



MARKETING METHODS

with

A PLAN FOR THE PRODUCTION AND MARKETING OF

THE BRITISH COLUMBIA POTATO CROP

by

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## FOREWORD

With increased production of Agricultural products, the problem of marketing is becoming more difficult each year; making it increasingly necessary to have a knowledge of the theory and practice, of the factors of production and marketing.

An effort has been made in this thesis to assemble information along these lines. The compiler has made use of the following publications, to the authors of which his thanks are due:

Co-operation in Agriculture, H.C. Filley; Marketing Agricultural Products, B.H. Hibbard; Report of the Milk Enquiry Commission in B.C. 1928, Dean F.M. Clement; The American Potato Journal, Lansing, Michigan; Business Cycle Theory, Hansen; Experimental Farm and Illustration Station Reports; Report of Division of Botany, 1927, H.T. Gussow; Regulations re Certified Seed Potatoes, John Tucker; Report on Certified Seed Potato Plots in B.C. H.S. MacLeod; Canada Year Book; U.S.D.A. Bul. 47; Also for information received from U.B.C. Dept. of Agriculture Dr. F. Shutt, Ottawa; E.M. Straight, and Mr. Foster, Saanichton, B.C.

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## INTRODUCTION

Production and Marketing of Agricultural Products, has developed from producing for home use only, during the self-sufficing age, into a national and international, problem. Since the Industrial Revolution we have passed through several stages of development, leading up to the present complex situation, in which we find the outlook for the production of Agricultural Products so good, that the outlook for the individual farmer is bad, unless he can adjust himself to newer and improved methods of production and marketing.

The competitive system has fallen down, as everyone concerned produced goods in a blind haphazard manner, because they were without knowledge of what others were doing. Price-making has been attempted in the same blind haphazard manner, and we find that it has failed to stabilize the market. There are several movements in which we co-operate, some of which are voluntary while others are compulsory. Co-operation is much more than marketing Agricultural products, it is in reality a religion with marketing taking a secondary place. Modern trends in marketing have been to make tariffs effective in countries with a surplus, also for control of marketing through central selling agencies.

Production of potatoes should start with the selection of disease free seed of high producing strains, (Certified Seed). Commercial potatoes are produced at a minimum cost, by adopting approved methods, good seed, and the use of fertilizers. The cost

of production varies in different places, as well as the yield. The supply usually exceeds the demand, thus presenting the problem of utilization of the surplus in the form of by-products. There are several middlemen services which must be performed in the movement of potatoes from the producer to the consumer. The greatest problem is the orderly marketing of the B.C. potato crop, which means that each producer should be allotted his share of the domestic market and at the same time be responsible for his share of the surplus.

## MARKETING METHODS

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A PLAN FOR THE PRODUCTION AND MARKETING OF

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### Chapter I

Marketing methods and systems.

Marketing methods of the past have been, as Hibbard says, blind and haphazard. This method or lack of method, has been in vogue a long time, and is still the general practice. It is used by many individuals in the most advanced countries of the world, but it tends however to demoralize the market, and keep prices low. This marketing method is based on competition which is supposed to be the life of trade, but it is the death of profits.

The competitive system, has shown how weak it is, in the number of failures, and depressions, that the world has passed through. These failures were caused chiefly through uncontrolled speculation, or buying up large stocks of goods, and when the market has risen to dizzy heights and become top heavy, it just had to tumble. We then find the goods dumped on the market in an endeavor to unload. The decline is very rapid indeed, as we have noticed this past season, when practically all commodities fell at a very rapid rate. This put the country in a bad state financially, as many commitments had been made expecting <sup>prices</sup> higher to continue. When money was not forthcoming to meet these

these obligations, the people just had to retrench, and live as best they could. This curtailed expenditure is reflected all along the line, and assists in making the depression felt, by practically all classes of society. It shows up as a slump in the business cycle, which usually or always follows a period of prosperity.

Hanson says<sup>I</sup> " among the present writers who have stressed the individualistic exchange economy as a basic factor in influencing the business cycle "Lavington" is probably outstanding. " " He points out that in the modern economic order, there is no central authority to adjust means to an end. Instead this complex task is left to many thousands of independent entrepreneurs, each one of whom specializes in one small part of the whole vast economic enterprise. The entrepreneur stands at the centre of the economic organization. Under his control pass all the productive resources of the community. He estimates future demands, and sets resources in motion to meet these demands. If his forecast is optimistic, the producing group which is organized under his command is active, and the market for the products of other groups is improved, if his forecast is pessimistic the opposite is true. The key to the business situation lies in the mind of the entrepreneur in the influences which determine his judgments. In such a society errors are bound to arise, and these errors tend to develop cumulatively either in the direction of optimism or pessimism. "

<sup>I</sup>  
"Not only is it difficult for each producer to know

I. Business Cycle Theory. Hansen.

know what other producers will want, but also each producer is unable to ascertain what all his competitors are doing. This fact is stressed by " Beveridge ". The demand for a product is met, not by one producer but by many, each acting independently of the rest, and each dominated by the desire to do as much business as possible. Since competitors do not know the actions of each other the market is glutted. This is the normal incident of competition."

I

" Every one of ten bootmakers, may accurately estimate the total demand for boots, say ten thousand pairs, at the lowest remunerative price. Each of the ten however, desires of this demand say one fifth rather than one tenth. The ten together will therefore set about producing twice as many boots as can be sold at a profit. "

I

" The modern industrial system is characterized by the fact that it is a money economy. It should be noted that a money economy presupposes an exchange economy, while on the other hand it is possible to have an exchange economy without a money economy ( an exchange economy is based on division of labour ). The writers who emphasize the money economy do not overlook the fact, that the producers of a community provide for each others wants through an elaborate co-operative process, but they hold that the productive process is brought into dependence upon factors, which have but a remote connection with the national conditions of well being -- factors which determine the prospects of making money. "

These illustrations show how unscientific and poorly

I. Business Cycle Theory. Hansen.

poorly managed, our exchange economy is, and how every entrepreneur is after all he can get for himself. He does not take the other fellow into his confidence, just tries to beat him to the market with what he produces, and as they have overproduced, the chance of making any profit is wiped out, and often the whole trade suffers on account of these mistakes.

The Laissez-faire plan, of, assisting a let alone policy, as has been attempted in some cases, by governments giving out information, on certain lines of production, is gradually being displaced more and more, by purposeful and scientific control, not only with respect to discount policies of the banks, but also with respect to trade competition, and intertrade relations. Voluntary associations, even more than governmental regulations are working in the direction of greater business stability. Many successful co-operatives, pools and farmers' companies, have done much to stabilize the markets, of various products, but they have been robbed of the success they could have had, by the individuals or independents, who refuse to share in the disposal of the surplus, and who profit by a good market, kept good for them by the co-operatives, who take care of the surplus, and thus hold up the umbrella for the independents..

This holding up the umbrella, has been the cause of a lot of dissatisfaction among co-operative association members as they usually have to take a slightly lower price on account of looking after the surplus. In many cases this has led to loss of members and finally the breaking up of the associa

association. Following this they all had to take a lower price for their goods.

There have been many attempts to improve the market by co-operative effort, some have failed, some succeeded partially, and some were quite successful. The most successful ones have been where they have had 100% control of the product or nearly so. Many plans have been tried in marketing the potato crop I will only relate a few of them here, and show where some were successful while others failed to obtain their objective and went out of business.

I

"The Michigan Potato Growers' Exchange. -- This association, head- which has/quarters at Cadillac, Michigan, is one of the best known and most successful of our co-operative potato-marketing agencies. It is a federation of local co-operative associations, and sells not only potatoes but onions, hay, apples, cabbages beans, turnips, and numerous other farm products. It has also purchased sacks, tags, twine, spray materials, and other supplies in wholesale quantities."

"The growth of the association, since it was formed August 10, 1918, is indicated by the following table:

<u>Season</u>	<u>Cars Potatoes Handled</u>		<u>Total Cars Handled</u>
	<u>Number</u>	<u>Index</u>	
1918-19	2118	100	2277
1919-20	2158	102	3085
1920-21	3250	153	3622
1921-22	2439	115	2520
1922-23	2922	138	
1923-24	3122	147	
1924-25	2867	135	2962
1925-26	2982	141	3023
1926-27	3013	142	3055

I. Co-operation in Agriculture, H. C. Filley.

"The Michigan Potato Growers' Exchange and the associations which compose it are all non-stock non-profit corporations. The fee for joining a local association is \$10, and that for joining the Exchange is \$100. Each member of a local association signs a non-interest bearing note for \$100 which may be used for collateral in securing additional operating capital."

"Each member of a local association signs a five-year contract in which he agrees to deliver all potatoes to his association except seed potatoes and those sold directly to consumers. A member may cancel his contract in June of any year. Nearly 9000 growers were members of the 75 units in 1927"

"The present contracts provide for pooling by local associations at the discretion of the members of each pool. Custom varies among the associations. At least one large association sells potatoes in carlot pools until October 1, then in weekly pools until November 1, and all delivered after that date in seasonal pools. The Exchange pools each day's shipments according to variety and grade!"

"Each local association affiliated with the Exchange appoints the Michigan Potato Growers' Exchange its sales agent and contracts to deliver to the Exchange all potatoes which it shall receive and such other products as may be agreed upon. These contracts may be cancelled during June of any year. The contract between each member and his local association, and the contract between each local and the

the Michigan Potato Growers' Exchange alike provide for liquidated damages in case the contract is broken by failure to deliver the pledged products. "

"The influence of the Michigan Potato Growers' Exchange has been out of all proportion to the volume of business handled. It has never marketed more than 21% of the total car-lot potato shipments from that state, and for two<sup>years</sup> it fell as low as 15%. The first year that it operated, 1918, the margin between the price which Michigan farmers received for their crop and the Chicago average price dropped more than 40% below 1917. The Exchange gave efficient service at a low cost to the grower. Other potato-marketing agencies were compelled by the force of competition either to lower their margins or retire from the field. All growers have profited because of the initiative of the men who made possible the local associations and the Exchange, and assumed the risk for the success of the venture. It is unfortunate that a few of the growers have been compelled to carry the burden and risk of the movement from which all have profited." ( This association was very successful. )

" Minnesota Potato Growers' Exchange.<sup>I</sup> - Minnesota farmers have experimented in co-operative potato marketing with somewhat varying success. Local associations, some formed as early as 1912, secured as satisfactory results as can be expected of an association with a small volume of business. In 1920 a large number of local associations organized the Minnesota Potato Exchange, following the same general plans as the Mich-

Michigan Exchange. It got along fairly well the first season, but encountered such difficulties in 1922 that reorganization was imperative. The principal cause of the trouble was poor grading. Some of the locals shipped poorly sorted potatoes as No. 1. Rejections followed. Such shipments were necessarily sold for what they would bring, which in some instances was but little more than the freight and handling charges. Since all shipments were pooled, the average selling price was lowered. Men who had sent a quality product to market protested at such injustice. In the reorganization, pooling was abandoned, and the Exchange operated largely on a commission basis."

"In 1923 plans were made for a new organization. It was proposed to secure a large number of members under an iron-clad contract, and proceed to "merchandise" Minnesota potatoes beginning with the 1924 crop. By the first of March of that year when the preliminary organization campaign closed, 12,326 contracts representing 161,543 acres of potatoes, had been received. The cost of securing the contracts had nearly consumed the \$5 fee paid by each member. The marketing of potatoes was necessarily financed by borrowing money."

"Storage space was secured for more than 5000 cars of potatoes. Warehouses were purchased, leased, or built at important shipping points. Those purchased and built were to be paid for within five years by making deductions upon all potatoes handled through each warehouse. Storage space was also secured in Chicago, Kansas City, Omaha, and other important wholesale markets.

"The producers fulfilled their contracts and delivered their potatoes; during the digging season there were days when more than 150 cars were shipped. The selling of the crop proved to be a different matter. Before the end of the year growers were complaining of the delay in securing returns, and the murmur of discontent did not lessen with the approach of spring and the end of the old potato season."

"In September, 1925, the Minnesota Potato Growers' Exchange announced that it would suspend operations so far as concerned the 1925 crop. The company was solvent, but internal dissension due to the low net returns made a continuance of operations impractical if not impossible. An unaudited statement of the operations of the Exchange for the first year was issued as of August 31, 1925. According to the tentative report, the association received and sold 6,215,112 bushels of potatoes. Net sales after allowances, freight, adjustments, and similar charges were deducted amounted to \$2,369,122 or about 60 cents per hundred pounds. The following table gives other deductions made from the net sales: "

Table 2

Financial Statistics, Minn. Potato Growers' Exchange, 1925

Net Sales		\$2,369,122
General office expense	\$154,170	
Selling expense	177,449	
Warehouse expense	813,849	
Other expense	58,801	
Investments	202,857	
Legal reserve	48,681	
Total deductions		<u>1,455,807</u>
Returns available to growers		\$ 913,315
Paid growers up to August 31		<u>849,421</u>
Probably available for final payment		\$ 63,894

"According to this statement the growers had received on the average less than 14cents per bushel for their crop and could receive only about one cent per bushel more. Under such conditions there is little wonder that the members were dissatisfied even though the Exchange was able to meet its financial obligations."

"A number of reasons, some of which are as follows, have been advanced to explain the low net returns."

"1. A large potato crop in 1924 which naturally reduced potato prices.

2. Bitter opposition from regular dealers who would lose if the Exchange succeeded.

3. Unduly high operating expense.

4. Unwise selling policy.

Whether or not any or all of these reasons are the true ones, at least three very definite inferences may be drawn from the experience of the Minnesota Potato Growers' Exchange.

1. While the pooling of commodities by grade is often of assistance, it does not insure the success of a co-operative marketing venture.

2. Unless the members of a co-operative believe that they are receiving an efficient marketing service and securing as good a price as their neighbors who sell through regular market channels, they are certain to censure their association.

3. An iron-clad, long-time contract neither insures loyalty nor a long-lived organization. In his speech on Conciliation with America, Edmund Burke said, "I do not know the method of

of drawing up an indictment against a whole people. "It is likewise impossible to compel the enforcement of marketing contracts when almost the entire membership desire their abrogation." (This was apparently too elaborate a system, and operating expenses took too large a percentage of returns.)

Similar results were obtained by the Comox Valley Growers' co-operative Association which was incorporated under the Co-operative Act in 1926.

This association was organized to handle vegetables, fruit and potatoes, but the growers did not put in the area that they indicated they would. When it came time to deliver their produce only a small amount was delivered to the association, and it was impossible to carry on with the small volume. The association only carried on active operations for six weeks when it was decided to cease operations. I had the task of closing out the business, having acted as secretary-treasurer since it was organized. The salesman resigned when he saw that there was no volume coming in, but it took some weeks to wind up the affairs. By using part of the membership fees to pay rent etc, it was possible to pay 70% of the price received for the produce to the producers, who were none too well satisfied. A small balance was left in the bank, so the association wound up business and remained solvent. During the past season an attempt was made to get it going again but I have not heard of it being in operation up to the present time.

Co-operative Marketing of Potatoes in M aine. - <sup>I</sup> The

I. Co-operation in Agriculture, H.C. Filley

The Maine Potato Growers' Exchange began operations in 1923 with 3100 members who grew approximately 50% of the Maine crop. It handled 2,897,860 barrels of potatoes of the 1923 crop and 3,396,724 of the 1924 crop. all potatoes were pooled by grade. The delivery of potatoes by members was regulated, as was also the disposal of the crop. At the close of the 1924-25 year, the Exchange owned 34 warehouses with a combined capacity of 322,966 barrels. It also leased during the marketing season 154 warehouses with a combined capacity of 982,755 barrels. Each member was bound to the association by a contract which assured the delivery of his potatoes. At the 1924 annual meeting of the board of trustees, the legal department was instructed to prosecute vigorously all breaches of contract. They carried out their instructions and the courts sustained the contracts."

"In September 1925, the Maine Potato Growers' Exchange suspended marketing activities. The members had received on the average less than 72 cents per barrel for the 1924 crop. Creditors who had sold fertilizers and other supplies on credit insisted that the 1925 crop should be harvested and marketed without delay. In the minds of many creditors and growers, the marketing policy of 1924 was not justified by the returns."

