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# The Work of the Barley Improvement Institute in Canada

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## INTRODUCTION

The Barley Improvement Institute is the medium through which the Malting and Brewing Industries in Canada are assisting in the improvement of agronomic characteristics and malting properties of barley.

Incorporated in May 1948, its offices are located in the center of the country, in Winnipeg, Manitoba. It is controlled by a Board of Directors, representing the sponsoring industries, and administered by an independent Director in Winnipeg.

The Institute aims at barley improvement through research and informative publicity. Publications dealing with agricultural problems are sent out to farmers for their guidance and research is aided by financial grants to Universities, by scholarships and by a laboratory to service plant breeding projects. The Institute also has over-all control of the National Barley Contest which was started after the war as an emergency action in an attempt to improve the quality of barley, which had deteriorated badly during the period 1939-45.

## THE NATIONAL BARLEY CONTEST

This Contest is held annually and is entered by over a thousand farmers in the six barley growing provinces. It is a cooperative project including most of the organizations interested in barley improvement. The prizes for winning entries are drawn from funds provided by the Malting and Brewing Industries, who also finance publicity and administration. The Provincial Department of Agriculture and Provincial Universities publicize the contest and receive applications. The Malsters, through their Field Services encourage growers to enter. The Dominion Department of Agriculture through its Plant Products Division collects and grades all seed samples. The Board of Grain Commissioners, through its Grain Inspection Branch, collects, cleans, pearls and grades according to the official Canadian Government grading system, all commercial samples. The Country Elevator organizations, through their operators, publicize the contest, ship the cars and collect and ship display samples. The Line Elevator Farm Service, through its Seed Testing Laboratory, makes germination tests on all qualifying samples. The Exhibition and Fair Boards show displays of prize winning samples and the provincial brewers organize functions for presentation of prizes and Awards of Merit.

Whilst called the National Barley Contest, the competition is, in practice, due to two different agricultural systems, divided into two regions: Eastern and Western. In the Eastern Division, consisting of the provinces of Ontario and Quebec, the contestant must plant at least five acres and harvest and prepare as seed at least forty bushels. In the Western Division, comprising Manitoba, Saskatchewan, Alberta and part of British Columbia and where over 90 percent of Canadian malting barley is produced, forty acres of an approved variety are required and the contestant must ship at least one minimum carload, (1667 bushels).

The provinces are sub-divided into regions and prizes are awarded on a regional, provincial and divisional basis.

The Contest originated in 1946, the idea of Mr. F. L. Jeekell, General Manager of the Dominion Brewers Association. During the war, government control on grain prices had set only one ceiling price for barley, regardless of quality. The wartime demand for feed barley was very great and soon all barley was selling at the ceiling price and drifting into the feed category, leaving very little

in the higher malting grades. This made no difference to the farmer who received the same price regardless of the grading his barley had, but the brewing and malting industries became greatly concerned with the deterioration in quality. By 1945, it appeared, the percentage malting grades in barley marketed in Canada had fallen to 2.5 from a pre-war high of 60. This situation was discussed at a conference where it was agreed that such an alarming position needed immediate remedy and, as one method likely to help rapidly, the contest was inaugurated.

It, along with a post-war spread in price between malting and feed grades of barley, has resulted in a marked increase in quality. The extent of this improvement is such that the amount of good malting barley in the 1949-50 crop year is expected to be about 42 percent.

The contest has also been largely responsible for the distribution of a recently released variety, Montcalm.

#### SITUATION IN 1947

It was noticed that whilst the contest was achieving some improvement in its first year or so, it could at the best go only so far since it improved only existing varieties and methods and, therefore, the necessity for new varieties and new scientific agricultural methods was realized.

Barley is the third largest crop produced in Canada, but it was, however, the poorest serviced. Only two malting varieties have been developed and licensed since O.A.C. 21 was distributed in the beginning of the century. These two, Olli and Montcalm, were produced within the last 25 years, whilst some 20 feed varieties have been introduced or developed.

Plant breeding work had been going on, but there was always the difficulty of financial support, particularly in the Universities. The workers had such limited appropriations for their projects that, especially during the depression years, they considered abandoning them. Industrial and grain trade grants later helped, but still no long term program could be properly planned.

A report was prepared by Professor T. J. Harrison, with these ideas in mind; if more money was available for barley improvement and if it could be assured for a definite period there was every possibility that better varieties would be developed. The report further suggested that these would lead to more permanent improvement than the contest and, further, that other channels of barley improvement could be explored and the whole project put under the control of one central body.

Considerable discussion followed with the two interested industries, and finally it was agreed to set up an organization to be known as the Barley Improvement Institute with a very definite program and the objective of improving the agronomic quality of malting barley. This Institute received its charter from the Secretary of State in May 1948 and began its task immediately, equipped with funds for five years of operations.

#### BARLEY IMPROVEMENT

The Plant breeders were immediately guaranteed a given amount of money for the period of the Institute's operation. The grants do not entirely finance plant breeding projects, but give just enough added assistance to induce the universities to give barley a prominent place in their crop breeding programs.

Another problem was that any scheme for research must have operating personnel and in Canada there is a shortage of trained men, specialising in barley. To attempt to overcome this deficiency, grants were provided for scholarships at a post-graduate level for studies in barley breeding and barley genetics and lately in barley biochemistry. Several of these have already been awarded to recommended students. Another of the Institute's primary efforts was in the establishment of a laboratory to test hybrids grown by the Plant Breeders. The initial research and plant breeding projects having been launched, attention was paid to agronomic improvement.

