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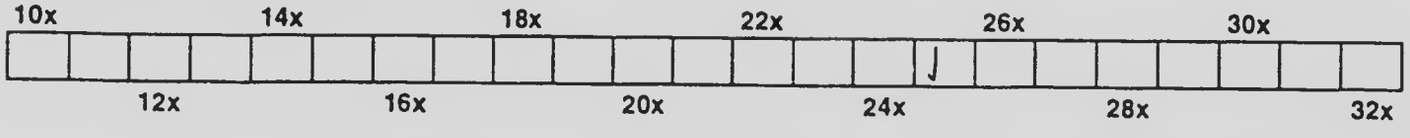

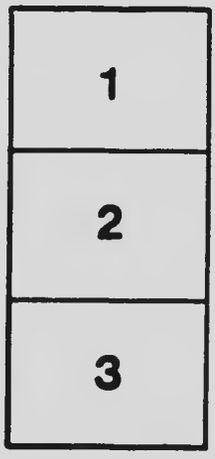

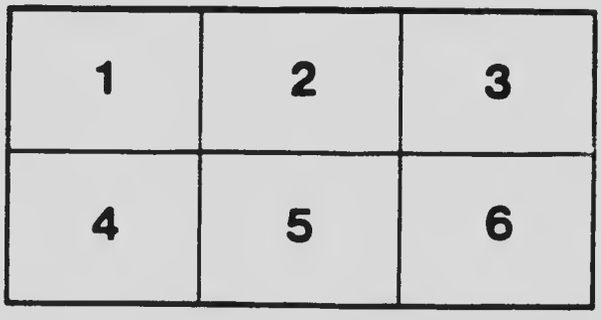

DEPARTMENT OF AGRICULTURE
COMMISSIONER'S BRANCH · · · SEED DIVISION

JAS. W. ROBERTSON,
Commissioner of Agriculture and Dairying

G. H. CLARK,
Chief of Seed Division

CONDITIONS OF THE TRADE

IN

TIMOTHY, ALSIKE AND RED CLOVER SEEDS

RESULTS OF INVESTIGATION

1902

BULLETIN No. 8—NEW SERIES

PUBLISHED BY DIRECTION OF THE HON. SYDNEY A. FISHER, MINISTER OF AGRICULTURE

DECEMBER 1902

OTTAWA, December 26, 1902.

To the Honourable the Minister of Agriculture.

SIR,—I beg to transmit herewith a Bulletin on the Condition of the Trade in Timothy, Alsike and Red Clover Seeds, which has been prepared by Mr. G. H. Clark, Chief of the Seed Division. The information which it presents must prove useful to the farmers of Canada. I recommend that it be printed for distribution.

I have the honour to be, sir,
Your obedient servant,

JAS. W. ROBERTSON,
Commissioner of Agriculture and Dairying.

DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE - - - COMMISSIONER'S BRANCH

SEED DIVISION

CONDITIONS OF THE TRADE

IN

TIMOTHY, ALSIKE AND RED CLOVER SEEDS

RESULTS OF INVESTIGATION, 1902.

Introduction.

Good seed is an important factor in the production of farm crops. The yearly rental of the land and the cost of preparing it for seeding, are many times greater than the cost of the seed; but, if only a small percentage of the seed be capable of germination, and that which is vital be not true to name, or if a large percentage of the seed consist of noxious impurities, the expense incurred may result in a complete loss, or worse still, in a positive injury.

The purpose of this bulletin is to call attention to the present condition of the trade in Timothy, Alsike and Red Clover seeds; to give the results of the analyses of several hundred samples of these seeds obtained from local dealers and other sources, in the spring of 1902; to present a summary of the methods of seed testing and seed control that have been adopted in other countries, and to publish other information which may be helpful to seed growers, seed merchants and seed consumers.

Source of Supply.

The greater part of the seed of Alsike and Red Clover sold in Canada is grown in Ontario. Timothy seed is produced in limited quantities in nearly all the provinces of Canada, but much of the best quality of Timothy seed on sale is grown in the Western States, and is obtained from Chicago and other western points. In general, Canadian grown Timothy seed contains a larger percentage of hulled seeds and weed seeds than imported stock.

Process of recleaning.—The larger seed firms have specially equipped machines for re-cleaning grass and clover seeds and a great deal of the seed they handle passes through these machines. The writer inspected one at work recleaning Alsike seed, from which six distinct grades were taken. About two-thirds of the seed which entered the hopper came out as "best re-cleaned" and was put in sacks for the export trade.

In this process of re cleaning considerable good seed is either fanned or screened out, together with the weed seeds, chaff, sand and other inert matter. These screenings, which contain a quantity of good seed, are usually mixed and again put through a cleaner fitted with less exacting screens. The lower grades of seed thus obtained are sold wholesale and are much in demand by local dealers.

In referring to the less progressive agricultural districts, where these screenings are sold, the manager of one of the largest Canadian seed firms remarked: 'Those people are a bonanza.' 'There is the dumping ground for our screenings, but we would rather sell them our best seed.'

Competition.—Competition in the seed trade has been, and still is, too largely confined to prices. For this condition the seedsmen are not wholly to blame. As long as farmers continue to demand cheap seeds, without regard to quality, worthless low grades will be offered. Competition among local dealers in towns and villages induces them to buy the cheaper grades of seed for their trade. They know that most farmers, like themselves, are incapable of estimating the real value of the sample or of detecting noxious impurities. There are few articles in the commerce of agriculture in which the real worth is so difficult to judge from appearance as grass, clover, and other small seeds. Fair competition in the trade in grass and clover seed is practically impossible except when they are sold according to fixed standards of quality or under a definite guarantee based upon a standard method of analysis.

Reputation of seed firms.—Seed firms, who have fitted their establishments with seed cleaning machinery seldom offer the lower grades and screenings of seeds in their retail trade. That would injure their reputation. Due credit has not been given to the enterprising and reliable seedsmen who have had so large a share in the development of Canadian agriculture. A competent seedsman, in addition to being a shrewd business man, must be a thorough agriculturist and be able to edit a catalogue that will not only represent his business, but also serve as a text book for the amateur florist, gardener, or even farmer. The business of reliable seedsmen is, however, brought into competition with less competent and less scrupulous merchants and local dealers. A great deal of the retail trade has gradually been passing from firms who devote all their attention to seeds, into the hands of men who have but a limited knowledge of seeds and whose main business is of an entirely different character.

In the older parts of Canada, farmers have an opportunity to get acquainted with the comparative reliability of the different seed firms; and in consequence, the businesses of the high class firms have been steadily developing while that of the firms of questionable reputation has been falling off with the better class of seed consumers. Similar results have occurred in the older and thickly populated European countries where seed firms are well distributed throughout agricultural districts. The business of some of the older seed firms in Great Britain is strictly confined to retail trade. It is reasonable to expect that in the development of the seed trade in Canada conditions would become properly adjusted to the carrying of it on in such a way, as to supply the farmers with pure sound seed and to leave fair profits for all engaged in it.

About Guarantee.—Canadian seedsmen make use of a non warranty clause which is usually printed in their catalogues, in their blank order sheets, and attached to or enclosed with shipments of seed. These non-warranty clauses vary slightly, but they are all intended to shield the vendor from responsibility. Samples of these non-warranty clauses are herewith given:—

"*Conditions of Sale.*—We take every precaution to supply reliable seeds, but give no warranty, expressed or implied, as to description, quality, growth, productiveness, or any other matter of any seeds we send out, and we wish it to be distinctly understood that we will not be in any way liable for any loss arising from any failure thereof or responsible in any way for the crops. All goods bought from us must be accepted on these conditions."

Usual Warranting.—We give no warranty, expressed or implied, as to the description, quality, productiveness, or any other matter of any seeds, bulbs or plants we send out, and will not in any way be responsible for the crops. If the purchaser does not accept the goods on these terms they are at once to be returned."

Canadian seedsmen claim that it is necessary to protect themselves by inserting such a clause, because the seed they sell is seed which they have purchased and with which they receive no guarantee regarding its genuineness, purity, or vitality. Again it is claimed by some seedsmen that purchasers of seeds might make claims for damages because of crop failures, even though the seeds were genuine, pure and vital

HOW QUALITY IS AFFECTED.

The principal indication of value in most agricultural seed is the pedigree or history of the stock from which it came. A high percentage of vitality, in seed of ordinary grain or root crops, is not sufficient proof that the seed is of superior quality. With such crops it is a great deal more important that the seed be true to name and taken from a crop that possessed vigour and gave a large yield per acre. These qualities cannot be determined in a seed laboratory. Purity and vitality, however, count for much in all kinds of seed and are of great importance in seeds of grasses and clovers.

Purity.—From the standpoint of an agriculturist the real worth of grass and clover seeds is most of all affected by the nature and amount of their impurities. The cost of labour in fighting weed pests has grown to be a very important item to the farmer. The seeds of many weed pests have, undoubtedly, been introduced by unwittingly sowing them with grass and clover seeds.

It would be impossible to estimate the loss that is sustained by farmers because of abuses in the seed trade. Crop failures caused by the use of seed of low vitality are inconsiderable items of loss when compared with the serious injury that is done by sowing seed which contains noxious weed seeds. If it were not for the prevalence of noxious weeds in Canada the net cost of producing agricultural products would be very much decreased.