"Every one will admit that the 1924 potato crop was larger than the country would consume at a price profitable to the producers. The Exchange could neither increase the demand for potatoes nor decrease the supply. The growers were most interested in whether or not the potatoes were marketed as efficiently through their own organization as through regular market-

irrevocable  
Marketing channels. . Certain it is that the long-time/contracts, the pooling policy, the attempt to feed the market, and various other policies which have sometimes been heralded as the essentials of co-operation did not suffice to keep the company from suspending marketing activities."

I

Some Smaller Potato-marketing Associations. - "Other co-operative Potato-marketing organizations have operated in North Dakota, Idaho, Colorado, Nebraska, Wisconsin, and probably in other states. The success or failure of each organization seems to have depended almost entirely upon the efficiency of the marketing service rendered. The marketing of potatoes through regular channels is sometimes far from satisfactory to the growers. The existing system has not been operated for their benefit. They suffer from the imperfections of the system itself and from the methods of its operation. Co-operation is a justifiable method of securing a more satisfactory selling service. Such a system, to succeed, must be based on efficiency and not upon hopes and day dreams."

The Prince Edward Island Potato Growers' Association. - It was not long after the Certified Seed Industry got under way in Prince Edward Island that the growers realized the necessity of organizing to sell their product. They organized a selling agency which had 100% of the growers, and was very successful for several years, and I believe is still operating successfully. This association has a continuing contract, but a grower is allowed to withdraw in any year by giving a month's notice before June 1. On account of the situation of  
I. Co-operation in Agriculture. H.C. Filley

of Prince Edward Island, it would be difficult for any grower to sell his own crop; as there is practically no local market, on account of the large volume of certified seed grown there (two-thirds of the total volume of potatoes being certified seed, and it may soon be all certified seed as a plan is being developed to make the island a disease free area.) Potatoes are shipped in boatloads, often several thousand tons at a time. The growers are all within a comparatively short distance of the shipping point. Each grower provides his own warehouse or storage facilities, and delivers to the dock, his share of each boatload, or order when requested to do so by the secretary. This means no central warehouse and low handling costs. The association maintains an office and secretary to look after the business.

They also purchase all sacks, and fertilizer for the members of the association. The fertilizers are bought in large quantities wholesale, one dollar per ton is added to the cost of the fertilizer, and this pays the secretary and office expenses, so that the price received for the potatoes is practically all passed on to the grower. Each variety is in a separate pool.

The Prince Edward Island association is one of the most successful that I have heard of, and has secured the large membership through efficient service, and satisfactory methods of handling the crop.

The Certified Seed Potato Growers in British Columbia, have been trying to work out a satisfactory system, of handling

handling the potatoes since 1923, when they first organized an association for this purpose, but it has not given efficient or satisfactory service to all members up to the present. They tried setting a price at the time of the potato show, usually about 20 dollars above the retail price of commercial potatoes. The price has ranged from 40 to 80 dollars per ton but the comment on the price was always the same "too high" and in most years only a small part of the crop was sold. Many growers became discouraged and ceased growing. Some went out and offered their potatoes below the set price, others offered at a lower price without final inspection, to save the tuber inspection charge which was imposed by the association at that time, some would not fill orders when they received them, others would raise the price, there has been a general disregard of any rules and regulations adopted, and they are being sold on a hit and miss plan. The secretary, during the past two years has disposed of quite a few tons, or several carloads through a jobbing or wholesale house in Vancouver. Sales have increased during the past few years but I do not see much hope of success until they organize along similar lines to the association in Prince Edward Island and give the management full power to make all sales and dispose of the crop.

## I

Facts Affecting Potato Marketing. - "Potatoes are produced in every one of the forty-eight states. They are produced most abundantly north of the Corn Belt. This is due in part to the fact that potato production is best adapted to regions where the climate is relatively cool, and in part to the fact

fact that, except where there is a good local demand, they are less profitable than corn. The following table helps to explain potato prices and some salient facts regarding potato marketing

Table 3 Potatoes x

Year	Acreage	Ave. Yield per Ac.	Total Production	Ave. Farm Price per Bu. Dec. 1
1921	3,941,000	91.8	361,659,000	\$1.10
1922	4,307,000	105.3	453,396,000	0.58
1923	3,816,000	109.0	416,105,000	0.78
1924	3,327,000	126.7	421,784,000	0.63
1925	3,092,000	104.6	323,465,000	1.87
1926	3,122,000	113.5	354,328,000	1.41
1927	3,505,000	114.7	402,149,000	0.96

x Yearbook, U.S.D.A. 1927.

"When the production of potatoes is small the price is relatively high, and when the production is large the price is low. A year of high prices is almost invariably followed by a greatly increased acreage. The area where potatoes can be grown is very large. In no one season has as much as 5% of the land suitable for potato production ever been planted to that crop. The quantity of potatoes which will be consumed at a price remunerative to the grower is limited to about 400,000,000 bushels in United States. If the price of potatoes rises very high, consumption is decreased because the housewife will serve cheaper foods. A very low price does not stimulate potato consumption as it does the consumption of fruits and some other foods, because at ordinary prices nearly everyone uses all the potatoes for which he cares. Because potatoes are perishable it is impossible to carry over a surplus from one year to the next. There is little demand for old potatoes when new potatoes can be purchased at a reasonable price. Any old stock carried

carried over is, therefore, a total loss to the owner. It is impossible for any man or group of men to regulate the production of potatoes or "to fix" prices. The most that anyone can hope to do, whether grower or speculator, is to hold potatoes in short-crop years until demand forces the price upward. The marketing agency for table stock potatoes, whether co-operative or regular, which plans a long-time program upon any other basis than that of efficient service, is fordoomed<sup>e</sup> to failure.

I quite agree with the author on the point he brings up, that large crops make for small prices, and small crops for high prices. The table used as an illustration does not give the amount or per cent of the potatoes produced each year, that were consumed, nor does he mention what happened to the surplus. It is quite evident that the consumer used only enough to satisfy his wants and large quantities either wasted in the warehouses, or were of so little value that they were allowed to rot in the pits. This happens occasionally here in British Columbia, and I beleive this is usually the case when there is over production, or when nature provides a large crop.

It is generally recognized that a good grade of any article will bring the best price, and so in years of large production only the best quality should go to the market. It is better to let them rot on the farm if there is no other use for them, than to send them to the market to take up storage space, and pile up expense and reduce prices to the point that production is discouraged, with the result of a smaller acerage the next year, and if it is a poor crop year there will be high

high prices with the usual result of an increase in acreage, with low prices again next year.

Another interesting point mentioned by the author is that it is impossible for any man or group of men to regulate production or "fix" prices. I quite agree with this point, but it does not mean that all growers acting together, through a central selling agency, cannot regulate production to meet the demand of the market. It may not be possible to regulate the amount of potatoes that will be grown, but the acreage can be regulated, and the amount that moves to market can be regulated, and in this way a healthy market maintained. The consumer has the last say in price and will curtail consumption if prices go too high.

High prices will encourage production, but if each grower has his returns reduced on account of this increase he will soon learn that he can only get a certain amount of revenue from his potatoes. If he grows fifty tons when his allotment is twenty-five tons it will cut his price per ton in half, in other words the half would be worth as much as the whole crop, if he is depending on the domestic market alone. Through central selling he would be assured of a market for many tons at a fair price. If he can feed the surplus to stock, he will at least get the cost of production for the surplus, and if any increased market develops he may be able to sell some of the surplus at a fair price. Other ways of using up the surplus are mentioned in another chapter, -by making into fuel alcohol, starch, glucose, flour etc. but it may be some time before any

any of these industries develop. In the meantime producers will have to plan to feed the surplus that they produce over and above their share of the market requirements.



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## Chapter II

Ways of determining price, or price "fixing".

I  
 "The Blind, or Haphazard Method. - This method or, more really lack of method, has been in vogue a long time, and still characterizes the practice over a large part of the world. This merely means the buying and selling on the basis of the immediate appearance of the supply-and-demand situation as viewed by the parties concerned. It may easily mean that one of the parties has no view of the market at all other than the offer of the other party. Such a situation usually suggests that it is the seller who is without information, particularly where the buyer is a middleman, but it may involve a thoroughly ignorant buyer, who particularly as a consumer, may pay altogether too much in view of existing conditions."

"The blind plunging ahead in price-making is fairly well illustrated in such a commodity as potatoes. The information is meagre and uncertain during the early part of the season. A sudden change in the weather may make a difference of twenty per cent in the yield, or a sudden fall in temperature in the digging and shipping season may make a profound change in the available supply. Until recently the potato trade offered a splendid example of the haphazard method. At present it is emerging from that state."

"The sale of fruit in a section where there is no established fruit market is a good example of the blind method. The

The seller knows little about qualities or grades of fruit, and possibly the buyer does not know much more. An instance of this kind occurred in the Middle West a few years ago. On a farm not in a fruit section was an apple orchard of several acres. This particular year it bore well. The farmer was not familiar with the work of harvesting apples. A storekeeper who had never handled any apples in a wholesale way made an offer on them, an offer which he thought was safe. He was surprised to get from the central market to which he shipped the fruit more per bushel than he had paid per barrel. In this sort of haphazard marketing the middleman, who takes a considerable risk, is likely to get the better end of the deal. Occasionally his lack of judgment carries him just as far in the opposite direction. It is a poor method of doing business, and one which does not speak well for the intelligence of those taking part in it. Extenuating circumstances, however, frequently exist in out-of-the-way places, and in such places the sort of marketing here described is to be found more often than anywhere else. One of the best instances of the blind, unstudied, price-making methods in connection with farm produce was that which was general in the butter and egg market before the days of cold storage. Each buyer bought and sold on the basis of immediate supply and demand, with the result that prices fluctuated greatly from season to season, and varied widely from place to place."

Speculative Method. - "In all marketing of a direct character, there is found some element of speculation. Neither the

the seller or buyer/<sup>know</sup> what the goods will be worth at a later date. Both take chances on future events, one by taking the present certainty rather than a loss or gain in the future, while the other assumes an active risk. But it is only the latter that is classed as a speculator."

"The speculator makes prices on the basis of his judgment of what prices will be in the future. It is a calculated price, but the calculations are made on information which is at best only more or less reliable, and on commodities that vary in price on account of the possibility of substitutes being used in the form of allied products. The speculator as a rule has but part of the information needed in forecasting probabilities. He usually does not control enough of the product to have any effect on prices in general, so his usual work is in predicting prices, and staking his money on his predictions, but he does not determine the price level. Since the introduction of cold storage, and proper warehouses, the range of prices have been narrower than they were previously, but it is not to be taken for granted, that speculators are the best agencies, for performing this desirable function."

The Projected, Calculated, or Bargaining Method. - "This method has been applied to marketing by marketing organizations usually growers' co-operative associations, which have a fairly complete knowledge, of supply, and as a rule a major portion of the supply. They are in a good position to know the demand as they have the necessary information. They are also in a position and have the power to arrive at a price at which the total

total supply can be moved during the season. The price may be higher at times, than it might have been under the competitive, and speculative system, and lower at other times, but in the long run it will likely average the same amount."

"Is a price made in this way, contrary to the best interests of society? There are two things to be considered in arriving at an answer. First is the price higher than it would have been, under the speculative method considering the whole season, when the growers would have sold their produce early in the season on a normally glutted market at a low price. Some of this might be sold at a low price but most of it at a higher price, which would likely be about the same average as that obtained by the association. So in the long run the public has not paid any more, for the product under a calculated price, than under a speculative system.

The second question is, does the grower receive more under the calculated method, or the speculative system? Usually the calculated method will bring the grower the greatest return, and a little higher price may be necessary, to keep the producer on the job, but prices cannot stay up indefinitely, as increased prices encourage greater production, which will make it necessary to lower prices, so in the end the consumer will benefit. Growers associations have to be careful not to put prices too high as they may have a considerable quantity of goods on hand, they also must be careful not to go too low as they may lose by not asking what the market will pay. The public would have a real cause of complaint if produce was des-

destroyed, so as to keep it from coming on the market. This often happens, especially in years of abundance when produce is not gathered, or is allowed to decay in storage because there is no market for it, as it would not pay expenses of moving it. The logical plan to dispose of any surplus potatoes over actual requirements, is to make some byproduct out of it, as described in a later chapter. A monopoly might be more effective than a growers association but none are in existence at the present time. It might be objectionable but could easily be regulated.

Feeding the market, is in reality a price fixing measure. It may not seem like an effective way of arriving at a price, but it is nevertheless, a means of getting out of a product, what the market at a given time or over a period of time will afford. This method of arriving at a price has limitless possibilities, it includes much of the best, in the methods discussed in the previous paragraphs. There is an element of speculation in it, but it plays a subordinate part, also an element of calculated price with a certain degree of bargaining power. In general these methods are not outstanding owing to the dominating feature whereby the management directs the movements. The market cannot be "fed" that is supplied regularly so as to avoid gluts and undue scarcity unless the association has control over a considerable supply. It is not necessary to have control over a major portion of the year's supply to achieve success, but to reach the highest degree of success, it should have control of practically all the supply.

Feeding the market is a way, of getting for the farmer or grower a price based on an orderly operation of supply and demand, in place of what the same forces working blindly would bring about. By this arrangement the producer may get more than he otherwise would receive, without raising the price which the consumer has to pay. This is possible because, by the orderly procedure of feeding the market, a relative degree of stability is maintained in place of violent ups and downs, which give opportunity for undesirable speculation. Feeding the market may involve holding part of the produce off the market, shipping to another market, or manufacturing into some byproduct as is often the case in the dairy industry, and is practiced by the Fraser Valley Milk Producers Association, where a large portion of the milk is made into various byproducts after supplying the market with the fluid milk it will consume.

This feeding the market involves not only control over the produce handled, but machinery for handling it, storage, transportation, agents, financial connections and such like. It may be said that it is easy to advise the farmer to feed the market, instead of selling blindly when he needs the money, but quite another matter to put the plan into practice. The Fraser Valley Milk Producers Association with head-quarters in Vancouver have put this system into practice, and have made a success of it. The same plan is used by corporations, especially in the meat business, where they have ranges raising beef cattle, and a complete line of operations right down to the retail stores.

An illustration of this is P. Burns and Co. who do all the services, from producer to consumer. If it is possible and profitable for them, it is just as possible and profitable for the farmer to do the same thing, and this has been done as mentioned above.

Price Fixing.- This method was used during the war and gave fairly satisfactory results, and it appears as an oasis in the desert in contrast to the demoralized prices of the succeeding months. But the work involved and cost of finding a cost of production, is so labourous that it is impossible to get figures up to date to base any price on. It takes months and may take years to get the cost of production of any one commodity, and even then a lot of it is only an estimate, so it appears to be out of the question to use this method. A monopoly or regulated agency that would feed the market will soon arrive at a price that will bring enough supplies to feed the market. If the price is too low production will fall and up will go the price, if set too high increase of production will take place causing a reduction in price.

### Chapter III

#### Movements Wherein We Co-operate

Under this heading we have three broad classes. Voluntary without any contract, voluntary with contract, and compulsory. In the first class, voluntary without contract, we have our churches which are supported by the people, through voluntary subscriptions. It is a fact that only a part of the people, support the churches, and many of the larger towns, and cities could not accommodate more than one third, to one quarter of the population, at one time, but they are an active influence in our system of society. Towns without churches usually have little law or order, and as new towns develop, churches, law and order usually come about the same time.

We also have lodges, societies, service clubs, and fraternities all working for the good of their fellow man, to make the district or town a better place to live in. They are fine examples of voluntary co-operation, carried on in the restricted field of service to fellow men, wherein interests do not clash as they do in the second class of voluntary co-operation, which usually has a contract.

In this second class we have the co-operative marketing movements, insurance etc. mostly on a contract basis or agreement, in a few instances contracts are not necessary, either because of loyalty to the institution or because members are getting better service than they can any where else, and it no doubt pays them to be loyal. In most cases, however, the contract

contract is in force, it has been found, a tie that binds most of the members, although many would be loyal without it. Many members who sign contracts are loyal whereas if there was no contract they might be tempted to sell to others, if an offer was received which they thought, might be better than the association price, and often getting the cash even if it is a smaller amount, than they would eventually get from the association means more to them, than a larger amount later on. These voluntary, contract co-operative movements usually result in a narrower spread between producer and consumer, and a levelling of prices.

