could be an important risk management tool when dry conditions exist at seeding and fertilizer prices are exceptionally high.



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Disclaimer

It is worthwhile to note, that like all things, there is bias in these priorities. This can come from the geographic distribution of directors and delegates and the policy issues of the day. AB staff will use these priorities as a guideline when working with scientists to develop research proposals, but it is not an exclusive list.