Vitality.—Vitality and vital energy are desirable qualities in any kind of seed. It is important that a large percentage of seed sown be capable of germination, and also that when the conditions favourable to germination are present, the young plant, while depending upon the seed alone for its food, will put forth a strong vigorous growth; that means that it possesses a high degree of vital energy. Fresh, well ripened seed of grasses and clovers is seldom deficient in these qualities. Unfavourable weather conditions sometimes make it difficult to ripen seeds of Red Clover. In some seasons a great deal of seed is harvested before it is fully matured, and in consequence it is weak in vitality and vital energy. During seasons of low prices, grass and clover seeds are carried over by wholesale firms from year to year. If these seeds be kept in a cool dry place they do not lose their vitality rapidly, but if improperly stored or if kept for two or more years the power to germinate and vital energy become seriously weakened.

Origin of Growth.—Few Canadian farmers consider whether origin of growth in grass and clover seeds makes any difference in their value. In a few localities only, is home grown seed preferred.

The results of using clover seed grown under various climatic conditions was tested by the United States Department of Agriculture at Washington. Plots were sown with seed from different varieties of clover grown in Europe and also under various conditions of climate in America. In every case the plots from the imported seeds showed a lack of vigour and succumbed to the strong summer heat, while the plots that were sown with home grown seed thrived well throughout the season. Canadian grown seed of the very best quality is usually catalogued and sold in Great Britain at a few cents per pound less than the English grown article. English and Scotch farmers prefer a home grown seed of lower vitality to Canadian seed that would germinate 100 per cent. Although there is as yet no exact data to show that changing grass and clover seed from one part of Canada to another has a tendency to influence the resultant crop, general indications are that these as well as other kinds of seeds are better for having been grown in the locality or district where they are wanted for use.

HOW GRASS AND CLOVER SEEDS ARE GRADED FOR CANADIAN MARKETS.

Each Canadian seed house has its own peculiar methods of cleaning and grading grass and clover seed. Some of the terms which are used to designate grades of Timothy seed are :—'Sun,' 'Salmon,' 'Silver,' 'Fancy re-cleaned,' 'Prime Western,' and 'Choice American,' and for clover seed :—'Red Western,' 'Coon,' 'Antelope,' 'Cricket,' and No. 66.' It can scarcely be said that 'No. 66,' 'Antelope,' 'Coon,' &c., are descriptive of quality when applied to grass and clover seeds. Such terms as 'Grade No. 1,' 'Grade No. 2,' and 'Grade No. 3,' if used by a reliable seed firm, would mean much to the purchaser.

Seed Testing Stations.—The idea of establishing seed testing stations with a view to improve the quality of seeds sold, as well as to safeguard the interests of agriculture, is not a new one. Seed testing stations have been established in most of the leading European countries. Such stations usually form a branch of the agricultural experiment stations, but in a few cases separate establishments have been started solely for the purpose of seed testing.

Seed control stations have exerted a wholesome influence among European seed merchants during the last thirty years. It would be useless for a seed merchant to attempt to do business in any of the European countries where seed control stations are maintained, unless he gave a guarantee as to the genuineness, purity and vitality of the seed offered for sale.

SEED TESTING IN FOREIGN COUNTRIES.

(Extracts from the appendices of the minutes of evidence taken before the Departmental Committee, appointed by the Board of Agriculture for Great Britain to inquire into the conditions under which agricultural seeds are at present sold.—Published 1901.)

'An important feature of the work of many of the stations is the so-called "Seed Control" which consists in an arrangement whereby seedsmen enter into an undertaking with the authorities of the station to sell their goods with certain guarantees of purity and germination, based on results of analytical tests made at the station of the samples submitted by them prior to the sale of the seeds, and agree to accept the results of examinations made at the station of samples taken by the buyers from the goods as sold, as the determinant of any question, which may arise as to the correspondence of the goods with the guarantees. Some of the Swedish, Finnish and Austrian stations also certify as to the quality of seeds in bulk by drawing samples on the seedsmen's premises, and furnishing tags to be attached to sacks containing seeds, which come up to certain standards of purity and germination, but this practice has not made much progress outside the countries named.

'In addition to the testing of seeds for seedsmen and agriculturists, experiment and research work in agricultural botany is also carried out at a number of the stations.

'The permanent staff of a good testing station usually consists of a director (except in cases when seed testing forms part of the work of an agricultural experiment station) with one or two male or female assistants, and a fluctuating staff of girls for seed counting and germination work.

'The cost of maintaining seed testing stations is defrayed partly from the fees derived from the control work, and most of the stations are supported by State subventions and by grants either from provincial funds or from agricultural societies.

'In Germany there are thirty-nine establishments for the testing of seeds, many of them being branches of agricultural experiment stations, which are supported by general subventions from the State, while some are supported by grants from provincial authorities and agricultural societies.

'The procedure at German seed testing stations is based on rules drawn up in January, 1898, by the Association of Agricultural Experiment Stations, in order to secure uniformity of methods in seed testing.

'In Austria-Hungary there are sixteen seed testing stations, some of which are private establishments, while six are supported by the State and two by agricultural societies. The most important of the Austrian stations is that at Vienna, which is maintained by the Imperial Agricultural Society and also receives a State subvention.

'In Belgium seed testing is undertaken at the nine State agricultural experiment stations.

'In France, where seed testing has apparently not made much progress amongst farmers, there is only one station, at Paris, which is attached to the Institut Agronomique, and is supported by the State.

'In Denmark there is one important station at Copenhagen, which is supported and managed by the State.

'The Swedish seed control stations, which number 18, are usually attached to the agricultural experiment stations. They are, however, supported by special grants from the State and from societies (and in three cases from provincial funds), and work under the direction of the State Agricultural Department.

'In Norway there are three stations, two of which are attached to the State chemical control stations at Christiana and Trondhjem.

'In Finland there are seed control stations in connection with the chemical experiment stations at Abo and Helsingfors.

'The Scandinavian stations adopted uniform methods for seed testing in 1890 in accordance with rules drawn up by a committee appointed by the Governments of Denmark, Sweden, and Norway.

'In Switzerland there is an important station at Zurich, which is partly supported by the State.

'Seed control work has not yet been established on a large scale in the United States, although many of the agricultural experiment stations have been engaged in seed investigation for a number of years. Regulations for seed testing, were drawn up by a committee of the association of American Colleges and Experiment Stations in January, 1897, and were published by the United States Department of Agriculture in February of the same year. This action of the central department may be regarded as the first attempt to establish a system of seed control in the United States.

'In none of the above-named countries, with the exception of the United States is there any special legislation requiring seedsmen to guarantee the purity or germination of the seeds sold by them. But the agreements signed by firms under the 'control,' of a seed-testing station are sometimes of such a character as to bring the voluntary guarantee furnished in accordance with such agreements within the jurisdiction of the civil courts, though an appeal to such tribunals is seldom necessary. In the United States one example, at least, is forthcoming of a seeds law, viz., in the State of Maine, where an Act to regulate the sale of seeds has been in force since September, 1897.'

METHODS OF SEED TESTING.

Uniform rules for seed testing have been adopted in most countries where seed control stations have been established. This is necessary in order that the methods of procedure at the various stations may be the same and that the work of one station may serve to check that of another.

In 1896 the Association of American Agricultural Colleges and Experiment Stations, at a convention held in Washington, appointed a 'committee of experts in seed testing to devise and adopt a standard form of seed testing apparatus and methods of procedure for use in all American stations.' The rules for seed testing that were adopted by this committee have been followed in detail at the Dominion Seed Laboratory, Ottawa.

When an examination for purity is to be made, the sample is first well mixed and the required quantities drawn and spread upon a sheet of paper, where it is examined under a magnifying glass and all foreign matter removed and weighed. The percentage by weight of each kind of impurity is then determined. The weed seeds are identified

and the number of each species found in the weighed samples is recorded. The number of weed seeds per pound is then calculated.

In making a test for vitality the seed is drawn from pure seed that has been thoroughly mixed for the purpose. For each test two hundred seeds are used. These are put between folds of blotting paper and placed in a Standard Seed Germinator —an apparatus specially designed for this work and such that the degree of heat, and and supply of air and moisture are under the control of the operator. After twenty-four hours the number of seeds that have germinated in each sample is determined and recorded. This is repeated each day while the test lasts. The times are, for Clover, ten days; and, for Timothy fourteen days. Each test is conducted in duplicate, under identical conditions, and when the duplicates vary more than 6 per cent they are discarded and a fresh test made.

It was with a view to awaken an interest in the importance of good seed and to direct attention from time to time to the evils and abuses connected with the seed trade that a Seed Laboratory was established. In order to obtain accurate information regarding the condition of the trade in grass and clover seed circular letters were sent to Farmers' Institute workers, secretaries of Agricultural Associations, and to individual farmers asking them to secure and forward to the Seed Laboratory one-half pound samples of grass and clover seeds that were offered for sale in the locality where they lived. Five hundred and thirteen samples were received and analyzed for both purity and vitality. With each sample of seed, information was inclosed giving the place at which and the dealer by whom it was sold, the price per pound or per bushel and the name of the wholesale seed firm from whom it had been obtained.