On account of the variation of weather, seasons etc. the amount of farm products produced annually is considerably below or above actual requirements. If quantity is low prices go up, and all get good prices but when there is a good crop, prices tend to fall again, and it is the usual thing to expect the co-operative associations to handle the surplus, which usually results in making for lower prices for the co-operator. The independents think they are entitled, to sell all their product, in the high priced market, while the co-operator looks after the surplus, and stabilizes the market. In this way the independent gets more benefit from the co-operative association, than the members of the co-operative.

A co-operative with control of 85% of the product has a big influence in steadying the market, but they also have all the surplus to look after, making for lower prices to its members, than the independents are willing and able to pay. In gen-

general practice it works out that a co-operative is better off with 50 to 60% of the product under control, as the independents then have to bear the burden of part of the surplus, and the price paid about equalizes. The co-operatives have not been as successful as hoped for, on account of the reasons stated above, but there is no doubt that they have had an equalizing effect on the market.

Insurance of any kind is in reality a form of co-operation, as we pay into a fund that is used, for the benefit of all the policy holders, and the interest or earnings are used to pay dividends. This is a means of saving as well as protection. This protection can be secured through both mutual and stock companies. There is little difference in the service they render. The mutual companies do not pay interest on stocks as all their capital is built up out of premiums, and any earnings go to the policy holders, while the earnings of a stock company, are divided, part for dividends for policy holders and part for dividends on stocks owned by members of the company.

We now come to the forms of compulsory co-operation. The very thought of compulsion seems to make us want to rebel, and to many people it is the taking away of the last or remaining bit of freedom that they enjoy, or they think it is. There are many things however in which we are compelled to co-operate, that has become part of our lives, and they are not regarded as compulsion, but as a matter of fact they are. Some of the things in which we are compelled to co-operate are as follows. We all have to pay our share towards our schools, their up-keep, and

and cost of educating the children. In some places this is represented, especially by people who still use private schools, and are at the same time compelled to support the public schools. There are a few places here in British Columbia where this is the case namely, Victoria, and Duncan, Many of the residents in these districts, are from England, where private schools are common, and so <sup>we find</sup> they transplanted this system into British Columbia to some extent.

We all have to pay our share towards the schools, and our educational system. There are however a large numbers, who may think that because they pay no taxes, they are getting out of paying school rates, but they are not, as the taxes are paid out of the rent they pay, and must be paid by the owner, or he loses his land or property. The rent is based on the amount that covers taxes, and interest on investment, the owner usually tries to get depreciation as well, so as to be able to replace the buildings, and in some cases may get a profit above all this, but the taxes come first.

Along this same line we have our municipal councils with the many improvements they are compelled to carry out, and collect taxes for. Especially building and maintaining roads, ditches, water systems etc, which are generally a public owned utility. There are also, privately owned utilities for which we are compelled to pay, or we do not get the service, such as telephones, electric lights etc. Municipal hospitals collect any deficits from the people, and we pay it whether we approve or not, but most of would not want to see them removed, so pay our

our share.

We are also compelled to pay income taxes, if we earn more than a set amount, the amount exempt, varying in different provinces, and cities. Most places now have a compulsory gas tax we pay it before we get the gas. We are also compelled to pay for a car license, before we can operate our cars, and compulsory insurance seems to be a probability of the very near future. A two percent turnover tax, is also suggested in order to make up for falling revenues of the Dominion. If this plan is adopted we will have to pay it, as it will be added to the price of the goods we purchase.

Most places now have legislation compelling employers to make working conditions safe for employees, and limiting the hours they may work. We also have <sup>a</sup> minimum wage act. Old age pensions are paid by the government and we are assessed in various ways to get the money to make these payments.

Most of these movements or assessments are for the purpose of making conditions better for us all, or is taking from us in a compulsory manner, and using it to maintain those who will not or cannot look after themselves.

Orderly marketing of all kinds of produce or other production, and adopting methods so that the market could always receive just what it could consume, would do away with many of the evils of our present society, as having to look after the unemployed, destitute etc. Our present system of marketing has fallen down, so it appears as if some measure of compulsion will have to be adopted, in order to improve conditions, and

and make it possible for all to enjoy a higher standard of living. This method of marketing will be discussed in a later chapter.

We also have several forms of mutual insurance covering fire, hail, accident, life and property, in which we co-operate and help carry the risks of the other fellow and he helps us carry our risk. Many independents who insist on doing their business of marketing in their own way, are firm believers in insurance and are always protected in one or more classes of insurance.



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## Chapter IV

### Co-operation Covers a Wide Field.

A great many people look on co-operation or the co-operative movement as a marketing organization only. But it is far more than that, as it covers all lines in which we work together, whether for business, social, or educational purposes.

Co-operation in marketing is a business, but only one phase of the great co-operative movement. We find that co-operative marketing movements have started the much larger, and wider co-operative movement in motion, and each year sees the co-operative movement strengthened, and more members joining up. There are times when the movement seems to be slipping, but these periods are usually only temporary, and the net result is a gradual gain.

Co-operation is much more than marketing of members' produce or goods. With real whole-hearted co-operators it is in reality a religion, as they talk, practice, and live in a co-operative way. Every thing they do is done co-operatively, and they try to see that all receive fair treatment, and have an equal chance to share in a market, or help any movement for the good of the community. Denmark is a good example of putting into practice this doctrine. We find that in Denmark, which is purely an agricultural country, that practically everything is produced or sold co-operatively, and that they have built up a wonderful co-operative spirit. Co-operation is taught in the schools, and quite a large percentage of the children are able

able to attend the high schools, where they feature agriculture and teach co-operation and co-operative ideals. So the children grow up under the influence of the co-operative spirit.

Most co-operative movements have mottoes, and among these we find some that are outstanding. "Each for all and all for each" which suggests working for the other fellows' interests as well as your own. By so doing a co-operator improves his own condition. Another motto often used is the "Golden Rule" sometimes called the Golden Rule of Agriculture "Do unto others as you would have them do unto you". If this spirit could be embodied in every producer's life, there would be no need of talking compulsory co-operation, as all would join any co-operative movement, in which they had some produce to sell or buy, or by which they could help improve the district, and make conditions better for all.

The co-operator has a much wider point of view than the independent. He is usually willing to work for anything that is for the benefit of the community, district or country, as he knows that it will be to his own benefit to do so, and considers any help given in this way of as much importance as increased prices for his products. He gets considerable satisfaction from having helped, and in making the district a better place to live. He thus assists in raising the standard of living and at the same time is putting into practice, the Golden Rule.

The independent on the other hand, is thinking chiefly of profits for himself, and has the more narrow point of view. He is usually more satisfied, when he can get more for his product

product than his neighbor gets, than to co-operate and make it/  
possible  
for both to get an average higher than either got before.

Those opposed to co-operation claim that it kills initiative, but they do not give any evidence to support such statements. I consider that there is just as much chance for a man to use his ability in a co-operative movement as in any private enterprise. Private enterprises include all small enterprises where the owner is the operator, such as factories, warehouses, stores etc. where the owner owns at least a majority of the stock, if not all, and is the actual manager of the same. It cannot be considered a private enterprise, when the manager is an employee, as is usually the case with a corporation. A corporation is in exactly the same position as a co-operative, the only difference is that one raises capital from anyone wishing to invest, and engages its employees from president to office boy, as in the case of railways and other large corporations, while a co-operative raises its capital from among its members, and also employs those who operate it. So in many respects they are similar, the chief difference is in the objects of the two organizations, the corporation is after profits for its investors, and the co-operative is trying to make savings in operation, which go to the members. They both hire their employees, and these employees have equal chance to use their initiative. Considering the large volume of business handled by corporations, and co-operatives it is quite evident that initiative is not killed by working for them, and we usually find the ablest men employed by them to operate and manage their businesses.

The aim of co-operators is to be able to control the commodities going to market, in such a way that there will always be enough to feed the market, but not to over-supply it. In this way a fairly level price will be maintained and high prices will be eliminated, as well as low prices. This would be better for all concerned, except the speculator who takes his toll, when he can force prices up. The speculators by keeping out of the market, when the produce is flowing freely, helps to make a glut become general. Then producers are willing to sell, at any price in order to save additional expense, especially where consignment shipments are concerned. But as soon as the surplus is in the hands of the speculator, it is to his advantage to keep enough off the market to stabilize it, so that the prices will go up, and in the long run the consumer pays as much or more than he would if the market had been stabilized by a co-operative.

Forcing the producer to take a low price is an injustice directly to the producer, and indirectly to the labourer, who would be able to work many more days in the year if the producer got full value for his product, as he would then be in a position to purchase the things he desires to maintain a satisfactory standard of living. So in the long run society as a whole loses by the ups and downs of business carried on for private gain, with high prices which are always followed by low prices and depression with much unemployment and hardship.

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Hanson says in his thesis on the "Business Cycle Theory" that "the problem is to eliminate depression, therefore it is

I, Business Cycle Theory. Hansen.

is necessary to stabilize the price level, but how? He states further that " Veblen tackles this problem from the goods side of the equation of exchange rather than the money side. His plan for stabilization calls for a reduction in the output of goods. This may be accomplished in one of two ways (1) by an increased unproductive consumption of goods, and (2) by the elimination of competition " a secure monopoly is the remedy according to Veblen. Thus in a community organized on the price system a " salutary use of sabotage "- obstruction of industry and such restrictions of output as will maintain prices at a profitable level- is necessary to ward off depression. In no such community can the industrial system be allowed to work at full capacity for any appreciable interval of time. "

What Mr. Macken Thinks. ( Extract from the Daily Province )

Something like a religious fervor filled the air at the high school as the dairymen concluded their annual meeting. Indeed, according to Mr. Macken co-operation in marketing is a religious matter.

" This is a spiritual thing as well as economic," he declared " It means working out the brotherhood idea in a practical way. "

Mr. Macken is one of the most highly esteemed co-operators in British Columbia. He is given credit for having drafted the original milk bill, making co-operative marketing of dairy products compulsory.

## Chapter V

### Modern Trends in Marketing Agricultural Products.

Co-operative marketing of agricultural products was slow in developing although co-operative efforts in buying had been attempted much earlier. Starting early in the 19th century, we find there were many failures as well as successes in this movement which has continued right down to the present time. Co-operative marketing of agricultural products developed late in the 19th century in Denmark, where this system of selling has had probably the greatest measure of success. Its first co-operative marketing started in 1882 in the form of a co-operative creamery. This was a success, and by 1900 there were 900 co-operative creameries, by 1923 this had increased to 1335.

This movement was followed by co-operative bacon factories, and co-operative egg marketing associations, which have had a great deal to do with establishing a successful and intensive system of agriculture in Denmark.

Some of the achievements of these associations, are the developing of standard grades of commodities, and having large quantities of each grade under one selling agency. They have also developed an efficient system whereby they can gather eggs grade, pack and deliver them in England and reach the consumer, sooner than the home producers get their eggs on the market. Where the producers are not organized they do not realize the necessity of acting promptly in marketing a perishable product. Another factor is that the high grade of the Danish product

product brings a premium on the English market, over the home product, which speaks well for the Danish system.

About the year 1851 saw the start of the co-operative movement in America with a cheese factory at Oneida County, New York. It was followed by others, and by 1865 there were 500 producer owned cheese factories in New York state alone. The movement developed in other states as well, and by 1869 there were over 1000 co-operative cheese factories.

The introduction of co-operative creameries was a natural sequence to the co-operative cheese factory, and we find that this was another sphere in which co-operatives have been a real success. Both these movements made it possible to manufacture much cheaper and to put out a much better and uniform product, which commands a better price. It did away with the home system of butter making, where almost as many grades were produced as there were producers, and included good, bad, and indifferent products.

This was followed by a farmer owned elevator movement during the later part of the 19th century, and this movement has developed into some exceedingly large farmer owned co-operative and stock companies which are operated by the farmers.

There was a gradual development from the local farmer elevators to the federal and centralized types, and eventually the wheat pools. Many other branches of agricultural products have been organized into co-operative marketing associations, and pools, but the amount of success has varied. On the whole they have had the effect of stabilizing the market and giving

giving the producer a larger share of the consumers' dollar. That they have not secured the success that was expected of them is due to not having full control of the products. They have given good service in taking care of the surpluses, and have helped to keep the local market in a healthy condition, so that the independents were able to pay a little more as they sold all on the local market. This has always been a cause of much discontent among members of co-operatives, as they have had to hold the umbrella up, by looking after the surplus, while the independents have taken shelter under it without giving any support.

There has been a great many plans worked out during the past twenty years, to try and give the primary producer a larger or fairer share of the consumers' dollar. Most of these have been on the basis of almost or complete control of the commodity, some have been put into practice, some have been tried and discarded. Many of these plans have been worked out with the idea of trying to give the producer the benefit of a protective tariff where a surplus is produced, in other words to make the tariff effective. I will mention some of the more prominent of these.

The Stevenson plan used by Great Britain to control the distribution of rubber. They had about 70% of the supply under control. The plan was effective for about eight years, or until other sources of supply had been found or developed.

This plan allowed enough rubber to be exported to about meet the demand, abroad. If the supply was getting short and

and prices advanced, on account of increased demand, more rubber could be exported, but if prices fell exports were curtailed. For some years the price was held fairly stationary, but a shortage developed at last, that sent the price away high, and the plan was finally discarded as other sources of rubber were secured. The supply could only be adjusted every three months. This was a weak point, as the price trebled within a three month period at one time on account of a shortage, and production efforts in other places were increased which finally brought about the abandoning the plan.

Another plan which has given good satisfaction, and is still in operation, is the Patterson plan, which is being used for dairy products in Australia. This plan makes a twelve cent tariff effective. The last press report on the situation shows that they paid nine cents per pound on butter exported during 1930. This bonus is secured by taking or keeping back a part of the proceeds of the butter which is sold for domestic purposes. This amount is equal to approximately 80% of the output. About two cents per pound is kept back for the bonus on the exports, which amounts to about 20% of the total product. This gives the producer the benefit of the tariff on the home market, and the bonus on the exports, taken out of the home or domestic sales, gives an average or pool price about two cents below the domestic price, which is world price plus the duty. Butter sold at world prices cannot be classed as dumped goods, the consumer at home however is at a disadvantage and pays the extra amount which makes the industry a fairly profitable one.

The Domestic Allotment plan, has been advocated in the United States. It has some advantages and some disadvantages. In reality it accomplishes the same purpose as the Patterson plan but it is a cumbersome one to administer. This plan allots to each producer a percentage of the home market, based on a five year production average. The producer can sell his allotment certificates which are worth practically the duty or tariff on that commodity. These can be sold at any time and are a source of credit for the farmer. Millers must purchase these certificates in equal amount to that which they grind. The balance must be exported at world price, so each producer exports in proportion to the amount he produces over and above his allotment for domestic purposes. This does not encourage overproduction as it is sold at a lower price. The amount of duty is counted as part of the returns of the domestic price.

The Export Debenture plan, which was worked out in the United States developed from an idea that they borrowed from Germany. With this plan, the idea was to issue debentures, which would be about equal to the tariff per bushel, and give them on all grain exported. These debentures could be used to pay import duties, and would be bought up by importers at slightly less than their face value. This plan would encourage exports, but would be a severe drain on the treasury, and it would most likely be taken exception to by importing countries, and they would in all probability put on a tariff to keep out any grain that was literally being dumped on their markets, with a bonus on it. Germany and France have already put on such high tariffs

tariffs that it is impossible to export to these countries. This would be a sure way of raising the price, as the domestic price would rise to world price plus the tariff, and give the greatest return to the producer, but it would be an added expense to the consumer, as he would pay directly the increased price on the domestic grain, and indirectly the debenture bonus on the exported grain.

wheat

In the United States the pegging of prices has also been attempted. The wheat board is in a position to buy up grain if the price goes down and sell if it rises. On account of the general fall in world prices the board stands to lose a lot of money, as much grain was bought considerably above a dollar per bushel and will likely be sold for much less. This is a price raising measure, but the increased price is coming out of the treasury. A much better plan, I believe, would be to establish a price within the country, it should be a set price with all imports of the commodity barred. A price that would rise and fall with the world price, plus the duty or almost the amount of the duty would not be <sup>so</sup> successful. A set price would be more satisfactory, they could make an initial payment of 70% and use the balance to even up the export sales, by pooling both domestic and export sales, thus paying a pool price for all grain of each grade at destination, (Fort William or Vancouver). This would work out in a similar way to the domestic allotment plan, but would not be so cumbersome. It would have to be a compulsory measure, and might have many objectors on this account. A set price could be established for say ten years, and if at any

any time the export price exceeded the set price for home consumption, the Canadian consumer would get the benefit of the difference as the price of bread would remain stationary.

