

# The Canadian Horticulturist

Vol. XXX

MAY, 1907

No. 5

## Improving and Originating Varieties of Apples

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SO much has been written of late regarding the need for improved varieties of almost every sort of cultivated plant that it will be unnecessary to devote any space at this time to a discussion of this phase of the subject. THE CANADIAN HORTICULTURIST has itself frequently urged the need for better sorts of orchard and garden fruits, and growers everywhere are constantly on the lookout for kinds better adapted to their particular conditions. I shall, therefore, proceed at once to a discussion of the control of the factors which make for improvement in varieties of apples.

The control of the varied agencies employed by the originator of improved races and varieties requires, first, an intimate knowledge of their nature, and, second, ability and method in their application. The first of these is by no means fully understood. The most learned men in botanical science are still struggling with the problems of variation and hereditary transmission of acquired characteristics, and so forth; and, until these secrets of plant life are actually laid bare, an absolutely definite system of breeding is not possible. But with regard to improved methods of applying such truths as we do know to the problems of breeding, much may be said of an exceedingly practical nature.

Method implies definiteness of purpose. Modern plant breeding is very largely characterized by definiteness of purpose, idealism in effect, for in no branch of art or science are ideals and unswerving adherence to them of greater importance in the attainment of success than in the improvement of plants. Methods depend upon purposes. The ideal in mind will decide the varieties to be used, the line of experiment and the standard by which the new productions will be tested.

The purpose of improving varieties of apples, summed up as briefly as possible, is to produce plants that are more *efficient* for specific uses and specific localities. Efficiency ideals may be thought of under the following headings: (1) yield ideals, (2) quality ideals, (3) seasonal ideals, (4) physical con-

formation ideals, (5) regional adaptation ideals (as to climate, soil, altitude, etc.), and (6) resistant ideals (as to insects and diseases). (Bailey, Proc. American Philosophical Society, Vol. 43, (1903), pp. 62-68.) The attainment of each of these ideals may require different methods of procedure. Each may under certain circumstances, assume paramount importance, or several of them may need to be considered in the course of one experiment. Moreover the breeder should endeavor to see that his ideals lie within the possible variability of the race, a matter which may

### Meets the Needs

I have observed with pleasure the many improvements in THE CANADIAN HORTICULTURIST during the past two years. It comes nearer to meeting the needs of the fruit grower and gardener than any other publication in America. May it continue to prosper.—C. D. Jarvis, B.S.A., Storrs Agricultural Experiment Station, Storrs, Connecticut.

of course, be difficult to judge accurately without definite experimental evidence. A very complete acquaintance with his varieties and species will, however, help the worker to mold his ideals correctly and save efforts which otherwise might be wasted in attempts to accomplish the impossible.

The writer knows of no new or magical principles in the improvement and origination of varieties of apples. Selection of natural variations, whether they be small or great (fluctuating variations or mutations), crossing and individuality of the plants themselves are the bases of the art. Orchardists generally have shrunk from attempts to develop tree fruits because of the time and room required to test seedlings. But a moment's consideration will show that the testing of seedlings on a large scale is an infinitely smaller problem than the solving of transit refrigeration for fruits, the control of insects and plant diseases

or the development, even, of power spraying, all of which are matters that the apple grower has attacked fearlessly and confidently. Success depended simply on the perfection of the methods applied in each particular instance. So, too, will the production of improved varieties of apples be made successful through the perfection of the methods applied.

It is manifestly impossible in an article of this kind to give detailed suggestions or directions for the conduction of experiments designed to originate new varieties to meet any considerable number of ideals. Hence, I shall take one example and supplement it with suggestions of a general nature for other lines of experiment.

The apple breeder is presumed to have supplied himself with the necessary collection of varieties, either on the premises where the experiments are to be conducted or within easy reach, and to have at his disposal a large number of orchards from which scions can be selected. In accordance with the principles already laid down, he outlines the ideal variety which he wishes to produce. To take an actual case, perhaps the most frequently expressed ideal of the American commercial apple orchardist is this, an apple of the size, color, hardness, productiveness, keeping and shipping qualities of Ben Davis or Baldwin, together with the flavor and dessert quality of Northern Spy, Spitzenburg or Fameuse. The tabulation on next page shows the breeder's outline. Each point referred to is given a certain valuation which represents the breeder's ideal in that regard; and by this standard, actually a score card in practice, his selections and crosses will be judged as they come into bearing.

It will be noted that this score card takes into account a great many of the characters desirable in apples. I have endeavored to have it cover all the points of *functional* importance, that is the points representing the *performance* of tree and the *value* of its fruit, and those only. This is immediately apparent in every instance under the heading, "Tree," except possibly the one defined as "Habit of growth."