TIMOTHY.

Timothy (*Phleum pratense*) is the most common grass seed on the market in Canada. Fresh, well ripened seed has a silvery white appearance which renders the detection of impurities a very easy matter. A lack of luster is an indication of age, although the seed is very often discoloured by wet at time of harvest. Showery weather after the seed is ripe has a tendency to loosen the glumes and, in consequence, Timothy that is exposed to wet is apt to produce a large proportion of hulless seed.

Hulless seeds, are usually the largest fully ripened seeds which have lost their glumes during the process of threshing. When fresh, they possess a high degree of vitality, but the vitality and vital energy of seed with hulls on is retained for a longer period because of the protecting glumes.

Although but few Canadian farmers make a specialty of growing Timothy seed in quantity, many farmers in the province of Ontario and Quebec reserve from one to ten acres of timothy from their hay crop which is allowed to ripen and is cut, tied in sheaves, and threshed with the ordinary grain crops. It is from these small lots that the bulk of the supply of home grown seed is obtained.

The weight per measured bushel of Timothy seed varies according to its quality; the legal standard is 48 pounds. This law which provides that each bushel of Timothy seed sold in Canada shall consist of 48 pounds is frequently violated by local seed dealers, many of whom supply only 45 pounds per bushel to the farmer, though when getting their supply from the wholesale seed houses they make sure of getting legal weight.

The cost of seeding a field to Timothy is small even with the best quality and highest priced seed. One pound contains about 1,350,000 seeds, and if sown at the rate of five pounds per acre, 1,400 seeds are provided for each square yard of land. If evenly sown on soil that is in good condition, and the weather be favourable for rapid growth, a small amount of seed will suffice, but under ordinary conditions in general farm practice a comparatively small percentage of the seed sown produces plants which come to maturity.

The following tables show a summary of the results of the analyses of samples of Timothy seed that were offered for sale by local dealers in the different provinces of Canada in the spring of 1902.

ONTARIO.

TIMOTHY.

Sample No.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed in 100 Pounds.	Per Cent Germination.		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Five Days.	In Fourteen Days.		
		$ cts.	Lbs.			$ cts.	
1	St. Catharines	3 00	93 4	96	96	3 21	31,982
2	Ottawa	3 90	67 7	67	68	5 76	1,431
3	Galt	4 00	72 7	72	73	5 50	634
4	"	1 20	98 1	99	99	1 28	3,533
5	Hamilton	3 75	96 5	97	97	3 88	6,161
6	Toronto	3 90	91 6	95	95	4 12	815
7	Brantford	3 50	88 7	94	95	3 91	79,063
8	Bradford	2 00	63 9	81	85	3 12	26,002
9	Toronto	4 56	94 7	94	95	4 81	181
10	St. Catharines	3 00	95 8	98	98	3 13	10,239
11	Pembroke	3 60	71 1	64	74	5 06	2,084
12	Carleton Place	4 00	93 8	95	97	4 26	7,076
13	"	4 00	91 3	91	93	4 38	4,077
14	"	4 45	95 1	97	97	4 66	906
15	"	4 95	95 9	96	97	5 16	1,631
16	Kemptville	4 50	94 7	96	96	4 75	2,356
17	Barrie	4 80	97 8	98	98	4 90	91
18	Carstown	4 26	94 4	94	96	4 51	2,265
19	Mallorytown	4 26	87 7	85	89	4 86	10,510
20	Powassan	4 80	96 3	96	97	4 97	2,537

In all, about 20 species of weed seeds were found in varying numbers in the Ontario samples. Eleven samples contained Cinquefoil; ten, Sheep Sorrel; nine, Mayweed; eight, Lamb's-quarters; seven, Peppergrass; five, Canada Thistle and five False Flax. Shepherd's purse, Cockle, Dock and Worm seed. Mustard were also found in a few samples.

Sample No. 7 which was obtained from a Brantford seed merchant, but which was said to have been imported from the United States, contained over 55,000 seeds of False Flax per pound. Sample No. 8 which was obtained from Bradford and had been grown by a farmer in that vicinity also contained a large number of this seed.

Practically all the samples contained varying quantities of seed of White Clover, Alsike, Red Clover and Blue Grass. Twelve of the above samples were said to have been obtained from Toronto wholesale houses.

QUEBEC.

TIMOTHY.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed per 100 Pounds.	Per Cent Germination. In Five Days.	Per Cent Germination. In Fourteen Days.	Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
		$ cts.	Lbs.			$ cts.	
1	St. Hyacinthe	3 85	96 4	96	97	3 89	2,340
2	" "	3 85	95 6	96	97	4 62	900
3	Danville	4 00	96 4	97	97	4 14	2,070
4	"	4 50	92 4	94	95	6 24	1,260
5	St. Hyacinthe	3 80	91 5	93	94	4 15	90
6	" "	3 45	96 4	96	97	3 57	1,620
7	" "	3 50	98 6	99	99	3 80	720
8	" "	3 60	95 4	96	96	3 76	1,440
9	" "	3 95	97 2	98	98	3 83	630
10	" "	3 65	97 3	98	98	3 80	900
11	Marieville	3 75	95 5	96	97	3 92	.....
12	"	3 90	95 5	96	97	3 57	4,500
13	Terrebonne	3 80	95 5	96	97	3 47	12,870
14	"	3 90	93 7	95	96	3 57	270
15	Ste. Martine	3 90	93 7	95	96	3 19	10,620
16	" "	3 90	94 6	96	97	3 42	3,780
17	" "	3 90	94 6	96	97	3 94	4,950
18	" "	3 90	94 6	96	97	3 44	12,780
19	Iberville	3 50	97 3	98	98	3 45	15,030
20	"	3 90	94 6	96	97	3 33	13,230
21	St. Johns	3 75	96 4	97	97	3 14	237,690
22	St. Casmir	4 00	96 4	97	97	3 57	90
23	Yamachiche	4 15	93 7	95	96	3 43	4,320
24	St. Firs. France	3 75	96 4	97	97	3 47	5,760
25	Lennoxville	3 90	97 3	98	98	3 24	1,800
26	Stanbridge East	4 15	96 4	97	97	3 57	630
27	Weedon Station	3 75	94 6	96	97	3 47	90
28	" "	3 90	96 4	97	97	3 57	.....
29	St. François	3 75	96 4	97	97	3 57	7,290
30	" "	3 90	96 4	97	97	3 57	90
34	" "	4 00	96 4	97	97	3 57	3,870
32	Louisville	4 00	96 4	97	97	3 57	27,630
33	Yamaska	3 90	96 4	97	97	3 57	15,700
34	"	4 00	96 4	97	97	3 57	450
35	Knowlton	4 00	96 4	97	97	3 57	450
36	"	3 90	96 4	97	97	3 57	270
37	"	3 90	96 4	97	97	3 57	540
38	St. Jovite	3 90	96 4	97	97	3 57	1,350
39	" "	4 00	96 4	97	97	3 57	630
40	" "	4 00	96 4	97	97	3 57	2,430
41	Chartierville	3 90	96 4	97	97	3 57	360
42	Sutton	3 90	96 4	97	97	3 57	270
43	"	3 90	96 4	97	97	3 57	630
44	Sutton Junction	3 90	96 4	97	97	3 57	2,070
45	Montreal	3 95	96 4	97	97	3 57	90
46	Yamaska	3 90	96 4	97	97	3 57	58,950
47	"	4 00	96 4	97	97	3 57	9,000
48	St. Henri	4 00	96 4	97	97	3 57	.....
49	St. Gabriel de Brandon	3 80	95 5	96	97	3 57	270
50	Roxton Falls	4 00	96 4	97	97	3 57	1,260
51	Stanbridge East	3 60	97 3	98	98	3 57	13,500
52	" "	3 75	96 4	97	97	3 57	360
53	St. Norbert	3 60	97 3	98	98	3 57	14,940
54	Trois Rivières	3 75	96 4	97	97	3 57	.....
55	Sherbrooke	3 85	97 3	98	98	3 57	180
56	St. Pierre	4 00	96 4	97	97	4 03	270

In comparison with the samples obtained from other provinces, the quality of Timothy offered by seed dealers in the province of Quebec may be considered fair. The nature of the impurities on the whole were not very different from the Ontario samples, except in a few cases of local grown seed. Out of the fifty-six samples of Timothy received from Quebec, only one contained seed of False Flax, whereas Ox eye Daisy and Chicory, which were not present in any of the Ontario samples, were quite frequent impurities in the Quebec seed. Only one sample had been obtained from a wholesale firm west of Montreal; most of the samples was reported to have been obtained from Montreal wholesale firms.

Samples No. 18 and 39 were very low in vitality, but practically all the seeds which were vital germinated during the first five days. This is an evidence that a small proportion of good fresh seed had been mixed with old and dead seed. Samples Nos. 4, 33, 47, 52 and 54 were low in both vitality and vital energy. They were evidently taken from old seed.

NEW BRUNSWICK.