The situation on the Canadian prairies has/<sup>developed</sup> into a general demand for 100% compulsory pools to handle the wheat situation. This is in reality the outgrowth of the success of the wheat board which operated to handle the wheat crop in 1923-24. The wheat pools were quite successful from their inception up to the big crop of 1928, when a large surplus piled up that has not been disposed of yet. With the decreased purchasing power of some importing countries, and prohibitive tariffs of others, as well as new supplies/<sup>from Russia</sup> being dumped on the market, making the present low price the lowest on record for Canadian wheat. In this we see massed competition, which is not much better than individual competition.

Coming to British Columbia we find that there has been many attempts at co-operative marketing with varying degrees of success. But the old story of holding up the umbrella is in evidence here as elsewhere, with considerable dissatisfaction among the members of co-operatives who have to take a little less than independents, and considerably less than they would, if there was 100% control of the product so as to eliminate competition. 100% control would give the producer a chance to get the benefit of the tariff which is supposed to be for his good. Competition however brings the domestic price down to the world price, if the surplus is uncontrolled.

In order to assist the fruit and potato growers of B.C.

British Columbia an act was passed in 1927 known as the Produce Marketing Act. This act has been administered by a Committee of Direction which has had some effect in stabilizing prices. An attempt was made to supply the various markets with what fruit they could consume. The system gradually lost ground as more independents entered the field. A spirit of resentment developed against the Committee, and the act was violated repeatedly until it became impossible to enforce it. On top of this an appeal to the Supreme Court of Canada, against a conviction in a lower Court and appeal to the Supreme Court of B.C., was made. Judgment handed down on February 16th 1931 stated that parts of the act were ultra vires of the power of the Government of B.C. So the act will not be enforced unless an appeal is carried to the Privy Council and the conviction is sustained there.

The potato growers were in a similar situation to the fruit growers. They had the assistance of the Committee of Direction which tried to stabilize the market but as the act was a measure without any teeth it was hard to enforce it. It might have worked if the Committee had had the actual selling of the produce, but when they did not there was no control and many evaded or broke the law. As they did not do the actual selling it was found difficult to collect the assessment on each box of apples, or bag of potatoes. The collection of these assessments caused a great deal of trouble with many court cases which finally led to the act being declared ultra vires as mentioned above. With this decision it becomes in-operative

in-operative and we find that the Committee of Direction ceased to function as such on March 7th 1931. A season of destructive competition appears to be the only solution or way to bring the growers together. They will then see the necessity of demanding a Dominion compulsory act to control the sale of all produce. This is a possibility in the near future as the prairie provinces are asking for 100% controlled selling agencies to handle the wheat crop, but may not be able to secure this control through provincial legislation in view of the decision, re the Produce Marketing Act of B.C.

When it became apparent that the Produce Marketing Act of B.C. was not fulfilling the purpose for which it was created it became evident that some other system should be adopted, and a plan for a 100% compulsory pool has been developed. This would assure each grower of getting his share of the home or domestic market, with the increased price that the tariff will give him, also have him assume his fair share of the export or lower priced world market. There are many supporters of this plan, and many who oppose it. A bill is being presented in the British Columbia legislature at this session asking for a 100% compulsory pool, which if passed will go into effect, after a vote is taken, if 60% of the growers are in favor of it. It seems a rather drastic measure, but it appears to be the only way to solve the problem, so that each grower will get his share of the home market, and the increase in revenue from his crop that the tariff would give, and at the same time make him share in the export, or in other words make him responsible for his

his share of the surplus which he grows over and above domestic consumption.

The dairy situation of the Fraser Valley of B.C. was in a similar condition to that of the fruit growers of the Okanagan, but they were not troubled about exporting any surplus, they do some exporting of condensed milk which brings a good price. The trouble in the dairy industry, was that the Fraser Valley Milk Producers' Association were holding up the umbrella, as is so often the case with co-operatives. They had to build or acquire plants to look after the surplus milk, and make it into butter, cheese, powdered milk, condensed milk etc., while many independents assembled and distributed milk in and around Vancouver. They bought just what they needed for the whole milk trade, and paid seven cents per pound butter-fat more than the Fraser Valley Milk Producers' Association could pay when the price of by-products was counted in the settling price. This caused considerable discontent among the members.

The Fraser Valley Milk Producers' Association was in a unique situation, they were an integrated organization, handling the product through all stages, from the producer to the consumer, for part of the fluid milk trade. They also sold wholesale to many distributors, to hotels, cafes etc., and manufactured the balance into other products. So we see the industry was in a fairly healthy condition, except for the fact that the independent shippers were getting about seven cents per pound butterfat more than Association members, and even at this rate of settling the independent distributors were getting an extra six cents

cents per pound B.F. over and above the recognized cost of distribution which pays all expenses and gives a profit. This increased price to the independent shipper, and increased price to the producer distributor created a great deal of discontent as mentioned previously. Gradually the idea<sup>developed</sup>/of making all producers share in the manufacture of surplus milk, and lower price received for by-products, until an act was asked for, making it compulsory for all dairymen in the Fraser Valley to share in the disposal of the surplus.

There was considerable opposition to the act, which was based on the report of the Milk Enquiry Commission, under the chairmanship of Dean F.M. Clement of the University of British Columbia. This enquiry was held during 1928, and they made a thorough investigation into the dairy industry in the Fraser Valley and the area which comprises the milk shed of Vancouver. Strong pressure was brought to bear on the Government by the producers, and an act was passed in 1929 entitled the "Dairy Sales Adjustment Act." This Act made provision for a committee of three, one appointed by the independents, one by the Fraser Valley Milk Producers' Association, with the chairman appointed by the Government. The cost of the Committee to be met by the producers. The act was not to be put in force for a year or until it was found impossible to make a satisfactory arrangement between the Independents and the Association. An attempt was made to work out a plan agreeable to both, but it was impossible to make any satisfactory arrangement, and the Government was asked to put the act in force. The Act came into force on

on January 1st. 1930 when the Committee as appointed started to function.

The results of the first year's operations have been highly successful as a whole, the price of butter declined about eight cents per pound wholesale, the production in the area increased 17% during the year, but the Committee was able to pay the producer, practically the same price per pound B.F. as they received during 1929, without raising the price to the consumer.

Most of the Independents complied with the Act although many objected to doing so, some refused to pay any proportion of their sales into the Committee (these are known as the Ginger group.) Apparently they hope to have the Act declared ultra vires, when some cases are taken into court. They little realize the condition which would develop with uncontrolled competition in full swing. A price war is a probability if this system of orderly marketing is destroyed.

I

Disposal of the Surplus Milk by the F.V.M.P.A. - The by-products of the surplus milk which amounted to 41.3% of the total in 1928 was made up as follows - butter 26.1%, casein .4%, powdered milk (skim). 2%, condensed milk 13.9%, cheese .7%. The butter was all sold in British Columbia, while the other products find markets in various countries throughout the world, China, Japan, South America, and Great Britain chiefly. This illustrates how a surplus can be marketed in an orderly manner, when it is all under one control.

The operation of the Act did not destroy competition, as the distributors were allowed to deliver as usual, they could

could not cut prices, but could compete in service and quality. Preferred raw milk and some special brands do not come under the Act, so the tendency has been for this trade to increase greatly, and thus avoid paying any share of sales into the adjustment committee.

It has been known for years that a great deal of the expense in distribution has been caused by duplication in delivery. Recently plans were developed and a new distribution company formed which took over about 95% of the milk distribution business, it included the Fraser Valley Milk Producers' Association and several of the independent distributors, The balance or 5% being looked after by independent distributors with special milk. It was found by the Commission which investigated the industry, that a saving of about seven cents per pound B.F. could be obtained by eliminating the duplication in delivery. The new company took charge of the milk delivery business on January 1 1931, and are working out a system to eliminate several delivery rigs from delivering in the same blocks or on the same streets. This will make a further saving for the producers and allow for a considerable expansion in the industry and still get the same price, as previously, which considering the present depression is a wonderful achievement, as the general index of practically all commodities has gone down very fast during the past year. This lower index on general commodities, makes for a lower cost of living for the producer, as well as a lower cost of production of dairy products, especially in the lower price of concentrate feeds that have to be purchased, these are down about 50%.

The poultrymen of British Columbia find themselves in a similar position to the dairymen. The B.C. Egg Pool has been looking after the surplus eggs and has stabilized the market, since it came into operation two years ago. They have about two-thirds of the total egg product of the Fraser Valley and Vancouver Island, while the independent dealers and producers have one third, which supplies practically all of the local market. This puts the egg pool in the position of looking after the surplus, or holding up the umbrella. Their chief market is in Eastern Canada, where the Canadian Egg Pool maintains a sales agency, and disposes of the surplus eggs. When the local market is best the Independents have the advantage, but at times the outside market is best and the Egg Pool then has the advantage as they have the supplies and the connections.

During the past year the dealers who purchased and stored eggs, put too many in storage, this no doubt was on account of the depression which set in, resulting in the decreased purchasing power of the consumer. The price of eggs did not go up as high as usual during the fall of 1930, and storage eggs moved slowly. As fresh egg production increased it became apparent that the storage eggs would <sup>not move</sup> so an attempt was made to move them by reducing prices, which caused the price of fresh eggs to fall too. On January 1st according to the Dominion Government report on the situation there were over four million dozen eggs in storage whereas the usual supply was just over one million dozen. Along with this we had a mild winter all across Canada and many flocks in the areas which usually do not produce any eggs

eggs at all in the winter, have been laying this year, consequently a great surplus developed, and prices dropped to a very low level, the producer getting from 17 to 19 cents per dozen for December and January. This was not as serious as it would have been a year ago, when feed was double the price. Flocks have been culled out and many of the boarders have gone, the production was not decreased very much by the culling but the cost of production was reduced.

The poultry industry is not in a healthy condition at present and we find that there is a demand for a compulsory pool or central selling agency to handle all the eggs, and eliminate competition. This is a good move, as the market could then be stabilized, the pool could have all surplus in storage, and would be in a position to export if too large a stock was developing. The only time that eggs can be exported to England is for the fall trade, and all our surplus or storage eggs, over what is required to supply the home market, during the fall, while the hens are moulting and while the pullets are coming into laying, should be exported. This would leave a clean market, and we would not have the terrible slump which we have witnessed this winter.

If the packers had got together last August, and shipped the largest part of the surplus four million dozen that was still on hand January 1st, they would likely have at least broke even, if not able to make a profit, instead of taking a loss of about ten cents per dozen on eggs they purchased last March, April and May, at around twenty-eight to thirty cents per dozen, and have paid storage on since. A central selling agency would

would be in a position to go after the export market, and have supplies to fill orders of practically any size, whereas the independent dealers were not able to do this, on account of not having a sufficient supply to go after the foreign or export market.

During 1930 the Canadian Egg Pool secured an order for two thousand cases of eggs, to be shipped during August of 1930 to Great Britian. They put these eggs in storage at New Westminster, but when the boat arrived to load the shipment, it was found that the cold storage facilities were not suitable, and that there was danger of the eggs becoming tainted, so it was considered the wisest plan to cancel the space. It was too late to arrange for other space to ship from Vancouver, and get them there in time. The management wished to fulfil the order, and ~~the~~ <sup>manager</sup> retain the connection, so the general~~l~~/went to Montreal and tried to secure eggs from independent dealers, with which to fill the order, or else have them fill the order and have the eggs replaced by the Egg Pool. They refused to consider the proposition, and the order for 2000 cases or 60,000 dozen had to be cancelled. These eggs helped to swell the surplus, and break the market in December as fresh eggs came forward in large quantities.

The Canadian Egg Pool is working on a plan now, that will take care of such a surplus in the future. They plan to go into the storage business in a large way, and ship large quantities of storage eggs during the summer, to help supply the fall demand in Great Britian, and at the same time keep the local market healthy. They plan to build up an export department to

to handle these eggs, and hope eventually that an export department or board will be developed to handle the export of all agricultural products. Under the present plan they expect to be able to make a fair advance on the eggs stored. Arrangements are under way with the Governments of the four western provinces to have a guaranteed advance of eight cents per dozen on the storage eggs produced in the four western provinces. It is not likely that they would ever be called on to make any payment, as it seems impossible for eggs to go below this price. It may be necessary to enact compulsory pooling legislation before this plan can be put in force effectively. If the provinces have not the power to do so, it is up to the Dominion Government to take steps to make such a marketing scheme possible.

Most of our laws, are made to make the few live and act, so as not to be a menace to society, but when it comes to marketing produce, competition reigns supreme. Competition is claimed to be the life of trade, but it is also the death of profits. Until recent years it was considered that a man had a right to grow and sell as he liked, but this idea is changing, even if a percentage of the producers still claim that right. It appears to be time that our legislators rose to the occasion, and passed acts making it compulsory to market produce in the manner that the majority of producers decide, so that a few individuals cannot take advantage of the stabilized markets, made so by the co-operatives and pools, or go out and under-sell, or cut prices in order to dispose of their product, and leave the other fellow without any market.

The time has arrived to make every producer responsible for his own surplus, and also to give every producer his share of the local and domestic market. This can only be done through 100% pool or central selling agency which has control of all the product.

The demand for controlled marketing is growing throughout the world, it is not just a local condition, as I have pointed out earlier in this chapter. I believe we can get this class of legislation and make it a success, but it is up to the producers to demand it, and if the consumer can be solicited to support the move, he will find that it will be greatly to his own advantage in the long run, as he will not have to pay any more than he does at present, and will probably get his produce for less. Production will thus be maintained on a satisfactory basis and as the producer gets greater revenue, he will be able to increase his standard of living, and make larger purchases. This means more work for the consumer, who is the producer of the goods which the farmer will buy and in this way bring a greater measure of prosperity to all.

The British Government has a marketing bill before the house at the present time, that has passed two readings, which if finally passed <sup>and</sup> put into effect will control the sale and marketing of all farm produce in Great Britian. Only the growers and the Government will have any say in the matter. The following press reports taken from " Butter-Fat " February 1931, the official organ of the Fraser Valley Milk Producers' Association. published in Vancouver, B.C.

" Drastic remedies justified to save Agriculture. Year after year the agricultural producer is asking more awkward questions as to why his industry is doomed to continuous uncertainty in the matter of returns. Great Britian has,at last come to beleive that something must be done for the depressed condition of its Agriculture and Parliment has introduced the " Agricultural Marketing Bill ". Of this the British Minister of Agriculture,Dr Addison says " The Agricultural Marketing Bill introduces a Principle,- The principle of compulsion,which is congenitally repungent,not only to farmers,but to all English speaking folk. But it is never the less a principle which at every stage of our daily life,we are compelled to accept,and which we consider individual examples,we would not for our welfare willing forego. We may not destroy our neighbors property,we may not drive a car at night without lights. Behind these examples there is the common idea that none of us would do things which would injure other folk,and that is equally the reason for giving farmers compulsory powers. "

" Speaking over CJ-BR recently R.H.Milliken,Saskatchewan Wheat Pool Solicitor dealt with the objection that the proposed referendum on the 100% pool is un-British. Mr Milliken referred to the bill the British Government has prepared and bringing before the present session,providing for 100% pooling of certain farm products,including milk,potatoes,hops,wool,cereals,cheese and livestock,and pointed out that " No one in the United Kingdom is to have any say as to whether these commodities come under the act except the growers and the Government."

I  
 " In its capacity of executive organization for measures for the promotion of poultry raising, the administrative authority of the Comitatus of Bihar ( Hungary ) has issued an order directing that in any commune in which two-thirds of the poultry farmers wish to keep improved breeds, all the breeding stock of inferior poultry must be replaced by improved breeds. This new measure has already been applied in four cases. "

It is usually the case that laws have to be enacted to control the minority. In many lines our activities are curtailed, we are not allowed to be a public nuisance or annoy people. A majority can impose beer parlors on a district, and majority votes elect our members of councils, governments etc. They can pass legislation to suit themselves and those who are opposed have to accept it. So there is no sound reason why farmers if in the majority cannot have power to control their industry.