The Institute set up a program of Extension, designed to bring the informa-

tion of science to the producer, and has distributed bulletins and booklets written by expert authors on existing field problems such as threshing, chemical weed control, harvesting, seed treatment, barley varieties, etc. By now, a large mailing list has been compiled and five to six thousand people receive this literature.

The Institute has also entered the field of seed improvement with the idea of increasing the quality and purity of seed. Seed improvement in Canada is not a new idea, there having been a seed improvement committee in Manitoba for the past sixteen years, and the idea taken up more recently by other provinces, but the Institute now works closely and in co-operation with these bodies. The program at present is largely concerned with hot water treatment for loose smut control of foundation and elite seed. A machine has recently been built in Saskatchewan for seed treatment to attempt to reduce the menace of loose smut and, it is hoped, to establish a smut free area.

#### RESEARCH ON BARLEY

On the subject of barley research it should be stated that the Institute's policy is not to encroach upon work already being carried out by other concerns but rather to assist and encourage by financial aid further and new research and development work. The assistance to plant breeders and scholarships for potential barley scientists are examples of this and now assistance is being given to Universities for special studies. Six Canadian Universities are being so helped at present and studies are being carried on in barley breeding and genetics at the Macdonald College of McGill University, at the Ontario Agricultural College of Toronto University and the Universities of Manitoba, Saskatchewan and Alberta. The University of British Columbia is at present engaged in a study on barley ecology.

#### TESTING OF PLANT BREEDING MATERIAL

In the search for new and better barley varieties large numbers of hybrids are grown and it is naturally of advantage to the plant breeder to have these tested as to the malting possibilities. Under the present research plan the number of samples for laboratory examination has grown considerably.

In the early days of this work, hybrids were tested and malted by Canada Malting Company. Later, prediction tests were developed by the Grain Research Laboratory as a time saving shortcut to determine a hybrid's potentiality, and it was thought that these tests could be carried out by the plant breeders. However, the work was actually done by the National Research Council and more recently by the Grain Research Laboratory. The latter is essentially a research institution and routine testing of new hybrids is not strictly one of its functions, so that only limited numbers of hybrids could be analysed and these only when they could be fitted in the regular research program. When the Institute was in its early stages it was suggested by Dr. J. A. Anderson and by the plant breeders that another laboratory to handle the increasing routine prediction tests would be essential.

Ultimately, a small, well equipped laboratory was established by the Institute, adjacent to its offices and designed specifically for its duty of routine prediction tests. The Institute's laboratory uses the analytical methods of, and works in close co-operation with, the Grain Research Laboratory.

Already several hundred hybrids have been tested and reported upon, and results show about 30 percent of them to be superior, from a prediction view, to the standard variety of malting barley, O.A.C. 21.

Prediction tests are very useful but not altogether sufficient and in the further stages of a hybrid's development, malting tests must be carried out. These, too, have been carried out in Canada for quite some time, first at the University of Manitoba's Agricultural College under the direction of Professor T. J. Harrison, then by the National Research Council and ultimately by the Grain Research Laboratory under the direction of Dr. W. O. S. Meredith. This summer the Institute's Laboratory is taking over the Grain Research Laboratory's malting equipment and will be doing most of the routine malting work, thereby fully servicing Canadian Plant Breeding projects.

It is possible that the Institute will not limit itself in the field of practical science to barley plant breeding tests, for the future holds the likelihood of the establishment of a Brewing Research Laboratory.

### CONCLUSION

The Institute relies firstly upon the Brewing and Malting Industries of Canada, its sponsors, for funds to carry on. It also depends upon Universities and Provincial Government Departments of Agriculture for assistance in showing where its Extension work may be best applied, upon the Grain Research Laboratory for technical co-operation and operational advice and finally upon an Advisory Committee. This committee consists of representatives of the malting and brewing industries, Government Departments of Agriculture, the Board of Grain Commissioners, the Department of Trade and Commerce and the Universities of the barley growing provinces, and meets annually to review the Institute's work and to advise, discuss and recommend upon future policy.

The Institute is a new organization dealing with one of man's oldest crops, different in many ways from its counterparts in the United States or in Britain and, therefore, typically Canadian, playing a decided role in Canada's progress.

It has now completed two of the five years originally planned, but it would seem there is sufficient work still to be done to warrant another five or ten years operation or even more. Its program of improvement is proceeding smoothly and surely; research, always a lengthy process, has been given a new and greater impetus. Barley science is being brought home to the farmer by publicity and he has been able to play an active part in the improvement plans. The contest, too, commands the interest of the growers, agriculturists, marketers and all connected with barley and the enthusiasm shown in it is an indication of the interest of everyone to work towards the common goal — better barley for Canada.

### DISCUSSION

MR. NELSON: What are the most common barleys used in Canada for malting?

MR. BENDELOW: OAC-21, Montcalm, predominantly Montcalm I would say, 70 per cent or more, and Olli.

MR. NELSON: Have you tried Kindred?

MR. BENDELOW: We have tried it.

MR. SIGAL: You say you make hybrid prediction tests. What tests do you run in the prediction of a hybrid?

MR. BENDELOW: Barley extract, protein, and the diastatic power of barley, in a prediction test. We compare the results from hybrids with the results obtained in the standard variety grown in the same location. OAC-21 is the official standard laid down by the Government. In other words, a hybrid must be at least equal to or better than OAC-21.