TIMOTHY.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable seed per 100 Pounds.	Per Cent Germination.		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Five Days.	In Fourteen Days.		
		$ cts.	Lbs.			$ cts.	
1	Fredericton	3 00	81	83	90	3 70	14,220
2	"	3 75	94 8	94	96	3 95	.....
3	"	4 50	97 5	87	98	4 61	180
4	Bathurst	4 80	92 1	91	95	5 21	1,980
5	"	4 80	97 4	78	98	4 92	.....
6	Elm Tree	3 35	92 1	90	96	4 18	3,780
7	Middle Southampton	4 00	98 9	98	99	4 04	.....
8	Woodstock	4 00	88 7	84	90	4 50	720
9	St. Stephen	4 25	95 9	95	96	4 43	180
10	Sussex	4 75	75 8	72	76	6 26	450
11	"	4 10	82 6	84	85	4 96	3,330
12	"	4 50	96 2	89	97	4 67	270
13	"	4 10	91 8	86	93	4 46	5,400
14	Perth Centre	4 00	86 8	88	96	4 60	1,116
15	" "	4 00	97 9	97	99	4 08	90
16	Woodstock	4 50	88 4	85	91	5 09	720
17	"	4 25	97 6	98	98	4 35	900
18	"	4 25	98 6	98	99	4 31	540
19	"	4 70	87 9	79	88	5 11	6,010
20	Andover	4 40	96 7	97	98	4 55	630
21	"	3 25	89	92	95	3 65	30,510
22	"	4 90	97 2	97	98	5 04	630
23	Bathurst Village	4 32	87 2	82	89	4 95	810
24	"	5 76	98 4	97	99	5 85	270

About sixty per cent of the samples received from the province of New Brunswick were reported to have been taken from seed that had been obtained by the local dealers from Toronto seed houses. A number had been obtained from Montreal and a few from the United States. Out of the twenty-four samples analyzed, eight had over 1,000 weed seeds per pound. Sample No. 21 contained no less than eleven different species of weed seeds, and sample No. 1 thirteen. Both of these samples had been obtained from a prominent seed firm, and there is no reason why the greater part of these impurities could not have been taken out by the use of the machinery which is in the possession of that seed firm.

NOVA SCOTIA.

TIMOTHY.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed per 100 Pounds.	Per Cent Germination.		Actual Cost of pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Five Days.	In Fourteen Days.		
		$	Lbs.			$	
1	Halifax	4 20	93·2	90	95	4 50	1,800
2	Weymouth	3 85	83·3	82	89	4 62	21,690
3	"	4 10	96·6	95	97	4 24	90
4	"	3 75	76·7	53	74	4 88	1,710
5	"	4 00	72·9	49	74	5 48	2,520
6	"	3 90	83·5	84	93	4 67	42,930
8	Antigonish	4 50	93·6	76	96	4 80	4,950
9	"	4 50	86·5	74	88	5 20	540
10	"	4 50	86·7	72	88	5 19	450
11	"	4 50	88·2	75	90	5 10	
12	Yarmouth	4 00	92·5	92	95	4 32	4,050
13	"	4 00	91·7	89	94	4 36	
14	"	4 00	90·8	89	95	4 40	11,430
15	"	4 50	86·5	62	88	5 20	
16	"	4 00	21·5	7	22	18 62	2,610
17	"	4 00	89·8	83	95	4 45	9,360
18	"	4 00	92·3	94	97	4 33	3,210
19	Digby	4 00	84·7	76	90	4 72	5 310
20			82·9	85	92		
21	Elmsdale		86·4	85	91		17,010
22	Lower Economy	4 75	90·9	63	92	5 32	720
23	"	4 75	89·5	86	91	5 30	3,060
24	"	4 50	92·4	92	93	4 87	540
25	Millsville	4 25	94·8	92	95	4 48	90
26	Antigonish	4 40	90·9	83	93	4 84	3,780
27	Hubbard's Cove	4 15	75·7	58	77	5 48	6,390
		5 92	86·1	87	92	5 92	

Canada Thistle, Ox-eye Daisy, Cockle, Dock, Mayweed, Chicory and Sheep Sorrel were the noxious weed seeds most prevalent in the Nova Scotia Timothy. Others quite prevalent, but less noxious, are Green Foxtail, Ribgrass, Cinquefoil, Lamb's-quarters, and Plantain. The nature of the impurities in general are not dissimilar to those of New Brunswick and Ontario. About fifty per cent of the samples had passed through Toronto seed houses. Many of the others obtained in either New Brunswick or Nova Scotia were reported to have been taken from home grown seed. Sample No. 6 contained over 30,000 seeds of False Flax, 1,890 of Peppergrass, and 6,390 of Mayweed per pound. Seed of False Flax is not, however, so dangerous an impurity in the Atlantic Coast Provinces as in districts where fall wheat is grown.

PRINCE EDWARD ISLAND.

TIMOTHY.

Sample Number.	Where obtained.	Market price per bushel.	Weight of pure and Germinable Seed per 100 lbs.	Per cent. Germination. In Five Days.	Per cent. Germination. In Fourteen Days.	Actual Cost of Pure Living Seed per Bushel.	Number of Weed seeds per Pound.
		$ cts.	Lbs.			$ cts.	
1	St. Peter's	4 32	94·1	96	97	4 59	2,070
2	Freetown	4 00	94·2	95	95	4 24	450
3	Bridgetown	4 80	92·4	95	96	5 19	90
4	Cardigan	3 96	92·7	95	96	4 27	630
5	Morell	4 32	86	88	90	5 02	3,070
6	St. Peter's Bay	4 32	93 8	67	94	4 60	1,080
7	Murray River	4 80	..	..	..	..	540
8	Eldon Belfast	4 80	92·2	88	95	5 20	3,330
9	Alberton	4 32	81·5	84	91	5 29	34,470

Only one sample, No. 9, obtained from the province of Prince Edward Island was reported to have been local grown. It was found to contain Cinquefoil, Chickweed, Sheep Sorrel and Caicory which were its only noxious impurities, and none of those excei t Chicory are considered dangerous weed pests. In sample No. 1, 1,100 Ergot sclerotia were found per pound of seed. This sample had been obtained from a Charlottetown seed firm and it is quite likely that the seed was grown on the Island as this fungus was seldom found in samples from Quebec or Ontario. Most of the seed obtained had passed through the hands of Charlottetown seed firms before reaching the local dealers from whom they were obtained.

BRITISH COLUMBIA.

TIMOTHY.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable seed per 100 lbs.	Per cent. Germination. In Five Days.	Per cent. Germination. In Fourteen Days.	Actual Cost of Pure Living Seed per Bushel.	Number of Weed seeds per Pound.
		$ cts.	Lbs.			$ cts.	
1	Mission	4 80	61 7	55	62	7 77	1,080
2	Vernon	4 08	82 6	81	83	4 93	90
3	"	4 80	25 8	14	26	18 60	450
4	Langley	5 28	84	81	85	6 28	1,260
5	Vancouver	.....	90·9	92	94	...	3,870
6	"	.....	90 1	92	92	.....	2,430
7	"	.....	95 8	96	96	.....	1,350
8	Nanaimo	6 00	86 1	83	83	7 36	28,710
9	Victoria	4 80	96 2	97	97	4 98	2,430
10	"	4 80	88 9	90	92	5 39	16,290
11	Duncans	5 28	97·4	98	98	5 42	1,620
12	"	4 32	97·3	98	98	5 43	1,980
13	Abbotsford	6 72	94 8	97	97	7 08	4,950
14	Chilliwack	4 80	74 2	95	95	6 46	123,750
15	"	4 80	63·9	73	77	7 55	102,870

The bulk of the Timothy seed retailed in British Columbia had been obtained from Ontario seed houses. The samples were on the whole rather inferior to those obtained from any of the other provinces.

Sample No. 1, which was practically free from weed seeds, had been grown by a farmer in the vicinity of Vernon, while samples Nos. 14 and 15 which had been imported, contained an alarming number of some of the most dangerous weed seeds, among which were White Cockle and Perennial Sow Thistle.

ALSIKE.

Alsike (*Trifolium hybridum*) is a hybrid clover produced by crossing a variety of the Red with White Clover. It is a perennial on rich moist land, but when grown in a dry climate, or on elevated and poor soils it usually dies out in from two to four years.

The seed is well known in the markets. It is extensively grown in the province of Ontario, and large quantities are annually exported to Europe and the United States.

Well ripened seed that is taken from moist clay land, has a bright green colour and characteristic lustre that is usually wanting in seed grown on light upland soils. Immatured seed from soils that are well suited to Alsike usually lacks in lustre, but seldom contains a large proportion of light coloured seeds. When sowing Alsike for the production of seed, highly coloured seed of the best quality should be used.

Fertilization of Seed.—Alsike is taken from the first and practically the only crop of the season. Fertilization is accomplished chiefly by insects, and it has been found desirable where Alsike seed is grown in quantity, to provide bees for this purpose. It is claimed by growers of Alsike seed that 100 colonies of common honey bees will fully repay for the attention they require in a 50 acre field of Alsike grown for seed.