I. Poultry. by A. Fold. Budapest, 1930 . International Institute of Agriculture. Rome, Italy.

(April 1 31) Note-The B.C. Govt. has refused to guarantee a loan of \$50,000 to the B.C. Egg Pool, so it is doubtful if any eggs can be put in storage for export. The Banks make advances on eggs for domestic use only. The Bill providing for a Central sales agency to handle the fruit crop, was thrown out by the Legislature, so uncontrolled selling will likely be in full sway this coming season. The Dairy sales adjustment Act was amended but only after a big fight in the house, and many stormy sessions. The chief amendments were dropped before being passed. )

## Chapter VI

### Production of Certified Seed Potatoes.

Potatoes are reproduced by planting enlarged rootstalks , in the form of tubers. These may be in the form of small potatoes, or parts of large potatoes, which have been cut so as to leave at least, one eye in each piece or set, two eyes would be preferable. They are also reproduced by planting seed, which is found in the seed balls. These seed balls are similar to tomatoes, and are found in some varieties quite often, but they do not reproduce true to variety. By planting this seed we get new varieties, but it is only occasionally that a new variety is found that is better than existing varieties. It takes three years to find out if a variety grown from seed is of any value, and several years after that to try it out in different districts, to prove its worth. Most of the new varieties of potatoes grown from seed are of poor shape or type. Many thousands of these seedlings are discarded, for each one that is kept or promises to be of value.

On rare occasions, new varieties may be secured through Bud Mutation, but it is only very rarely that this takes place in potatoes, or that the phenomenon is noticed. The only case that has come to my notice, was one that developed in Duncan on Vancouver Island on the farm of Phillip Fremlin. A new variety was found growing in a field of Gold Coin potatoes. He had purchased the seed from a seed house in Vancouver, so it was impossible to trace the origin of the seed any farther. When he dug

dug the crop in the fall he found four hills entirely different from the Gold Coin, but they were all alike. They were smaller than the Gold Coin, and had a copper colored skin. They were a very good quality potato and a good yielder. He named them "Cowichan Leader", after the district in which Duncan is located.

I sent a sample of these potatoes to the Windermere Experimental Station at Windermere, B.C., and they were grown there for a few years, during 1926-28 at least. The reports that I received showed that they were among the highest yielders there. Mr. Heath, the head gardener at the time, advised me that he never got such a surprise in all his life as he did with these potatoes. As mentioned previously they were a copper colored potato when grown at Duncan, but when they were dug at Windermere they were white, and turned pink in blotches after digging. They were also much larger and longer than the original seed grown at Duncan.

For centuries the plan followed in growing potatoes has been to plant small whole potatoes or potato sets secured from larger potatoes by cutting into two, three or more pieces, each piece having an eye or a cluster of buds from which the new plant starts. Potatoes are really enlarged underground stems, with a store of food to nourish the young plant until it becomes established and has developed a root system of its own, and is able to draw its nourishment from the ground. This stored up food is also a valuable source of food for human consumption, and on account of the ease with which potatoes are grown

grown, is much in demand as a staple food.

Small potatoes are of little value commercially, so they are usually used as stock food or for seed. In many districts the small whole potatoes, about two ounces, are preferable for seed, but in other districts the cut seed is equally as good, and in some cases better. Where the ground is wet, and in peaty soil, if the water table is high, cut seed is apt to rot, and in real dry land the tendency is to draw the moisture out of the cut potato, and hinder germination, or stop it entirely. We find that the small whole seed gives the best results in these cases.

Some Whole Seed Vs Cut Seed. Experiments were conducted during 1928-29-30 on the Certified Seed potato plots at Sumas and Lulu Island B.C. These experiments were in charge of H.S. MacLeod, Chief Inspector of the Certified Seed Potato Inspection Service for B.C.

	Whole Seed tons per ac.	Cut Seed tons per ac.	In favor of whole Seed, tons per ac.	Percentage increase
1928	15.2	4.6	10.6	243
1929	10.2	7.8	2.4	30
1930 X.	8.62	7.07	1.55	22
1930 Y.	4.50	3.20	1.30	40

X. Average of four varieties of main crop potatoes.

Y. " " eleven " " of early commercial potatoes.

1928 results from experimental plots at Sumas.

1929-30 " " " " Lulu Island. B.C.

These experiments were carried on to determine the value of whole seed over cut seed for low lying lands, that are cold and wet until late in the spring. Cut seed rots in many cases

cases on this type of land, making a poor stand and thus reducing yields. The rotting of seed accounts for the big variation in yields for 1928, when the experimental plots were on the Sumas reclaimed area. During 1929 and 1930 the plots were on much drier land on Lulu Island. The past two summers were dry, and the variation in yield was not so marked, but even this increase in yield from whole seed is of considerable importance.

Results obtained at Charlottetown P.E.I. reported in the 1927 report of the Division of Botany, show similar results. -  
 Size of potato seed-piece, - An experiment to determine whether small sets can be used economically for seed purposes. Four years' observations reveal the tendency to be constant, of conformity of plant growth with the size of seed piece. Not only have whole tubers produced heavier and more vigorous plants than cut sets, but the size of the plant increased in direct proportion to the weight of seed-piece used.

Results of size of set experiment-1927 (table 66) Table 5

Kind of set. oz	Yield in Bu. per ac.			Percentage of culls %	Order of merit
	marketable bus.	culls bus.	less seed bus.		
<b>Whole tubers</b>					
3	161 $\frac{1}{4}$	140	245	46.5	4
2	187 $\frac{1}{2}$	97 $\frac{1}{2}$	247 $\frac{1}{2}$	34.2	3
1 $\frac{1}{2}$	199 $\frac{1}{4}$	104 $\frac{1}{2}$	275 $\frac{1}{2}$	34.5	1
1	177	91 $\frac{1}{4}$	248 $\frac{1}{2}$	34	2
$\frac{1}{2}$	143 $\frac{1}{4}$	64 $\frac{1}{4}$	198	31	8
<b>Cut sets</b>					
1 $\frac{1}{2}$	178 $\frac{3}{4}$	70 $\frac{1}{2}$	231 $\frac{1}{2}$	28.3	5
1	164 $\frac{1}{2}$	60	204 $\frac{1}{2}$	26.7	6
$\frac{1}{2}$	161 $\frac{1}{4}$	48	199 $\frac{3}{4}$	23	7

Average yields in bushels per acre from potato sets of different weights over a period of 4 years. (table 67) Table

Table 6

Seed piece oz whole tubers	Seed per ac. bus.	Yield per ac Total bus.	Market able bus.	percent- age of culls %	Seed deduct- ed bus.	Order of merit
3	56 $\frac{1}{4}$	394 $\frac{3}{4}$	276 $\frac{1}{4}$	31	338 $\frac{1}{2}$	1
2	37 $\frac{1}{2}$	350 $\frac{3}{4}$	255 $\frac{1}{4}$	29	313	4
I $\frac{1}{2}$	28	347 $\frac{3}{4}$	256 $\frac{1}{2}$	27	319 $\frac{3}{4}$	3
I	19 $\frac{3}{4}$	317	239 $\frac{3}{4}$	25.5	297 $\frac{1}{4}$	6
$\frac{1}{2}$	9 $\frac{1}{4}$	272	219 $\frac{1}{4}$	21.5	262 $\frac{3}{4}$	7
Cut sets						
I $\frac{1}{2}$	28	358 $\frac{1}{4}$	279 $\frac{1}{4}$	22	330 $\frac{1}{4}$	2
I	19 $\frac{3}{4}$	321 $\frac{1}{4}$	254	22	321 $\frac{1}{2}$	5
$\frac{1}{2}$	9 $\frac{1}{4}$	266 $\frac{1}{2}$	217 $\frac{1}{2}$	20	257 $\frac{1}{4}$	8

" One important observation is the perceptible yearly decrease in yield. (The results of 1927 were about 20% below 1926) Inasmuch as the plants in this experiment have been practically free from virus diseases, this reduction might be better explained by the fact that the same plot has been given over to potato experiments continuously. Where a rotation is followed, it is doubtful if this noticeable reduction in yield would occur. It is evident that small tubers planted whole will return fairly good crops; but the practice should be indulged in only when seed is scarce or expensive, and the farmer is sure the seed represents a good-yielding, disease-free strain, bearing in mind that good seed stock is found only in healthy tubers which conform to type and variety. "

" The results from these experiments (tables 5 & 6) must be analysed from the view-point of the growers of Certified Seed Potatoes. As might be expected, yields have not been in absolute agreement from year to year. In the main, however, tendencies have been comparable. Larger seed-pieces have returned greater

greater yields, along with a proportionate increase in culls, as will be seen in the averaged results of four years' work (table) 6). In addition to producing the most culls, 3-Ounce tubers require the greatest amount of seed per acre. On the other hand the  $1\frac{1}{2}$ -ounce cut set (3-ounce tuber halved), requiring one-half as much for seed, yields slightly less certified seed. Similarly it will be seen that the  $1\frac{1}{2}$ -ounce whole tuber is more profitable than the 2-ounce whole."

The results obtained locally show a marked advantage in favor of whole seed, for Fraser Valley conditions, but good results may be expected from cut seed, when conditions are favorable, and the soil is well enough drained, to get warmed up before planting time. Types of soil and climatic conditions are big factors in the production of potatoes. It has been found that potatoes do better in the cooler climates or where the soil can be irrigated.

The use of fertilizers, manures, soiling crops, and rotation of crops are important factors in production of potato crops, but will be considered in a later chapter on the production of commercial potatoes.

It will not be out of place however to mention that all these factors play an important part in the production of good seed. Large yields are more profitable and usually have the smallest percentage of culls or small potatoes. Having an abundance of plant food encourages a strong growth, which is usually the healthiest growth, and potatoes grown under these conditions appear to be the most resistant to disease.

As mentioned above climate plays a big part in the production of clean healthy seed, and we find that districts that are dry and hot in the summer do not produce good seed. If the soil which tends to be hot is irrigated, there is a big change in soil temperature and healthier seed is produced. Where dry, hot, or unfavorable conditions are not changed by man the seed tends to run out very quickly. This was demonstrated at the Summerland Experimental Station as reported by the Division of Botany for the year 1927 in their annual report,<sup>I</sup> "In the dry belt of the province, of British Columbia, virus diseases of potatoes are quite general. Of these diseases, mosaic has been, up to the present, the most prevalent, and growers have had difficulty in trying to keep their various strains of potatoes free of infection. In an attempt to overcome this difficulty, many growers began importing certified seed from another section of the province. These attempts appeared to be disappointing, for, although for the first year results were sometimes fairly satisfactory, during the second year infection was fairly severe, and in the third year's growth the crop was nearly wholly affected.

The existing conditions may well be illustrated by observations made by this laboratory on plots at the Summerland Experimental Station. It so happened that at the Farm there were growing three different plots: one from northern grown seed that had been planted locally for the two previous seasons; one from similar seed that had been grown locally for one

I. Report of Division of Botany, for the year 1927.

one season; and one plot from the current season's northern grown seed. A comparison of the three plots showed that in the plot of new seed the infection was less than 2 percent; in that of seed grown locally for one year infection ran about 85 percent; and in the plot of seed grown locally for two years 100 percent of the crop was affected.

As a result of this condition the growers have recently adopted the practice of importing new seed each year, and naturally the question has arisen as to why there is this rapid deterioration in their imported seed. There seems to be two possibilities as to the reason for this trouble. One is that the imported seed may already be inherently infected with mosaic when it is brought in. As is generally believed, mosaic symptoms are sometimes masked due to certain environmental conditions of climate, and it is possible that the seed comes from localities where masking occurs. The second reason is that there may exist certain local environmental conditions whereby vines, although originally free of the virus trouble, readily becomes affected."

The plant food in the soil at Summerland is not deficient but is not available for plant growth unless irrigated so the effect is the same as if the plant food is not present.

During the years 1923-24-25, while I was inspector of certified seed on Vancouver Island, I observed a similar tendency for potatoes to run out or develop mosaic very quickly. During the past ten years certified seed has been produced at Courtenay with very small amounts of virus disease present. Seed grown there has given good satisfaction year after year in that dist-

district, and it usually gives good satisfaction for the first year that it is grown in other districts. If conditions are favorable for potato growing, and there is enough plant food for the crop, it is quite easy to grow crops year after year, that are practically free of the mosaic and leaf roll diseases.

In 1923 I inspected a two acre field of Green Mountain potatoes in the Victoria district that were free enough of virus disease to pass inspection quite easily. The seed came from Courtenay district, being grown there in 1922. ( I might mention that growing conditions at Courtenay are much more favorable than at Victoria. Courtenay has an annual rainfall of 47 inches, the larger part of it coming in the winter but a fair amount in the summer, while Victoria has an annual rainfall of 25 inches and practically all of it coming in the winter, so that the growing season is usually dry and hot. ) There was a fairly good yield from this two acres and the grower graded out nine tons which passed tuber inspection and were certified. This seed was purchased by a seed and feed store, and sold to other growers. Many of these growers asked for inspection, and I found on first inspection that there was from 20 to 35 per cent severe mosaic in every one of these crops. Another field of Green Mountain potatoes grown near Victoria for a longer period, two seasons or more was very suspicious of having mosaic, It had patches of from a few square yards to a square rod or more where apparently all potatoes were affected with mosaic. This patchy condition indicated that there was a soil condition which gave it this appearance. The field was on a slope and the lower half had

had practically all of these patches. I recommended to the grower to divide the field and use the apparently affected part as commercial potatoes, and keep only the top part of the field for seed. He did this and the following year he sold 12 sacks of potatoes as seed, the buyer did not ask for certification, so I do not know how they turned out. The Experimental Station at Saanichton B.C. wanted some of this seed and I secured 50 pounds for them. These were planted along with the other varieties on test in 1924 and showed 61 percent severe mosaic on the first inspection. This result is very similar to the results secured at Summerland a few years later as reported above.

The following table of Northern grown seed Vs Southern grown seed as reported by the Agronomy department of the University of British Columbia shows that northern grown seed was more free of disease, where mention is made of the disease factor. These figures, the average of three plots in each case, show that northern grown seed was much better than southern grown seed, with Early St. George for the period of 1924-27, while the Green Mountain gave an increased yield for two out of four years, when taking total tonnage into consideration.

Table 6 Northern vs Southern grown seed. (Green Mountain.)

Date		Marketable lbs. row		Unmarketable lbs. per row		Average Tons per acre	
1924	N	87	N	18.6	N	13.93	
1924	S	92.3	S	15.0	S	14.16	
1925	N	41.6	N	24	N	8.66	X Local seed more affected with disease than Northern grown seed.
"	S	33.6	S	18.6	S	6.88	
1926	N	28.3	N	16.3	N	4.46	
"	S	28.7	S	17.3	S	4.6	
1927	N	60	N	44.3	N	13.86	
"	S	69	S	30	S	13.07	

Table 7 Northern vs Southern grown Seed. (Early St. George.)

Date		Marketable lbs. per row		Unmarketable lbs per row		Average tons per acre
1924	N	54	N	20	N	9.76
"	S	58	S	18	S	10.10
1925	N	29.6	N	14	N	5.76
"	S	13.6	S	29.6	S	5.69
1926	N	26.0	N	17.0	N	5.67
"	S	18.3	S	17.0	S	4.66 X
1927	N	54	N	33	N	11.35
"	S	26	S	37	S	8.32
1928	N	31.3	N	34.3	N	8.66
"	S	17.3	S	28.0	S	5.98

X Mosaic and Rhizoctonia plants rogued out.

Prince Edward Island Seed Potatoes in New Jersey.

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" South Jersey second crop seed, during the season of 1929, has certainly made a reputation for the growers. The following table shows the results from twenty-three potato growers in the county, and from observations and reports this same comparison would hold true among the majority of the growers in Monmouth County:"

Table 8

	No. of Farms	Average Yield--Bus.
South Jersey	11	204.9
Prince Edward Isle.	22	181.2
Virginia	5	152.9
Local	5	180.2
Maine	11	174.5
Maryland	2	156.5

(Note. It will be noticed that the P.E.I. seed gave excellent results considering the large number who used this seed.

" The South Jersey seed growers should be congratulated on the high quality stock furnished to the growers of Monmouth

Monmouth County during the past year, especially when we realize that only recently they found it necessary to change almost completely their sources of seed. The move on the part of the South Jersey growers in securing from Maine and P.E.I. some of their best strains of cobbler seed, certainly shows that the growers are on the job, and anxious to produce a high-class product.