Cleaning in the Field.—Alsike is one of the most impure seeds in the market. Twenty-five species of weed seeds were found in the samples examined. The seeds of many of the worst weeds ripen with Alsike, and on account of their similarity in size and weight, cannot be separated from the threshed seed. The practice of carefully going through the crop before the seed is ripe and pulling and removing all noxious weeds, is the only way to ensure good clean seed. Such plants as Dock, Lamb's-quarters, Pigweed, Cockle, False Flax, Shepherd's purse and Peppergrass are not difficult to detect in a crop of Alsike, and the cost for labour to pull and remove them is more than repaid by the increased value of the seed.

Harvesting and Threshing.—The method of harvesting Alsike seed that is followed in general practice is to cut the crop with a common mowing machine, to the cutter bar of which is attached a drag table, on which the Alsike is allowed to gather into bunches before being forked to the side. The seed is threshed by a clover mill or 'huller'—a machine made specially for threshing the various kinds of clover.

Amount of Seed to Sow.—Although Alsike seed usually sells at a much higher price than Red Clover, the cost per acre of seeding to Alsike is less. A good quality of Alsike contains about 700,000 seeds per pound, or about double the number contained in a pound of Red Clover. It is usually sown in the spring mixed with grass and Red Clover seed. Seven or eight pounds per acre is considered a liberal amount when sown alone. From three to five pounds per acre is frequently used in mixtures sown for hay.

Practically all the Alsike seed sold in Canada is grown in Ontario and passes through the larger seed houses to local dealers, in consequence, the nature of the impurities in the seed offered in the different provinces is very much the same. A great deal of the Alsike sold in the markets contains large quantities of other clover and grass seeds; many of them as much as 20 per cent by weight. The prices charged for

many lots of seed were not in keeping with their actual value, because of the prevalence of Timothy and Red Clover seed.

The following tables show a summary of the results of the analyses of samples of Alsike seed that were offered for sale by local dealers in the different provinces in Canada in the spring of 1902.

ONTARIO.

ALSIKE.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of Pure and Germinable Seed in 100 lbs	Per Cent Germination.		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	Ottawa	8 40	84	84	89	10 38	5,169
2	Bradford	11 00	91	92	95	11 70	272
3	Toronto	10 50	90	86	91	11 66	272
4	Ottawa	9 60	47	59	65	20 42	14,496
5	Toronto	9 00	90	93	96	10 00	1,903
6	Brantford	8 00	48	66	80	16 66	19,830
7	Hamilton	8 50	65	69	76	13 07	1,903
8	Pembroke	10 80	72	71	82	15 00	14,528
9	Galt	9 50	60	68	74	15 83	14,043
10	"	9 00	62	73	77	14 51	23,556
11	Ottawa	12 00	75	74	78	16 00	815
12	"	9 60	81	84	87	11 85	2,265
13	"	10 80	79	77	84	13 67	1,359
14	"	10 20	79	82	86	12 91	2,899
15	Pembroke	12 00	87	86	90	13 79	181
16	Renfrew	10 20	80	84	86	12 75	3,533
17	Carleton Place	7 20	65	69	75	11 07	8,879
18	"	10 20	62	74	80	16 15	7,248
19	"	10 20	84	87	90	12 14	2,718
20	Kemptville	10 20	82	88	91	12 43	3,715
21	Barrie	7 20	78	77	83	9 23	2,718
22	Mallorytown	8 40	53	70	72	15 84	9,785
23	Powassan	10 80	63	73	79	17 14	7,640

The twenty-three samples of Alsike that were obtained from local seed merchants in the province of Ontario were found to contain twenty-two species of weed seeds, none of the samples being free from them. False Flax and Sheep Sorrel were very common impurities. Sample No. 6 which was obtained from Brantford, contained over 42,000 seeds of False Flax per pound. Worm-seed Mustard occurred in five samples, and Charlock or Wild Mustard in one. Sample No. 22 which was reported to have been obtained from a prominent Toronto seed firm, contained fourteen species of weed seeds, six of which are dangerous pests, in addition to having twenty-five per cent by weight of Timothy seed.

From the above table it may be noted that the market price of Alsike seed in Western Ontario was lower than in the eastern part of the province. Western Ontario farmers have some advantage because of living in the principal clover seed producing district in Canada, and where clover seeds are used in larger quantities than in any other district.

The vitality and vital energy of many of the samples were low. Seed that will not germinate eighty-five per cent in three days in a laboratory test is not likely to prove satisfactory when sown under average conditions in the soil.

QUEBEC.

ALSIKE.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed in 100 Pounds.	Per Cent. Germination. In Three Days.	Per Cent. Germination. In Ten Days.	Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
		$ cts.	Lbs.			$ cts.	
1	Terrebonne	7 50	35 9				
2	"	12 00	86 3	24	39	29 89	4,950
3	Ste. Martine	10 20	89 3	21	29	13 90	4,050
4	"	10 80	92 5	24	34	11 42	5,040
5	"	10 20	89 4	32	35	11 67	630
6	"	10 20	93 5	28	33	11 40	5,940
7	St. Hyacinthe	15 75	73 1	29	33	12 29	25,200
8	"	16 75	86 4	32	33	21 58	33,760
9	Danville	12 00	90 6	42	36	19 38	3,780
10	Richmond	12 00	100	42	36	13 24	4,230
11	Hull	12 00	87 5	44	44	15 51	5,220
12	St. Casmir	9 60	88	35	91	10 97	1,620
13	Yamachiche	10 20	86	33	90	11 59	900
14	Quebec	9 30	81 8	33	91	10 81	3,960
15	St. François de Beauce	10 80	79 3	36	96	13 20	2,520
16	" "	9 60	86	37	96	12 15	15,210
17	Weedon Station	10 80	86 7	37	97	12 55	14,040
18	Belle Riviere	9 00	82 4	33	92	10 88	2,610
19	Ste. Scholastique	10 20	84 4	33	92	12 08	4,680
20	" "	9 90	83 1	32	92	11 91	3,330
21	St. Francois	10 20	86 8	32	92	11 75	5,760
22	Louiseville	9 60	82	33	93	11 40	1,350
23	Yamaska	9 60	83	33	93	15 23	2,160
24	St. Jacques	10 80	83 9	36	93	16 99	17,730
25	Knowlton	9 90	91 1	36	93	10 86	540
26	"	12 00	85 5	37	91	14 03	5,400
27	"	10 80	85 8	32	85	14 24	3,780
28	St. Jovite	12 00	88 5	30	94	13 55	4,950
29	"	9 60	89 1	30	95	6 37	5,220
30	"	10 80	87	36	96	13 33	8,370
31	Chartierville	12 00	86 2	39	96	13 92	7,750
32	St. Norbert	8 10	84	34	95	11 21	20,100
33	Montreal	10 80	86 9	33	95	12 42	1,170
34	Yamaska	9 90	92 3	36	96	8 76	12,420
35	"	9 60	84 7	36	96	11 33	5,310
36	St. Henri	8 40	80 1	32	92	13 90	7,200
37	St. Damien de Brandon	10 80	83 9	32	92	12 87	14,850
38	Roxton Falls	9 00	90 9	28	92	9 90	5,130
39	Trois Rivieres	9 75	85 3	28	92	14 93	18,360
40	Sherbrooke	9 90	82 2	28	92	12 04	2,520
41	St. Pierre	9 60	80 6	68	97	11 34	8,020
					92	15 84	3,000

A considerably larger number of samples of Alsike as well as of Timothy and Red Clover, were obtained from the province of Quebec than from any of the other provinces, not because these seeds are more generally used in the Province of Quebec, but because the request sent to the Agricultural Associations that samples of these seeds be secured and forwarded to the Seed Laboratory met with a more generous response.

Sample No. 23, which was being retailed at eighteen cents per pound and had been obtained by the local dealer from a Montreal firm, contained no less than twenty species of weed seeds. Samples Nos. 31 and 38 were also very bad. Out of the forty-one samples, thirty-six contained White Cockle; twenty-eight, False Flax; thirty-five, Sheep Sorrel; thirteen, Canada Thistle; eighteen, Curled Dock; and nine, Shepherd's-purse. All of the samples contained varying amounts of Timothy, Blue Grass, White and Red

Clover Seeds. The seed in samples Nos. 1 and 33 had not been fully ripened which accounts for its low vitality.

NEW BRUNSWICK.

ALSIKE.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed in 100 Pounds.	Per Cent Germination.		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	Fredericton	10 20	84·6	86	90	12 05	2,610
2	St. John	9 60	83 9	89	93	11 44	8,910
3	Sussex	12 80	46 1	35	54	26 03	27,540
4	"	9 60	62 9	77	79	14 30	6,390

Only four samples of Alsike were obtained from the province of New Brunswick, and these contained eleven species of weed seeds. Sheep Sorrel, White Cockle, Black Medick and Canada Thistle were the most common impurities. Sample No. 3 contained 21,600 seeds of Sheep Sorrel per pound, and had evidently been taken from old seed.

NOVA SCOTIA.

ALSIKE.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed in 100 Pounds.	Per Cent. Germination.		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	Halifax	10 80	59 7	59	69	18 09	15,300
2	Weymouth	12 60	81 6	87	90	15 44	11,340
3	Yarmouth	9 00	78	87	90	11 53	5,310
4	"	9 00	80	88	90	11 25	2,700
5	Elmsdale	10 80	65	78	84	16 61	4,130
6	Millsville	8 40	87	90	93	9 65	54,090
7	Hubbard's Cove	9 60	65	81	94	14 76	27,900

Out of the seven samples obtained from local dealers in the province of Nova Scotia, six contained Sheep Sorrel; five, White Cockle; five, Mayweed; four, Black Medick; five, Lamb's-quarters and four, False Flax. Sample No. 7 contained sixteen species of weed seeds.

PRINCE EDWARD ISLAND.

ALSIKE.

Sample Number	Where obtained	Market price per Bushel.	Weight of pure and Germinable Seed in 100 Pounds	Per Cent. Germination.	Actual Cost of pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
		$ cts.	Lbs.		$ cts.	
1	St. Peters	9 90	70 2	91	12 48	3,510
2	West Devon	9 00	52 9	77	17 01	50,130
3	Bridgetown	10 80	86 6	94	13 39	9,360
4	Murray River	10 20	43 2	70	23 64	18,630
5	Eldon Belfast	9 60	57 2	76	16 78	16,380
6	"	9 60	60 1	80	15 97	20,250
7	Alberton	10 20	26 7	82	38 26	180,450

All of the samples received from Prince Edward Island were reported to have been obtained by the local seed merchants from a Charlottetown seed firm, except sample No. 7 which was reported to have been obtained from a farmer. It contained 26 per cent by weight of sand, of a colour characteristic of the Island seashore, in addition to having over 180,000 seeds of Sheep Sorrel per pound. Samples Nos. 1, 5 and 6 were also very impure, and contained sixteen, seventeen and seventeen species of weed seeds respectively. The impurities in sample No. 2 consisted chiefly of seeds of Sheep Sorrel.

BRITISH COLUMBIA.

ALSIKE.

Sample Number	Where obtained	Market price per Bushel	Weight of pure and Germinable seed in 100 Pounds.	Per Cent Germination.		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	Langley	12 50	85 7	81	87	11 00	3,510
2	Vancouver		53 5	37	54		7,200
3	"		79 9	74	84		12,878
4	"		37 9	49	63		4,140
5	Victoria	13 40	85 7	79	87	13 30	5,040
6	Kamloops		69 6	70	80		2,520
7	"		88 2	92	94		4,950
8	Abbotsford	9 60	94 2	93	95	10 19	180

The market price per bushel of samples Nos. 6 and 7 are omitted from the above list, because the price quoted for the one half pound sample is evidently very much in advance of the price at which the seed was sold in quantity. The price quoted was forty cents per pound. No information regarding the market price was received with samples Nos. 2, 3 and 4. In all, seventeen species of weed seeds were found in the eight samples. Samples Nos. 2 and 4 were very low in vitality which would greatly increase the actual cost of pure and living seed per bushel.

RED CLOVER.

Although there are several varieties of Red Clover, only two distinct varieties are well known in Canada. Common Red Clover (*Trifolium pratense*), and Mammoth or Pea Vine Clover (*Trifolium medium*) or (*Trifolium pratense perenne*), are quite extensively grown in Ontario and Quebec and to some extent in the Maritime Provinces and in the West. These two varieties are offered in the markets under a large number of confusing names, and although most farmers are acquainted with the nature of growth of the two varieties, difficulty is very often experienced in getting seed of the kind desired because of these local terms.

Common Red Clover is a deeply rooted biennial plant rarely appearing in quantity after the second year, although, if the after growth be not cut or closely pastured, it freely re-seeds itself and frequently continues in the hay crop for a number of years. The stem is shorter, and it is from ten days to two weeks earlier than the Mammoth variety.

Mammoth Red or Pea Vine Clover is claimed to be a short lived perennial for moist climates. In a dry inland climate it seldom produces a profitable crop after the second year. It is very hardy and is considered a better variety for light soils than the Common Red. Its roots are more fibrous, and its stems are longer and weaker. It is in some respects the best variety to sow with grasses. It matures at about the same time as Timothy, and the grasses help to keep its weak stems from trailing on the ground.

Nature of Seed.—It is practically impossible to distinguish the Common Red from the Mammoth Red seed, though in some cases the seed of the Mammoth shows a slightly higher coloration. One pound of either variety contains about 350,000 seeds. When sown alone from ten to sixteen pounds of seed, according to the nature and condition of the soil, should be used per acre.

Production of Seed.—Red Clover seed is produced from the second crop the second year after it is sown. When the crop is to be left for seed it is usually pastured until about the middle of June, or cut for hay early so as to allow the second crop to get a vigorous growth. The yield of seed fluctuates according to the season and it is very difficult in any year for seedsmen to get reliable information regarding the possible supply until much of the clover has been threshed.

Fertilization.—The fertilization is accomplished chiefly by insects, but on account of the long tubular corolla of the flower few insects can gather nectar from Red Clover, and in consequence fertilization is left to a few species of insects, the most important of which is the common 'bumble bee. It is stated on good authority that the reason for seed not forming, except to a limited extent, in the first crop is because only the queen 'bumble' bee lives through the winter, and her first brood is not hatched in time for the young bees to fertilize the first crop.

The harvesting and threshing of Red Clover is managed much the same as Alsike.

Nearly two hundred samples of Red Clover seed were examined, and scarcely any of these were free from the seed of noxious weed pests. The results of the investigation, as is shown by the large quantity of weed seeds, explain how weeds become rapidly disseminated from field to field and from province to province.

The remunerative prices that have been offered for both Alsike and Red Clover seeds during the last few years, has encouraged their production on farms which are foul with weeds. Much of the seed which is grown in Canada is handled by the wholesale firms who buy both direct from the farmer and from local seed buyers. In the wholesale houses it is graded and re-sold on sample to local seed dealers.

Although in the retail trade two or three grades may be kept and offered by local seed dealers, with the difference of from 50 cents to $1 per bushel between the lower and the best grades, the actual value of the lower priced seed is usually from $2 to $4 per

bushel less than that of a No. 1 article. Many tenant farmers buy the lower grades of seed, thinking that, so far as their interest is concerned, there is better value in the low priced article, whereas, independent of the noxious weed pests, they may be getting not more than 60 per cent of pure living seed for which they are usually charged 90 per cent of the cost of the best quality of seed.

The seed of Curled Dock, Canada Thistle, White Cockle and Ribgrass is very similar in size to that of Red Clover and it is practically impossible to remove them after the crop has been cut. Many of the seeds, however, which are common to Red Clover could be taken out by thoroughly cleaning with an ordinary fanning mill well equipped with screens.

Only a few samples showed a germination of less than 50 per cent, and those contained a large proportion of immature seeds. Most of the samples analyzed proved to have a high degree of vital energy as is indicated by the percentage germination during the first three days. This is a very important factor because if the germination be slow under conditions which are most favourable such as was secured in the Standard Seed Germinator, the probability is that under less favourable conditions when sown in the soil much of the seed would be useless.

ONTARIO.

RED CLOVER.

Sample Number	Where obtained	Market price per Bushel	Weight of pure and Germinable Seed per 100 Pounds.	Per Cent Germination		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	Ottawa	7 20	75	64	78	9 60	1,440
2	Toronto	6 60	95	93	96	6 94	
3	St. Catharines	5 50	92	91	94	5 97	7,245
4	"	5 50	96	94	96	5 72	182
5	"	5 50	95	94	96	6 05	585
6	Brantford	5 25	72	86	94	7 93	13,005
7	"	5 50	84	83	92	6 54	9,480
8	"	6 00	94	82	88	7 14	10,110
9	Barrie	7 20	94	86	93	8 00	1,170
10	Ottawa	6 60	93	84	95	7 74	2,430
11	"	6 60	89	83	94	7 76	10,470
12	"	6 60	62	66	74	15 47	20,565
13	"	6 60	86	84	90	9 06	5,535
14	Hamilton	5 50	91	92	93	7 85	675
15	"	5 50	85	91	93	6 39	5,715
16	Pembroke	5 40	85	94	95	9 54	7,020
17	Galt	5 00	85	93	96	6 94	5,985
18	"	5 75	94	88	96	6 14	1,440
19	Pembroke	5 00	85	83	87	8 47	9,360
20	Kemptville	6 60	92	93	93	9 04	16,350
21	Ottawa	6 60	93	93	93	7 41	4,230
22	Pembroke	5 60	94	95	95	5 95	10,080
23	Toronto	5 30	91	92	95	5 42	8,910
24	Pembroke	5 80	92	92	95	6 47	2,475
25	"	5 40	93	95	95	5 58	1,305
26	Renfrew	5 20	76	82	93	14 74	36,990
27	"	5 20	87	92	94	8 45	13,185
28	"	5 60	84	85	93	7 14	7,110
29	Carleton Place	5 50	93	92	95	9 00	3,240
30	"	5 50	92	92	95	8 06	1,035
31	"	6 50	94	92	95	8 13	990
32	"	5 20	80	88	91	9 00	19,935
33	Cantown	5 00	93	91	94	7 74	9,180
34	Mallorytown	5 50	90	91	94	8 60	7,470
35	Powassan	5 50	91	87	92	8 24	9,720

The vitality of the samples as shown in the above table was quite satisfactory, over one-third of them germinated 95 per cent or over. The chief cause for low vitality and vital energy was immature seed.