From the past summer's experience, we believe the South Jersey growers have an opportunity to hold a real place in the seed growing industry, provided a 100 per cent attention is given to the original sources of seed from which the commercial seed stock is grown and if they also appreciate that even a small percentage of disease in their seed stock is too much to overlook and requires the most careful roguing.

Prince Edward Isle seed has shown up well in Central Jersey, and it should continue to do so as long as these growers keep their seed free from disease.

By far the majority of seed used in Monmouth County is certified, and if enough certified seed were available it is doubtful if any other would be used. Certified seed from P.E.I., South Jersey and Maine as a rule produces some of the best crops in Monmouth County. It is further recommended by those who have made a study of the Central Jersey potato industry that at least two sources of seed should be planted by every grower in Monmouth County. This recommendation is made on the strength of weather, soil and climatic conditions, as well as dates of harvest since the northern seed is ready for market earlier than the southern seed and thereby, extends the marketing season."

During the spring of 1924 six 10 pound samples were sent to Prince Edward Island by the B.C. Department of Agriculture, to be tested out. The Green Mountain sample was from Courtenay. The report received back in the fall showed that this sample was free of virus diseases, while other samples from other districts had some disease.

Another point which I have observed is that where sufficient moisture is obtained to grow a crop, and a good application of fertilizer, high in potash applied, - from 800 lbs to 1200 lbs per acre - that the amount of disease is negligible or absent altogether.

Some authorities consider that the use of fertilizers only masks the disease. I do not agree with this theory. It may be so in regard to the use of Nitrogen, which if used in excess produces a soft growth, and I would not be surprised to find the disease showing up to a greater extent the following year after its use. The use of a liberal supply of potash and phosphoric acid however does not produce a soft growth, but builds up a more solid cell structure, and makes a more mature plant, which appears to have a greater resistance to disease, and produces potatoes that will grow under very adverse conditions and show very little disease the following year. But we cannot expect the progeny of these potatoes to produce disease free seed, one, two, and three generations later, when grown under conditions unfavorable for <sup>healthy</sup> plant growth, such as a soil lacking in plant food, or where the food cannot become available on account of lack of moisture.

These observations tend to show that the virus diseases are controlled to a great extent by growing in districts favorable for potato production, where the soil does not get too hot, and where there is plenty of moisture available, also plenty of plant food in the soil to produce the crop.

In Nova Scotia, New Brunswick and Prince Edward Island where they have the greatest success in growing certified potatoes, they have good growing conditions and use fertilizers very freely. Many of the growers have built up disease free stock, that is, it continues to reproduce under these conditions and does not show any virus disease.

Two samples of disease free seed, Irish Cobbler and Green Mountain, brought in from P.E.I., and grown in Courtenay district from 1924 on, were free of disease for four years and were practically free of disease this year in the test plots of the growers' samples. They gave as good a record as fresh seed brought in from P.E.I. and Nova Scotia this year, showing that we have some districts that are capable of growing good clean seed, and some growers who can produce good seed.

I have also found that the growers in B.C. in the districts where growing conditions are favorable, and where they use fertilizers freely, 1000 pounds of a 4-10-10 mixture to the acre, that they produce practically disease free seed, that gives a clean crop practically any place the following year, but the second year will start to show up some disease, and a poor crop will likely be harvested if planted the following season, as in the cases reported at Summerland and Victoria.

This leads to the subject of growing seed potatoes, pure as to variety, true to type, and free from disease. To accomplish this a system has been built up by the Division of Botany whereby potato crops are inspected and certificates given to the growers who have been able to grow the crops free of disease or eliminated it to such an extent that they come within the regulations set for this purpose, as follows:-

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 " Rules and Regulations Governing Their Production. - During the past few years it has been amply demonstrated, that certified seed potatoes can be depended upon to give higher yields of better quality potatoes than potatoes which will not meet certification requirements.

The standards set for certification in the early days of the inspection work were necessarily low compared with to-day, but the tolerance of 12 per cent disease plus 5 per cent for mixed varieties was considered necessary to obtain seed potatoes in quantity even as late as 1920. The standard has been raised year by year and, for 1927, permits of only 3 per cent disease on second field inspection and no mixed varieties at tuber inspection. There were 10,392 acres which passed inspection in 1926, a creditable record under such a high standard as obtained for 1926.

Whether potatoes are grown for seed purposes or table stock, it is essential that the very best seed be used, as good foundation stock is the basis of good crops and profitable marketing. Certified seed has been adopted in all the principal

I. Canadian Certified Seed Potatoes. Pamphlet No. 84-New Series

principal potato-growing districts, for it is found to be the quickest way to reduce diseases and the most efficient method of producing large quantities of desirable marketable potatoes at a minimum cost.

The production of certified seed potatoes requires special care in the selection of seed, thorough methods of control of diseases, good cultivation, suitable soil, great care in digging, handling and storing, and careful grading. Such seed usually costs a little more than the common run of table stock, but is well worth the difference.

Meaning of Certification. - Certification is a means of recording seed stock that is of good type, from vigorous plants, and relatively free from diseases. When potatoes have been inspected in the field and after harvest by an officer of the Dominion Department of Agriculture, and have been found to be vigorous and to conform to certain standards of freedom from serious diseases and of purity of variety, they may be certified. Official tags are issued for such seed stocks, and all potatoes sold as certified seed must have the official tag attached to each container of potatoes. It is an indictable offence under the Destructive Insect and Pest Act to use any other kind of tag likely to mislead an unsuspecting public. Growers and associations are permitted, however, to attach their own tags or brand or mark any container with any special description, but such must only be done when the official tag is present on the container. These tags alone constitute the guarantee that Canadian certified seed potatoes are being dealt with.

## Regulations Governing Certification.

1. The seed used in planting the crop for which certification is desired must have been taken from stock which passed both field and tuber inspections the previous year. Seed should be of desirable type for the variety entered, and should be as free as possible from scab and Rhizoctonia, or be treated before planting.

Any variety, however, which is correctly named may be certified after passing all inspections for two years in succession.

2. Potatoes intended for inspection and certification should be planted at least 200 feet from other potatoes. This is to avoid possible infection. Disregard of this ruling has led to the rejection of many fields.

3. No fields which upon first field inspection have more diseases than are permitted in the standard, or show insufficient growth and vigour, will be given a second inspection or further consideration for certification.

4. Fields should be kept well cultivated and sprayed for blight and insects. Weedy, poorly cultivated fields, and those showing many plants stripped by insects, will be disqualified.

5. Seed potatoes must be dug and handled with the greatest care to prevent unnecessary bruising or they will go down in storage. They must be kept from danger of frost injury. Tubers exposed to frost injury will not be certified.

6. First field inspection will commence about six or seven weeks after the average planting date for the district. Second inspection will follow in from two to four weeks later.

After field inspections are completed, growers will be notified by card if their fields have passed. The return of the card to the district inspector will ensure their receiving tuber inspection. In the case of a field failing to pass the field inspection, grower is notified of this fact by letter and the crop is not considered further for certification. Tuber inspection will be given at digging time, or as soon after digging as possible, and continue until all who apply for tuber inspection have been visited.

#### Certified Seed Potatoes - Inspection Standards

Table 9	Field	Ist	2nd
		Inspection	Inspection
		%	%
	Blackleg	3	I
	Leaf Roll, Curly Dwarf	2	I
	Mosaic	2	I
	Wilts	3	2
	Foreign	I	$\frac{1}{2}$
	Misses (if due to roguing)	2	0

Providing that in no case shall a total of more than 6 per cent disease be allowed on first inspection or more than 3 per cent on second inspection.

#### Table IO Tuber

Tags to be issued by inspector only on the express understanding that tubers must conform to the following standard when shipped:

Wet rot (Bacterial)	$\frac{1}{10}$
Late blight and dry rot	I
Scab or rhizoctonia-	
Slight	IO
Severe	5
Necrosis, wilts, and internal discolourations, other than due to variety.	5

Providing that in no case shall a total of more than 7

than 7 per cent be allowed except in the case of slight scab or Rhizoctonia.

Not more than 1 percent of powdery scab allowed under scabs. Not more than 2 per cent of the tubers to be malformed, or spindly, or badly damaged by sunburn, cuts, cracks, bruises, insects etc.

No frost injury or foreign tubers shall be allowed.

Not more than 5 per cent by weight of the tubers shall be below 3 ounces or above 12 ounces.

At fall bin inspection, if more than 3 per cent late blight is found in the bin, grower will not be allowed to grade for fall shipment but may hold for spring shipment, subject to re-inspection.

7. Growers should allow at least ten days in storage before attempting to grade.

8. Potatoes must not be sold as Certified Extra No. 1 seed potatoes unless they have the official certification tags attached to the containers. Certification is not complete until that time.

9. Seed stocks improperly stored as indicated by excessive sprouting or shrivelling will be refused certification.

10. Any person found guilty of misusing certification tags will be liable upon conviction to the penalty or penalties imposed or set forth under The Destructive Insects and Pest Act. "

These standards are much higher than they were even in 1920, and those who have been growing certified seed, or using certified seed to grow their crops have been able to increase

increase their yields and make potato growing more profitable.

The industry has been particularly successful in Prince Edward Island where over three fifths of the potatoes grown are entered for inspection as certified seed, and a movement is on foot to have the Island made a disease free area, that is as near as it can possibly be by allowing only certified seed to be grown there. This will be a big advance for the industry and will be of great assistance, by eliminating crops which are diseased but not rogued. Prince Edward Island, although the smallest province grows the major part of the certified seed potatoes of Canada.

During 1920 the Provincial Department of Agriculture in B.C. started a system of potato certification. The Federal system of certification did not extend to B.C. at this time. The rules, regulations, standards etc. were somewhat similar to those used by the federal Department, but the idea was for mass production and fields of ordinary commercial potatoes were inspected and given certificates, where comparatively free of disease.

This system accomplished some good but did not produce good foundation stock. Some districts were more successful than others on account of more favorable growing conditions. But the whole system made little progress on account of seed being sold as certified from districts that were not suitable for its production. The seed had been brought in and gave good results one year, but would not stand up, consequently certified seed got a severe knock and a set-back.

Many growers tried to grow certified seed because it pro-

promised to give greater returns, but in most cases they did not take enough interest in the industry. If the seed would grow and be free from disease all was well but they were not anxious to learn the diseases, and often hesitated to rogue out a diseased plant because that would reduce the yield. Some would try to get out enough of the bad plants to pass inspections. They were not interested enough to try and produce a better seed.

My observations dating back to 1923, are that there is only one or two growers in each district that are interested enough to go to the trouble to produce good foundation stock, about ten per cent that could grow certified seed if supplied with good foundation stock, and would do the necessary roguing so it would pass inspection, and the balance could grow good commercial seed from this certified seed.

This would give us three grades of growers. The foundation stock grower, who could also grow certified seed and commercials too if he was so inclined. The certified seed grower, who could grow commercials as well, and the commercial grower.

The tendency at present is toward producing the foundation stock in a seed plot, which is carefully rogued, staking the best type plants that are free from disease, and selecting the best type hills from this plot, and the heaviest producers, for tuber and hill selection units, the following year in the seed plots. The balance can be used in the certified seed plot, but the poorer <sup>seed</sup> should be eliminated.

If this practice is followed yearly the crop should improve, and disease will be almost eliminated. The seed available

available for the certified seed grower should produce a clean crop that needs very little roguing, consequently could be produced and sold for a lower price than is asked for it at present.

This seed in turn will give the commercial grower a greater return, and he will be able to reduce his acreage and get the same tonnage produced at lower cost, thus making a larger profit if sold at the same price.

Unless conditions are very favorable for the production of potatoes, I would not advocate growing of foundation stock in a district. Where conditions are not favorable the certified seed may be grown if regulations could be enforced to keep common or diseased seed from being planted. This seed if grown under favorable conditions, of moisture, temperature, and available plant food, will give a crop which would be fairly satisfactory in many districts not so favorable for potato growing, and which have proved not at all adapted for certified seed growing. By getting in new clean seed every year, the industry could be made much more profitable, that is the required amount could be grown on a greatly reduced acreage, thus reducing costs.

We have laws controlling certain diseases among the human race, certain diseases among animals, birds and bees, also for controlling insects, pests, and weeds. Surely it is not beyond the powers that be, to make laws controlling virus plant diseases which cause a great economic waste each year. In fact it would be doing a good service for all, to take such a step and make it possible for every producer to grow a paying crop.

It may only be necessary to make some of the most favorable districts, disease free areas and allow only test plots, certified seed plots, and commercial potatoes grown from certified seed to be grown in these areas. In other districts, where certified seed can be grown, to forbid the planting of seed that is not reasonably clean, and compel the producer to plow up or destroy any crop that is badly infected with virus disease, or rogue out the plants infected if the crop is not over 20 per cent or so diseased with the various diseases that infect potatoes. But as soon as enough clean seed is available to forbid the planting of anything but certified seed.

I am quite satisfied that the tuber unit and hill selection method will greatly increase our average yield, and it is not too much to expect, that the average yield can be doubled.

During 1924 the Federal Department of Agriculture, Division of Botany, offered to assist with the inspection of certified seed potatoes in B.C. The offer was accepted and two inspectors were supplied by the federal inspection service. This arrangement was carried out until 1927 when the federal inspection service took over the work entirely and supplied all the staff. This was at a time when certified seed was going out of favor very fast as the growers were not making any noticeable headway and certified seed was hard to sell, in fact most of it had to be sold as commercial potatoes.

Since 1927 a new foundation has been laid and the growers who have remained are the ones who are the most interested and are trying to build up good foundation stock. Some progress has

has been made in hill selection and seed plots. Considerable valuable information is being secured from the test plots operated by the Department. The districts most suitable for growing certified seed are being located and the growers most interested are being found and encouraged to grow good seed.

The amount of certified seed sold is increasing yearly and the industry appears to be definitely on the up grade. There are new growers appearing yearly, many of them drop out as they think it is too much bother to rogue and select, but the best men are continuing in the growing of a better grade of seed, as they find that they are getting bigger yields by doing so.

#### Potato Inspection and Certification Service

(John Tucker, Chief Inspector, Central Exp. Farm, Ottawa)

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Approximately \$1,500,000 was received by the certified seed potato growers for potatoes from the 1927 crop, exported under the official "Extra No. 1 Seed" tag. In addition, over 2,500,000 bushels of certified seed were made available to the potato growers of the Dominion for the improvement of their table stocks.

This specialized seed trade is growing rapidly, and is well worth the best efforts and the keenest interest of all concerned. Very considerable responsibility rests with the inspection service to see that the quality of the produce is maintained, especially as many hundred new growers join the ranks of certified seed producers each year. There must be no slackening, otherwise this extensive business which has been so carefully

carefully built up would soon crumble away.

All inspections were made free of charge to the growers; official tags were supplied free for seed which passed all inspections.

#### Cost of the Inspection Service

The total cost chargeable to this service in 1927 amounted to approximately \$78,000. Of this amount \$62,000 was spent on actual field and tuber inspection work, for salaries and travelling expenses, and supervision; this amount, however, included other necessary work performed by the temporary inspectors, such as planting potato experimental plots, etc., before actual field inspection work commenced, and digging plots and recording experiments in the interval between field and tuber inspections.

The balance of \$16,000 was expended for salaries of all the permanent inspectors between seasons. This may reasonably be charged to extension work, Short Course lectures, addressing meetings, issuing foreign certificates on potato shipments, etc. and for printing, supplies, etc.

The staff of inspectors employed for this work throughout the Dominion consisted of two senior inspectors, and seven district inspectors on full time pay, and fifty temporary inspectors engaged for varying periods. The inspection work necessitated total travelling on the part of the inspectors of over 200,000 miles by rail and car.

The inspections made included one field inspection on 31,601 acres, and a second field inspection on approximately

approximately 28,500 acres--a total of 60,100 acres, inspected. On the crop, after digging, over 6,000 tuber inspections were made at the farms, and approximately 2,000 shipping inspections.

The total cost of inspections works out at \$32,923 for field inspections, and \$29,821 for tuber and shipping inspections; \$62,000 for 31,601 acres, approximately \$2 per acre for all the inspections performed.

The cost varies considerably according to locality--in Prince Edward Island the cost per acre is lowest, being approximately \$1.20 for all inspections. Cost is highest in British Columbia, running at \$8.72 per acre. The low cost per acre in Prince Edward Island is made possible by the large acreage inspected, and the short distances travelled. "

## Chapter VII

## Growing Commercial Potatoe Crops

There are many factors to be considered in growing commercial potatoes, production, consumption, demand, soil fertility, moisture, climate, seed etc. as well as distance from market, marketing facilities, and uses for small, culls, or surplus potatoes.

Potatoes grow best in the cooler climates, that is north of the 30th parallel of latitude. Early potatoes are grown chiefly south of this line, but practically all the late grown potato crops, are grown in the more northern states or in Canada in North America. They are grown extensively in Continental Europe, in Great Britian, France, Germany, Russia Poland etc. and are a main source of food in many of these countries.

Production of potatoes in the cheif potato growing countries for 1928 was as follows,

Country	Acreage (000) omitted	Production cwts(000) omitted	% of ave.	Population (000) Omit- ted	Prod- uct- ion cwts.	Con- sump- tion cwts
Austria	468	54,858	158.7	7.000	14	
Belgium	411	80,119	115.6	7.393	13	
Czecho- slovakia	1.800	189,435	81.5	13.367	14	
France	3.614	248.328	87.7	40,744	11	
Germany	7.040	954.851	119.4	60.000	26	4.8
Gr. Britian	814	127.661	112.1	45.000	3	
Hungary	659	32.419	87.8	8.000	4	
Italy	875	32.846	87.8	39.000	1	
Poland	6.819	609.811	76.7	25.372	24	
Spain	802	62.382	103.1	20.000	3	
United States	3.825	465.657		123.000	3.5	2.6
"	" down 25%	345.177	(10% below ave crop)	(1929)		
Canada	599	50.195		9.000	4.5	2
" (1929)	544	39.930				
" (1930)	574	49.160				
British Columbia	14.4	1.347				
	18	1.892	(5 year ave 1924-28)			

The demand for potatoes varies according to the country and standard of living of the people. The amount of potatoes eaten depends on the income of the consumer. Those with large incomes eat comparatively few potatoes, and as the income gets smaller the amount of potatoes consumed increases. In Canada and United States the per capita consumption is about two hundred pounds per year or just about one-half pound per day, while in Germany it is about 7.6 per capita or four hundred pounds.

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"An interesting study by Behrend shows that the consumption of potatoes in Germany stands in inverse ratio to the wealth and social status of the people. The well-to-do people there, use 3.6 bushels each per annum, about 210 pounds. The peasantry about 8.8 bushels or 530 pounds, and the laborers in Western Germany 12.3 bushels or 740 pounds. While in the eastern provinces the per capita consumption of the poorer laborers is about 17 bushels each per year or 1020 pounds."

A large portion of eastern Germany was forfeited to Poland at the close of the war. The production and consumption of potatoes in this area is quite large, as that was the part of the country with the greatest consumption per capita before the war.

Potatoes are grown in a great variety of soils, and in many climates. We find, however, that they do best in a deep friable loam with plenty of humus, available plant food and moisture etc., and in areas where the temperature does not get too warm, or the soil too dry and hot.

Northern Europe with its cool, equable summer, has a climate better adapted to potato growing than any, except possibly the

the most northerly states in the United States, and the eastern provinces of Canada.

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 "The average mean temperature in Posen, North Germany, for July is 64 degrees F. Practically all of the potato districts in the U.S., with the exception of Aroostook County Me. lies south of the isotherm of 65 degrees F., and the average summer heat is not far from ten degrees higher than in Germany."

"Most of our varieties of potatoes are unable to withstand high temperatures, and in the central to southern States, about two-thirds of the area of U.S. the potatoes are subject to tipburn, sunscald, and other troubles which result in abnormal maturity, and small yields. In the Southern States and Mexico only early spring or fall crops can be grown."

Climatic conditions for growing potatoes are quite favorable in Canada. In the Maritime provinces, the temperature is even better than in the Northern States, they also get sufficient moisture, and the industry is usually a profitable one. As we go farther west we find that conditions are quite favorable in both Quebec and Ontario. In the Prairie Provinces the temperature is favorable but moisture conditions are not always good, so they occasionally have a small crop or a failure on account of a shortage of moisture. This was quite in evidence in 1929 when several hundred cars of potatoes were shipped in, British Columbia supplied 518 carloads, and during the same season imported from Washington about 300 carloads.

In B.C. we have a variety of soils, moisture and climatic

I. U. S. Department of Agriculture, Bulletin No. 47, 1913.

climatic conditions. In the dry belt the soil is usually quite fertile and produces abundantly when it receives moisture, this is usually supplied through irrigation as the rainfall is quite deficient. In central B.C. and the Kootenays they get more moisture but have a short growing season and may get frost during the growing season, but the temperature and moisture are usually sufficient. In the Fraser Valley we have a great variety of soils, peat, silt, clay, sandy and gravelly loams. The temperature for potato growing is excellent, but on account of the variety of soils and shortage of moisture during the summer months, there is a great range in yields. This is intensified by using many varieties of potatoes, and especially by planting varieties on soils that are not adapted for them. Similar conditions prevail on Vancouver Island, summers are quite dry around Victoria, but conditions improve as we move north on account of the increased rainfall. Seed is an important factor in potato production. It is essential to secure the best seed, either to grow it or purchase it. In order to get the greatest returns it is essential to get the highest producing strains. This can be accomplished by using certified seed, which was discussed in the previous chapter, but it should be hill selected seed, where the highest producing strain has been selected. It is quite possible to double the yield by practicing hill selection, but it is necessary to keep up this selecting year after year, or purchase from a grower who is producing his seed in this manner.

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" Certified seed, spraying, the proper kind and amount of fertilizer, the right type of cultivation at the proper time, and growing potatoes on potato soil, are all playing an important part in the elimination of chance in the potato growing industry of Central Jersey."

" A few years ago, it was claimed that luck played an important part in potato production, especially when a grower secured a large yield of high quality stock in a season when prices were high. To-day either there is no such thing as luck or luck plays very little part in the program of the grower who makes a profit above cost of production, four years out of five."

" Economic production, which includes the most careful consideration of every phase of potato growing is more than nine-tenths responsible for the profit from the industry. To secure a good yield under adverse growing conditions, and when prices are high is a credit to the potato grower, while large yields under ideal growing conditions are easily secured by the poorer grower. While marketing is a factor in profit and loss from the potato industry, those markets are limited which will return to the grower a profit from poor yields of low quality tubers. At the same time, even in a year of so-called over production, buyers can be found who will pay a premium for high quality products. The buyer as a rule knows where the high quality product is to be found and no amount of salesmanship or persuasion will continue to sell a poor quality product or a poorly graded package."

Treatment of seed -- Potatoes should be treated for rhizoctonia so as to reduce the damage caused by this disease. It is a disease that attacks the root system and kills the lower part of the stem, making it necessary to develop a new root system, this new set of roots develop near the surface of the ground. Potato plants badly infected with rhizoctonia, usually produce a cluster of small tubers or in some cases aerial potatoes which are useless, and reduce the yield very considerably. Every plant will become infected in extreme cases. The disease develops rapidly, when a suitable host is available, and gets worse each year if potatoes are planted in the same soil year after year, this is especially true with late or main crop potatoes. Early potatoes are dug early and usually are not affected by the disease. A rotation of crops appears to be one of the best methods of controlling the disease, treating with formalin or corrosive-sublimate are effective methods also. This treatment will help control bacterial diseases that are on the surface such as black-leg, and is an effective control for common scab.

The virus diseases can only be detected during the growing season, while many of the tuber diseases can be detected and eliminated through selection of seed. This is a wise precaution as many of these diseases will carry over in the soil, if diseased seed is planted, and in a few years will become so badly infected that it is impossible to grow profitable potato crops, unless the soil is given several years rest from potatoes. These troubles are eliminated to a large extent by using certified seed that has passed all inspections.

It is very important to select potatoes that are adapted to irrigated lands, for such districts. Netted Gems and Burbank potatoes are most suitable for this purpose or for planting in peaty soils where the water table is high. Burbanks will grow under drier conditions and will do fairly well on soils that will not produce a paying crop of Netted Gems.

There are some varieties that are more drought resistant than others, and we find that the Sir Walter Raleigh does well in dry areas, especially if planted late, after May 24th. They will then grow throughout the dry season and be in good shape to continue growing in the fall when it is cooler and the fall rains have arrived. This variety does well around Victoria, as they do not have the killing frosts until November, but they are not adapted to many districts outside of there. Green Mountain, Manistee, Columbia Russet (a new variety), Gold Coin, Early St. George, and a few others do fairly well under semi-arid conditions. It is good policy to try out several varieties both early and main crop, and find out which do best on the soil in question.

Some of the larger yielding varieties produce a large tonnage of potatoes on moist soils but they are not of as good quality as when grown on the drier soils. Netted Gems produce the greatest yields on moist soils, peaty, or irrigated lands, and these are usually of good quality, but many other varieties are not so good when too much moisture is present, as they tend to develop into a watery potato and on some soils the potatoes are of low quality and turn black in cooking. This is more

more likely to happen on peaty soils which are high in nitrogen. This situation can be improved by the addition of fertilizers omitting nitrogen.

Owing to the vagaries of the weather and other climatic conditions it is impossible to grow the right amount of potatoes to meet the demand of the market. There are always a lot of small potatoes as well as off type, nobby, cut and bruised tubers, so it is necessary to grow a much larger crop than can be used commercially. This means that some other outlet must be found for the surplus. But the tendency is to ship all possible to the market, including many "C" grade potatoes, this only tends to demoralize the market, and reduce prices to a low level. All surplus small, off grade, or cull potatoes should be kept off the market, and fed to stock or used up in some other manner. This phase will be dealt with in a later chapter.

Distance from market is also an important factor, as potatoes cannot pay big freight rates except when the price is high. It is also expensive to haul by wagon or truck to the market, railway, or boat. Being bulky and heavy makes for heavy expense in handling. It is a good policy economically, to grow as near the market or near cheap transportation as possible.

Potatoes are well adapted to growing in rotation. They do real well when planted after a clover crop especially if the farmer has plowed under the aftermath instead of cutting it for feed as is so often the case.

One crop of potatoes in four years will not hurt the soil deplete it, or cause it to become affected with diseases, if

if clean seed is used. If the crop is given a liberal application of fertilizer, along with a green crop plowed in, either a soiling crop or an aftermath of clover, there will be sufficient left in the soil to give an excellent grain crop the following year, with a good catch of clover, which would give a good crop of clover the third year, most likely two cuttings. And if only one crop is taken the fourth year and the aftermath plowed under, the soil is in excellent shape for another crop of potatoes. Humus and fertility have been added and the soil improved. This makes an ideal rotation, but all the farm cannot be used in this manner, so it is usually necessary to use part of the land each year for growing other root crops and corn or other crops for silage, which will serve the same purpose in the rotation as potatoes.

Fertilizers.- Fertilizers are playing a more important part in the production of potatoes each year. The use of them and their re-action is not clearly understood by the majority of growers. If they get an increased yield then the fertilizer is good, but if their crop shows no increase then it is no good. They do not consider that they may not have used the right kind of fertilizer, or that they may have applied it wrongly or at the wrong time of the year.

We have a great many kinds of fertilizers and they are obtained from a great many materials. One important fact that is often overlooked is, that there is quick, medium, and slow acting fertilizers. The quick acting ones can be used at time of planting, and if conditions of moisture, heat etc. are favorable

favorable good results will be obtained, if applied in large enough quantities to supply the needs of the plant for maximum production. The medium acting fertilizers must be applied before planting time to get the best results, unless moisture can be applied in order to make them available during the growing season. The slow acting fertilizers must be applied a considerable time in advance of seeding so that the elements will be available at the time they are required. To get the full use and value of fertilizers it is necessary to have the soil in a good state of cultivation, and in fine tilth so as to retain plenty of moisture, or irrigated to supply the required moisture

In the quick acting fertilizers we have the soluble Nitrates of which Nitrate of Soda is the most common and is used the most. Nitrate of Soda is available immediately, and is used as a side dressing quite often, this practice gives good results if there is sufficient rain to carry it into the soil or if the soil can be irrigated, otherwise it may give no results whatever, if the season is dry. When placed in the drill or worked into the soil and is in contact with moisture it soon makes itself felt, but its strength is exhausted in from six to eight weeks, and more applications are necessary to assist in further growth. Extra time taken in applying is costly, and as a side dressing may not give results, for reasons explained above, it is necessary to find some other source from which to secure additional Nitrogen. It may be obtained from Sulphate of Ammonia which comes in the medium slow acting class. This Nitrogen is more slowly available and lasts over a much longer period.

It can be applied at the same time as the other fertilizers, and placed in the drill near the potato sets and supply the plant throughout the season. The amount to use will vary according to condition and fertility of the soil. If a good aftermath of clover has been plowed in, the nitrogen requirements will be small, but if the soil is deficient a fairly heavy application should be made. In Dr. F. Shutt's bulletin on fertilizers, Division of Chemistry, Dominion Department of Agriculture, he recommends that 25 per cent of the Nitrogen be in the form of Nitrate of Soda, and 75 per cent in the form of Sulphate of Ammonia. Growers in the Comox area who have adopted this recommendation have had good results. They use a 4-10-10 mixture with the nitrogen supplied as suggested above, and use it at the rate of 1000 pounds per acre,

Ten per cent phosphoric acid has been found to give excellent results in the 4-10-10 mixture at 1000 pounds per acre, This is usually supplied by using Super-phosphate of Lime. This is a medium slow acting fertilizer, and should be supplied in advance of planting if it is apt to be dry during the growing season, but if moisture is abundant or can be controlled it may be applied at planting time. Bone meal, basic slag etc. are much slower acting phosphates and should be applied earlier than super-phosphate. Basic slag should be applied the previous fall, it is best adapted for pastures and hay fields or fall sown crops.

Ten per cent potash has also given good results in this mixture. It is generally supplied by using Muriate or Sulphate

Sulphate of Potash. Both forms are used extensively but the sulphate gives the best results on most soils. It is usually about 50 cents per 100 pounds more than the muriate but gives a better quality potato and usually larger yields. Those who have tried both on Vancouver Island, in general agree, that the sulphate gives the most satisfactory results. The additional cost per acre is negligible, being only about two dollars per acre more. Potash is slowly available, and should be applied some time in advance in order to get the best results.

Farmyard manure supplies all three elements but the amount of nitrogen is in excess of demands for plant growth in comparison with the phosphoric acid and potash that it contains, so it has been found to advantage to supplement barnyard manure with phosphoric acid and potash. Ten tons of manure per acre and 500 pounds of an 0-10-10 mixture would be found an excellent combination, and twice the area can receive manure as would be the case if twenty tons were applied on each acre and no commercial fertilizer applied.

#### Results of Fertilizer Tests

Fertilizer Test--Potatoes at Agassiz, B. C.

4-10-10 and 4-10-6 mixtures applied at the rate of 750# and 1500# per acre. Table 12

4-10-10 made up with 97 pounds	Nitrate of Soda
214	" Sulphate of Ammonia
937	" Superphosphate of Lime
300	" Sulphate of Potash

4-10-6 as above except Sulphate of Potash which is used at the rate of 180 pounds, this ingredient being the only variable. Applied at 750 pounds the above weights are halved.

Table 12

Year	Date	Fertilizer	gave	per	acre	II tons	II57 pounds
1929	4-10-10	at 750#	"	"	"	12	1313
	"	" 1500#	"	"	"	"	"
1930	"	" 750#	"	"	"	12	938
	"	" 1500#	"	"	"	14	1856
1929	4-10-6	" 750#	"	"	"	10	521
	"	" 1500#	"	"	"	12	1071
1930	"	" 750#	"	"	"	12	1891
	"	" 1500#	"	"	"	15	1581
1930	No fertilizer					5	688

In 1929 each treatment was replicated three times in a single 30 foot row.

In 1930 each treatment was replicated four times in a single 30 foot row. In 1930 there were included four check plots receiving no fertilizer.