Seed of Timothy, Alsike, and White Clover were present in most of the samples. Sample No. 2 which was supplied direct from a prominent Toronto seed house is the only one that was absolutely free from weed seeds. Thirty one out of the thirty-five, contained seeds of Green Foxtail. Twenty-two samples contained varying quantities of White Cockle seed. Ribgrass or Chinese Plantain, Curled Dock, Sheep Sorrel, Canada Thistle, Lamb's quarters and Lady's-thumb also occurred very frequently. Fifty per cent of the samples contained twelve or more species of weed seeds.

QUEBEC.

RED CLOVER.

Sample Number	Where obtained.	Market price per Bushel.	Weight of Pure and Germinable Seed in 100 Pounds.	Per Cent Germination.		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	Marieville	6 10	89	88	93	7 97	6,660
2	Terrebonne	5 90	98		95	6 04	585
3	Yamaska	5 10	94	90	90	5 93	8,910
4	Terrebonne	9 60	95	97	98	9 47	315
5	"	11 30	96	81	84	11 80	1,845
6	"	6 30	93	91	95	6 51	765
7	Ste. Martine	4 80	92	92	95	4 47	4,665
8	"	8 20	89	92	96	8 08	11,250
9	"	9 40	95	95	98	9 21	315
10	"	6 20	93	92	97	6 57	1,665
11	"	6 20	95	92	97	6 57	3,150
12	"	4 80	92	91	96	4 47	1,230
13	Louiseville	8 40	97	93	98	8 05	990
14	Ste. Martine	9 20	94	92	94	8 57	13,500
15	Yamaska	9 45	94	90	90	9 25	8,910
16	"	13 20	96	94	96	12 21	13,005
17	"	10 20	93	93	98	9 74	9,000
18	"	10 20	93	89	93	9 57	23,310
19	Danville	9 00	94	93	96	8 57	4,770
20	St. Jacques	8 80	93	97	98	8 38	585
21	Hull	13 50	97	89	70	12 93	12,780
22	St. Jacques	7 20	94	92	97	6 65	1,980
23	Iberville	10 40	92	92	94	10 63	16,935
24	St. Johns	8 60	89	88	93	8 76	10,350
25	St. Jacques	8 05	91	93	94	7 74	8,145
26	St. Casimir	5 90	93	90	94	5 41	630
27	Yamachiche	7 50	96	94	97	7 21	1,560
28	Quebec	5 90	93	95	97		
29	St. François de Beauce	9 80	86	91	93	8 98	9,945
30	Yamaska	8 80	95	94	97	8 21	2,610
31	St. François	8 90	79		87	8 33	12,780
32	"	9 50	94	96	96	9 27	135
33	Lemoyville	9 20	87	89	91	8 57	5,040
34	"	9 20	87	89	92	8 47	16,780
35	Wendon Station		92	89	93		2,250
36	"	11 80	88	89	93	8 86	10,395
37	"	9 20	86		94	8 37	18,270
38	"	6 70	83		92	6 86	16,965
39	"	8 00	80		90	7 50	21,690
40	Yamaska	9 40	91		95	9 13	9,135
41	Ste. Scholastique	9 35	99		99	9 42	135
42	Belle Riviere	8 40	93	94	95	9 05	2,115
43	"	8 80	92	93	95	8 47	4,905
44	Yamaska	6 90	97	95	97	7 11	180

QUEBEC—RED CLOVER—*Concluded.*

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed in 100 Pounds	Per Cent Germination.		Actual Cost of pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
45	Yamaska	6 60	81	92	93	8 14	19,485
46	St. François	6 90	94	93	94	7 34	45
47	"	7 20	91	95	96	7 91	11,205
48	St. Jacques	7 20	93	94	95	7 74	4,680
49	Yamaska	7 20	90	91	95	8 00	18,990
50	St. Jovite	6 60	96	97	97	6 87	135
51	"	9 00	95	96	97	9 47	4,815
52	"	9 60	84	89	94	11 42	14,940
53	Chartierville	6 60	87	87	90	7 58	16,165
54	St. Norbert	7 20	93	95	97	7 71	1,155
55	"	7 20	86	88	88	8 37	5,175
56	Sutton	7 20	92	94	96	7 74	5,175
57	Sutton	7 20	87	94	95	7 27	20,465
58	Montreal	6 90	92	94	95	7 50	1,860
59	"	7 65	93	94	96	8	8,190
60	Yamaska	7 80	90	95	96	8	11,385
61	"	8 10	93	95	96	9 03	5,175
62	St. Henri	6 60	90	91	94	7 33	8,325
63	Roxton Falls	7 35	86	93	95	8 54	1,620
64	Trois Rivieres	6 90	86	88	92	8 02	1,170
65	Sherbrooke	6 30	89	93	95	7 07	315
66	Quebec	6 90	87	92	95	7 93	5,715
67	"	6 30	87	91	94	7 78	18,990
68	St. Pierre	6 90	84	88	90	8 21	225

The quality of the Red Clover seed which was obtained in the province of Quebec is not noticeably inferior to that obtained in the province of Ontario. Many of the samples that were obtained in the latter province, however were picked up by men who had been asked to secure all the samples of low grade seed that could be obtained from local dealers in the locality where they lived, and from several districts in Ontario only low grade samples were obtained, whereas the samples which were received from the province of Quebec may be considered as representative of the various grades offered.

With a few exceptions there is little cause for complaint because of low vitality.

The price at which seed is offered to the Quebec farmers in the retail trade, is a little in advance of the Ontario prices. This may be accounted for by the comparatively larger quantities that the Ontario farmers use. The price of Red Clover seed in the province of Ontario is usually quoted per bushel or per hundred weight, whereas in many districts in Quebec and the other provinces, it is retailed at from 10 cents to 15 cents per pound, and usually in smaller lots.

The impurities in the Quebec samples were practically of the same nature as those found in the seed obtained from Ontario. Nearly all the Clover seed offered was reported to have been obtained by the local dealer from wholesale firms in the province of Quebec.

NEW BRUNSWICK.

RED CLOVER.

Sample Number.	Where obtained.	Market Price per Bushel.	Weight of pure and Germinable Seed in 100 pounds.	Per cent. Germination.		Actual cost of Living Seed per Bushel.	Number of Weed Seeds per pound.
				In three Days.	In ten Days.		
		$ cts.	Lbs.			$ cts.	
1	St. John	7 35	90	93	95	8 16	13,500
2	"	7 50	85	83	87	8 82	14,850
3	Bathurst	7 20	66 6	96	90	10 81	38,340
4	"	6 60	86	90	93	6 97	24,210
5	Middle Southampton	7 20	78 5	86	86	9 17	17,145
6	St. Stephen	8 40	91	92	94	9 23	4,365
7	Sussex	8 40	91	90	93	9 23	4,005
8	"	8 40	86	95	98	9 76	2,835
9	"	7 20	85	91	92	8 47	10,635
10	Bathurst	8 40	89	80	90	9 43	2,430
11	"	8 40	49	37	71	17 14	40,635
12	"	6 00	94 6	94	95	6 34	225
13	Perth	7 80	92	95	97	8 47	9,630
14	Perth Centre	7 80	86	86	91	9 06	8,505
15	Woodstock	7 20	80	91	94	9 00	9,135
16	"	7 80	93	94	96	8 38	1,485
17	"	7 80	92	94	97	8 47	6,435
18	"	8 40	95	93	96	8 84	3,870
19	Andover	7 80	97	96	98	8 04	180
20	"	7 20	87	89	91	8 27	4,590
21	Bathurst Village	6 60	86	88	94	7 67	20,565

Only one out of twenty-one samples obtained in the province of New Brunswick had been taken from seed grown in the province. Sample No 14 was reported to have been grown by a Carleton county farmer. Practically all of the Red Clover seed offered in New Brunswick has been obtained from Montreal and Toronto wholesale houses.

One lot obtained from Bathurst, sample No. 11, was very bad. A ten gram sample (about one-third of an ounce) of this seed contained the following weed seeds: Lamb's-quarters, 80 seeds; Stickseed, 4; Canada Thistle, 21; Catnip, 17; Mayweed, 5; Barnyard Grass, 1; Curled Dock, 44; Green Foxtail, 303; Yellow Foxtail, 3; Panicum glabrum, 15; Plantain, 8; Bull Thistle, 1; Black Medick; 55, and Black Bindweed 2; in addition to having 9 seeds of White Clover; 245 of Timothy and 953 of Alsike. Three of the samples contained Charlock or Wild Mustard, namely, samples Nos. 2, 3 and 15. Three of the samples, Nos. 2, 3 and 11, each contained eighteen or more species of weed seeds.

With the exception of No. 11, all the samples showed a high percentage germination during the first three days, only a few of them, however, were reasonably pure.

Twelve out of the twenty one samples contained over 5,000 weed seeds per pound, eight of which contained over 10,000 weed seeds per pound. Their general appearance as well as the results of their analysis is quite in keeping with the statement made by one of Toronto's prominent seedsmen:—"Certain districts in the eastern provinces are an excellent dumping ground for the screenings of the western grown seed."

NOVA SCOTIA.

RED CLOVER.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed.	Per cent. Germination.		Actual Cost of pure Living Seed per Bushel.	Number of Weed seed per Pound
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	Halifax	7 80	81	87	90	9 62	9,495
2	"	8 40	85	92	94	9 88	7,335
3	Weymouth	7 80	85	91	95	9 17	1,485
4	"	8 40	50	76	78	14 00	27,045
5	Antigonish	7 20	88	94	96	8 18	585
6	"	8 40	92	92	95	9 13	6,615
7	Yarmouth	9 00	85	89	92	10 58	10,935
8	"	9 00	25	17	26	36 00	8,775
9	"	9 00	81	91	93	11 11	4,770
10	"	9 00	89	85	89	10 11	1,035
11	"	9 00	82	88	89	10 97	12,825
12	Digby.	9 00	66	63	73	.. ..	4,635
13	"	.. ..	87	92	94	.. ..	11,610
14	Millsville.	.. ..	93	92	95	9 03	1,485
15	Antigonish	8 40	91	93	95	10 21	1,935
16	Hubbard's Cove	9 60	81	84	86	10 37	9,135
		8 40					

Sample No. 8 from Yarmouth had been imported from a Boston seed house and was evidently old seed, judging from its colour and slow germination. The farmers who were so unfortunate as to buy seed from this lot paid four times its first cost for the pure living seed contained in the sample. If the prices that were quoted with the samples obtained represent their general market prices, the farmers of Nova Scotia have been paying too high a price for their supply of Red Clover seed. The best quality of Red Clover seed offered could have been obtained in the Toronto market at from $6 to $7 per bushel.

Sample No. 4 contained 22 species of weed seeds. The nature and prevalence of the impurities of the seed from the province of Nova Scotia is very much the same as that from the other provinces.

PRINCE EDWARD ISLAND.

RED CLOVER.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed in 100 Pounds.	Per cent. Germination.		Actual Cost of pure Living Seed per Bushel.	Number of Weed seeds per Pound.
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	St. Peter's	6 90	95	94	96	7 26	180
2	"	6 60	90	90	93	7 33	4,455
3	Bridgetown	7 20	87	92	93	8 27	11,740
4	Morell	8 10	77	85	86	10 51	19,350
5	St. Peter's Bay	8 25	95	92	95	8 68	225
6	Murray River	7 80	95	95	97	8 21	2,565
7	Eldon Belfast	7 20	87	92	93	8 27	5,175
8	Alberton	7 20	88	93	94	8 18	1,390
9	"	7 20	95	94	96	7 57	630
10	"	10 20	84	87	90	12 59	11,070

Charlock or Wild Mustard seed was found in large quantities in samples Nos. 3, 4, 7 and 10. To insure the identity of these seeds, a growing test was conducted. Sample No. 4 contained sixteen species of weed seeds. In general the quality of the Red Clover seed obtained from Prince Edward Island was better than from the other two maritime provinces, and the market price per bushel was lower.

BRITISH COLUMBIA.

RED CLOVER.

Sample Number.	Where obtained.	Market price per Bushel.	Weight of pure and Germinable Seed in 100 Pounds.	Per Cent Germination.		Actual Cost of Pure Living Seed per Bushel.	Number of Weed Seeds per Pound.
				In Three Days.	In Ten Days.		
		$ cts.	Lbs.			$ cts.	
1	Mission	10 20	88	83	89	11 59	135
2	Vernon	9 60	90	89	94	10 66	90
3	"	9 60	96	96	97	10 00	270
4	"	7 50	94	95	97	7 97	1,980
5	Langley	9 50	92	89	93	10 43	270
6	Vancouver		91	92	95		11,970
7	"		96	95	97		315
8	"		94	92	95		135
9	Nanaimo	18 00	83	85	90	21 68	14,400
10	Kamloops	24 00	87	87	88	27 58	270
11	"	21 00	94	91	96	25 53	2,835
12	Duncans	10 20	94	94	95	10 85	200
13	Mount Tolmie	9 60	84	87	90	11 42	11,160

With the exception of samples Nos. 6, 9 and 13, the quality of the Red Clover seed obtained from the province of British Columbia was excellent. The most of the samples obtained were from Windsor and Toronto seed houses. Samples Nos. 9 and 13

contained twelve and ten seeds respectively of Charlock or Wild Mustard in the ten gram samples (about one-third of an ounce) that were analyzed.

The following table gives the common and scientific names of weed seeds that were found in the samples on which a summary of the results of the analysis is given in the preceding tables. It also shows the per cent of the samples of each of Timothy, Alsike and Red Clover in which seeds of the weeds named occured.

Name of Weed.		Per cent of Samples in which Seeds of Weeds named were found.		
Common.	Scientific.	Timothy.	Alsike.	Red Clover.
Black Medick	*Medicago lupulina*, L.		23 3	4 9
Curled Dock	*Rumex crispus*, L.	41 3	33 3	54 3
Canada Thistle	*Cnicus arvensis*, Hoffm.	18 5	31 4	23 8
Charlock or Wild Mustard	*Brassica Sinapistrum*, Boiss.		1 1	7 0
Chicory	*Cichorium Intybus*, L.	3 3	2 2	0 6
Cinquefoil	*Potentilla Norvegica*, L.	60 3	17 8	1 8
Catnip	*Nepeta Cataria*	7 3	28 9	19 5
Ergot	*Claviceps purpurea*, Tul.	4 6		
False Flax	*Camelina sativa*, Crantz	13 2	63 3	3 7
Green Foxtail	*Setaria viridis*, Beauv.	9 3	40 0	24 5
Lady's-thumb	*Polygonum Persicaria*, L.	1 3		62 2
Lamb's-quarters	*Chenopodium album*, L.	12 0	72 2	23 8
Mayweed	*Anthemis cotula* DC	23 8	13 3	31 1
Ox-eye Daisy	*Chrysanthemum Leucanthemum*, L.	6 0	5 6	0 6
Perennial Sow-Thistle	*Sonchus arvensis*, L.	0 7		
Pigweed	*Amarenthus retroflexus*, L.	7 9	14 4	36 0
Plantain	*Plantago major*, L.	34 4	22 2	22 7
Peppergrass	*Lepidium Virginicum*, L.	38 1	34 4	1 2
Ragweed	*Ambrosia artemisiaefolia*, L.			1 2
Ribgrass	*Plantago lanceolata*, L.	1 0	20 0	62 2
Shepherd's purse	*Capsella Bursa pastoris*, Moench	6 6	14 4	
Sheep Sorrel	*Rumex Acetosella*, L.	10 0	80 0	52 4
White Cockle	*Lychnis vespertina*, Sibth.	13 9	76 7	59 1
Wormseed Mustard	*Erysimum cheiranthoides*, L.	7 0	14 4	1 2
Yellow Foxtail	*Setaria glauca*, Beauv.	6 0		11 0

* White Cockle is a common name also frequently applied to *Silene noctiflora*, L. The two plants are quite similar and the seeds from them are almost identical.

CONCLUSIONS AND SUGGESTIONS.

1. The trade in grass and clover seeds is an exceedingly fruitful medium for the dissemination of noxious weeds.

2. The relative market prices of Timothy, Alsike and Red Clover seeds are not determined by their actual value. Competition in the seed trade has been too largely confined to prices without due attention to quality.

3. Too many local dealers dabbling in the seed trade, are incompetent to safeguard their customers from the dangers connected therewith. Under the present conditions it is advisable to purchase seeds direct from seed firms that are known to be reliable.

4. Ignorance on the part of farmers, as well as ignorance and a lack of progressiveness on the part of seed merchants, are responsible for most of the abuses connected with the seed trade. Ignorance is an environment in which fraud flourishes.

5. Many of the most noxious weed seeds cannot be separated from grass and clover seeds by mechanical processes, therefore it is highly important that seed growers should thoroughly clean their fields of weeds before the crop is harvested.

6. As long as Canadian farmers are content to use cheap, low grades of seed, without having any definite knowledge of their real worth, so long will the best quality of our home grown seeds be exported to countries where the seed trade is conducted on a more businesslike basis.

7. There is a great need for wise measures and energetic and persistent efforts to protect Canadian farmers and their fields from the far reaching and long continuing damages which arise from the sale of seed containing noxious impurities.

8. Much permanent improvement may be accomplished by disseminating information regarding the conditions of the seed trade, among seed growers, seed merchants and seed consumers, through the medium of newspapers, bulletins and agricultural meetings. This process of education, however, is necessarily slow and will need to be supplemented by other measures, if the evils connected with the seed trade are to be checked in the near future.

9. It is not unreasonable to ask seedsmen to test their seeds, to grade them as to quality, and sell them accordingly; and it is not too much to require seed merchants to furnish a statement showing

the percentage of purity and vitality of the grass and clover seeds they sell, instead of a non-warranty declaration.

10. The sale of seed containing seeds of such weeds as Bindweed or Wild Morning Glory, Wild Oats, Charlock or Wild Mustard, Field Pennycress or Stinkweed, and Perennial Sow-Thistle should be restricted or prohibited.

11. It is desirable that uniform methods for grading grass and clover seeds according to fixed standards of purity and vitality be adopted for Canada. Any seed containing noxious impurities should not be represented or sold as a No. 1 grade.