The cost per acre of fertilizer was:-

4-10-10 at 1500# per ac.	\$41.80	at 750#	\$20.90	per acre
4-10-6 " " " "	37.30	" "	18.65	" "

Value of crop when dug in 1929,	\$40.00	per ton
" " " " " " 1930	25.00	" "

	Value of crop per ac. less fert. cost. 1929	Value of crop per ac. less fert. cost. 1930
4-10-10 at 750#	\$428.24	\$290.83
" " 1500	464.46	331.40
4-10-6 " 750#	\$391.57	304.99
" " 1500	464.12	357.46
No fertilizer		133.35

Owing to small area of plots, cost of production cannot be calculated.

Early Potatoes At Agassiz, Experimental Farm for the years 1926-27-28 show a total average yield per acre of 9.970# for the fertilized rows, 7.319# for the unfertilized rows, Fert. cost \$13.65 per ac. Ave. value of increase \$145.80 .

Results of Fertilizer Experiments on the Illustration Stations at Alberni, Courtenay, and Duncan, 1927-28-29.

Table I3 I Alberni. 1927

Plot	Fertilizer used	Yield per acre tons	Increase over check plot tons	Cost of fert.		Profit per acre above plot not fertilized	
				\$	¢	\$	¢
1	Nit. of Soda 200#	15½	1¾	6.69		28.31	
2	Superphos. 600#	16	2¼	6.01		38.99	
3	Mur. of Pot. 150#	17	3¼	2.63		62.37	
4	3-10-7 - 500#	17¾	4	7.73		72.27	
5	3-10-7 - 1000#	18½	4¾	15.46		79.54	
6	Check, unfertilized	13¼					
1928							
1	Nit. of Soda 50#)						
	Sul. of Ammo. 150#)	7.18	4.80	9.22		90.93	
2	Superphos. 600#	7.45	5.07	5.08		96.32	
3	Sul. of Pot. 200#	7.74	5.36	3.69		103.50	
4	4-10-10 500#	7.66	5.28	6.92		98.68	
5	4-10-10 1000#	7.96	5.58	13.84		97.76	
6	Check, Unfertilized	2.38					
1929							
1	Nit. of Soda 50#)						
	Sul. of Ammo. 150#)	5.10	0.87	6.40		28.40	
2	Superphos. 600#	6.14	1.91	5.59		70.81	
3	Sul. of Pot. 200#	5.53	1.30	3.94		48.06	
4	4-10-10 1000#	7.97	3.74	15.00		134.60	
5	4-10-10 500#	6.78	2.55	7.50		94.50	
6	Check, Unfertilized	4.23					

In 1927, with the exception of nitrate of soda which was applied at planting time, fertilizers were broadcasted on the plots Feb. 26. Potatoes of the Burbank variety were planted May 10th and were dug October 24th. On the potato fertilizer tests, 3-10-7 mixture at one thousand pounds per acre gave the highest yield but many potatoes were rough and misshapen. The plots with superphosphate and muriate of potash gave the largest percentage of marketable potatoes. In calculating the profit or loss per acre <sup>1927</sup> potatoes were valued at \$20 a ton. In 1928 potatoes were \$20 per ton. In 1929 potatoes were \$40 per ton, Yields were lower than usual but tubers were an even marketable size.

Table I4

Courtenay 1927

Plot	Fertilizer used	Yield per. acre tons	Increase over check plot tons	(-)loss fert. (-) decrease	(-)loss acre above plot not fertilized
1	Nit. of Soda 200#	8½	4¼	\$6.08	\$78.92
2	Superphos. 600#	9¼	5	4.75	95.25
3	Mur. of Pot. 150#	7½	3¼	2.31	62.69
4	3-10-7 1000#	15½	11¼	13.36	211.64
5	3-10-7 2000#	13¼	9	26.73	153.27
6	Check, unfertilized	4¼			

Duplicate Plot

1	N. of Soda 200#	7¼	--1¼	\$6.08	\$31.08
2	Superphos. 600#	8¼	¼	4.75	9.25
3	Mur. of pot. 150#	7¼	¼	2.31	-17.31
4	3-10-7 1000#	9¼	¼	13.36	1.64
5	3-10-7 2000#	12	3½	26.73	43.27
6	Check unfertilized	8½			

1928

1	N. of Soda 50#)				
	Sul. of Amm. 150#)	9.35	0.38	\$ 3.86	\$ 3.74
2	Superphos. 600#	9.72	0.75	4.06	10.94
3	Sul. of Pot 200#	11.30	2.33	3.35	43.25
4	4-10-10 1000#	10.40	1.37	11.28	16.12
5	4-10-10 2000#	12.73	3.76	22.55	52.65
6	Check unfertilized	8.97			

Duplicate Plot

1	N. of Soda 50#)	8.95	.11	\$3.86	\$-1.66
2	Sul. of Amm. 150#)				
2	Sul. of Pot. 200#	8.97	0.13	3.35	-0.75
3	Superphos. 600#	8.82	-0.02	4.06	-4.46
4	4-10-10 1000#	10.56	1.72	11.28	23.12
5	4-10-10 2000#	13.59	4.75	22.55	72.45
6	Check Unfertilized	8.84			

1929

1	N. of Soda 50#)				
	Sul. of Amm. 150#)	9.57	0.77	\$5.98	\$24.82
2	Superphos. 600#	8.36	-0.44	4.72	-22.32
3	Sul. of Pot. 200#	9.46	0.66	3.66	22.74
4	4-10-10 1000#	11.66	2.86	13.47	100.93
5	4-10-10 2000#	11.82	3.02	26.95	93.85
6	Check Unfertilized	8.80			

Duplicate Plot

1	N. of Soda 50#)				
	Sul. of Amm. 150#)	11.59	6.37	\$5.98	\$248.84
2	Superphos. 600#	12.76	7.54	4.72	296.88
3	Sul. of Pot. 200#	14.30	9.08	3.66	359.54
4	4-10-10 1000#	11.72	6.50	13.47	246.53
5	4-10-10 2000#	11.98	6.76	26.95	243.45
6	Check Unfertilized	5.22			

At Courtenay Potatoes were \$20 per ton In 1927 & 1928 and \$40 per ton in 1929. Potatoes grown from Certified seed of the Burbank variety are used on this Station. By means of "hill selection" the operators are gradually improving their product. The yield of 15½ tons to the acre on plot 4 (1927) is the product of "hill selected" potatoes. On other plots ordinary certified seed was used.

Table 15		Duncan 1929		Profit per	
Plot	Fertilizer used	Yield per acre tons	Increase over check plot tons	Cost acre above of plot not fert. fertilized	Profit per acre above
1	N. of Soda 75#)				
	Sul. of Amm. 225#)	6.80	2.05	\$ 8.90	\$ 93.60
2	Superphos. 900#	6.60	1.85	7.08	85.42
3	Sul. of Pot. 300#	6.84	2.09	5.45	99.05
4	4-10-10 Mix. 750#	7.00	2.25	10.13	102.37
5	4-10-10 " 1500#	7.16	2.41	20.26	100.24
6	Ave. of 2 check plots 4.75 not fertilized				

Early St George potatoes were grown at Duncan for the early market and proved a profitable crop. They were planted March 28th and harvested during July and August. Barnyard manure was applied at the rate of twenty tons per acre. In calculating profit and loss the potatoes are valued at \$50 per ton.

In addition to the above tables I have definite figures on the potato crops of a grower at Westholme, Van. Island, B.C. for the years 1928-29-30 which show that profitable crops can be produced when good seed, plenty of fertilizer, and the right variety is used for the soil. He plants Netted Gems and secures Certified seed of this variety that has been grown on high land, getting his seed yearly from the best source available. The results for the three years are as follows, 1928 1½ acres 22 t. per ac. 1929 2 ac. 33 t. per ac. 1930 4 ac. 26 tons per acre.

Crops like these are profitable any year, as cost of production is low. These experiments show that the use of fertilizers increase the yields per acre, with a corresponding increase in net returns.

Planting;- To get the maximum crop it is essential to have a 100% stand, To get this it is necessary to have the rows close together, and have the plants as close together as possible without any misses. Rows are planted from 27 to 36" apart, and the sets are placed from 8 to 18" apart in the rows depending on the variety. By planting 27" apart in the rows, the number of rows per acre is increased 33% over a 36" spacing. This tends to increase the yield, especially if the plants are of a small type. When planted close they will cover the ground much quicker and retain moisture, whereas they could not cover the ground as soon if planted 36" apart, and much moisture would be lost causing a reduced yield. With large type potato plants it is better to allow more room between the rows, and they should be spaced accordingly.

In spacing the sets in the rows, the type of plant, variety etc. has to be considered, also whether the grower wants small, medium sized, or large potatoes. Close planting, such as 8 or 10" apart in the row, usually produces small potatoes, this is desirable if small potatoes are required for seed. If medium sized potatoes are required, the sets should be planted from 12 to 14" apart, and for larger potatoes from 14 to 18" apart. In rich soils these distances can be reduced, while in poor soil or soil that may be very dry the distances should be increased to secure

secure potatoes of the desired size, but for the average soil the distances given above should be satisfactory.

The soil should be cultivated or ploughed to a good depth in order to give the plants the best seed-bed possible, and the most favorable conditions for the tubers to develop. Land which is plowed shallow and has a hard bottom to the furrow, makes a poor seed-bed. The deeper the land is plowed the better the seed-bed, but in some cases deep plowing is not advisable on account of hard pan, or gravel, or other soil that would be unsuitable if brought to the surface. In a case of this kind it should be ploughed as deep as the surface soil will permit of, and loosen up the subsoil with a subsoiler to a depth of from 12 to 20". This increases the reservoir to hold moisture for the plant, and gives a greater area in which to develop the root system. Subsoiling is not necessary very often, once in a rotation will be sufficient, and all other crops in the rotation will benefit as well as the potato crop.

Fall ploughing is not advisable in the coast area of B.C. unless some crop is planted that will use available plant food. Land left fallow leaches badly and a poor crop is usually the result. If the land is left until January or February or until after the heavy rains are over, it can be plowed shallow especially if it is a sod field, and left for six weeks or two months then ploughed again going deeper, and using a subsoiler to loosen to a greater depth when necessary. The soil should be worked several times before planting time, by discing, cultivating, harrowing etc., to get a good seed-bed, this work will help retain

retain moisture and destroy any weeds. The soil will then be found in excellent condition for planting. The fertilizers which need to be applied in advance can be applied before this last ploughing and become thoroughly incorporated with the soil.

Planting:- Several systems of planting are adopted, use of a planter, making drills, and planting as the field is plowed. With any of these methods a fertilizer can be applied at planting time if it has not already been applied. The use of the planter is a common method, but a serious fault with planters is, that they often do not plant deep enough. This may be more a fault of the operator than of the planter. Shallow planting is sometimes best in soils that have sufficient moisture, if it can be retained, but in soils that dry out deep planting is more desirable. If cut seed is planted shallow, the soil may dry out and absorb considerable moisture from the potato set reducing germination. I have seen fields on Vancouver Island that have been reduced from 50-90% in germination from shallow planting. Another fault of shallow planting is that the field cannot be touched until the potatoes are up, as many potatoes would be unearthed especially if the field is harrowed. Harrowing is the cheapest and most effective method of killing young weeds, and keeping a good mulch until the potatoes are up high enough to cultivate between the rows. When this method is followed there is very little hoe work to keep the field free of weeds.

The drill method is better in some ways but it has some draw-backs as well as advantages. It is adaptable to wet soils that need to be dried out some before planting. If moisture is

is scarce it is often a disadvantage to open drills as the soil dries out especially in hot weather and germination is reduced. The potatoes are in deeper however when this method is used, than they usually are when planted with a planter, and can be harrowed several times or until the young plants are well out of the ground. If the staff planting is large enough, the drills are not open very long and very little moisture is lost.

Planting as the ground is plowed has some advantages, but it takes more labor than a planter, the drill method has this draw-back as well. By planting as the land is plowed the furrow is soon covered over and the moisture is retained, it also has the advantages of giving the soil a thorough cultivation at planting time and allows for harrowing which will keep the soil in first class condition, until the potatoes are up high enough to cultivate between the rows.

In soils that are apt to flood or are inclined to remain moist as our peaty soils often are, it is of advantage to hill up the potatoes, this will raise them a little above the water table. In the drier soils it is often to advantage to practice level cultivation, especially when there is a good deep seed-bed, and only hill up enough to keep the potatoes covered if the tubers show above ground. Hilling may also be necessary to cover the tubers deeper to save them from the pheasants, but should be left as late as possible in order to let the tubers form, as they tend to form near the surface, for this reason it is best to delay hilling until the plants have come into bloom.

Size of seed piece:- Considerable work has been done to

to determine the size of the seed piece, and treatment of the seed, as well as handling after cutting. It is generally recognized that a  $1\frac{1}{2}$  or 2 oz. set is the most desirable and economical. Smaller sets may be used if growing conditions are favorable and the soil conditions suitable, that is, if there is plenty of plant food available to feed the young plant after it takes root, and plenty of moisture to assure it of a good steady growth. Thick potato peelings have been used in times when seed was scarce, and occasionally have given good results, but the practice is not to be recommended, if good seed is available at a reasonable price. If the season is apt to be dry, it is much safer to plant a fair sized set, so that the young plant has a store of food to draw on, until it becomes firmly established. A good start is often the difference between a good crop and a poor one other things being the same.

Whole Vs Cut Seed:- This question has received much attention and many results have been tabulated. It is impossible to give definite recommendations to cover all classes of soils and conditions, but several tests and observations have made it possible to advise on what is best for various types of soils and conditions under which potatoes are planted.

Results of tests in B.C. are recorded in Chap. 6 Pg. 60. These tests were carried out in the Fraser Valley during the past three years, and they show that small whole seed is preferable to cut seed in this district, this is chiefly on account of the cut seed rotting or decaying, when planted in the cold wet soil. Whole <sup>seed</sup> is able to survive these conditions and give a fair

fair crop often a good one, while cut seed is often a failure. For this reason cut seed is not in favor or demand on many of the low lying soils.

Results of similar experiments carried on at Charlotte-town P.E.I. are recorded in Table 5 Pg. 61 and Table 6 Pg. 62.

I  
 " Trials with different size of seed potatoes under dry land conditions--Yield

Table 16 (ave. for two years)

Station	Whole Large bu. per acre	Whole Small bu. per acre	Two Eye Pieces bu. per acre
Edgeley Sub-Station	154.6	111.0	109.0
Dickinson "	162.3	88.9	115.7
Williston "	<u>99.3</u>	<u>77.2</u>	<u>78.2</u>
Average	138.7	92.4	100.9

The above table shows that the average results from a two years' trial on the three sub-experiment stations, gave 37.8 bu. more tubers per acre from planting large entire potatoes than from the ordinary two eye pieces. The difference in the amount of seed used, however, was twenty bushels or slightly more per acre, which leaves the balance in favor of the large tuber rather small. The price is usually enough greater at planting time than at the digging season to more than offset this advantage. The results are interesting in that they show that under dry land conditions even those minor features which tend to stimulate the early growth of a crop have an advantage not observed under humid conditions."

Small whole seed is liable to have a larger percentage of disease than large potatoes, or to be badly diseased if taken from an ordinary crop, but if taken from a certified seed crop

crop that is free of disease, will usually give good results. Cut seed should not be kept for any length of time after cutting unless spread out on a floor rather thinly. It gives best results if planted soon after cutting. Some prefer to let the cut surface dry up before planting, but this is not necessary if the soil is moist and warm enough to start growth.



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## Chapter VIII

## Cost of Production and Quantity to Grow.

Cost of producing an acre or ton of potatoes is a very important item in the potato industry. It is necessary to keep the cost at as low a point as possible, in order to get the cost of production at least, in years of a large crop which tends to greatly reduce prices. It will usually be found profitable to put enough labor, good seed, and fertilizer on an acre to produce a good crop. If the same amount of expense is applied to two acres the chances are that the total crop will be no greater than it would have been from the one acre. Twice as much seed would be required for two acres, but little time or labor could be expended on the two acres unless an exceedingly large amount would have been put on the one acre. The extra time in plowing, planting etc., on two acres would take as much time as the cultivating, hoeing, and hilling up of the one acre. If the amount of fertilizer required to grow a good crop on one acre was spread over two acres it might show very little result.

I

Table I7.

Plowing	\$2.50	Cultivating	\$2.50
Levelling &		Irrigating	1.50
Harrowing	1.00	Digging	7.50
Seed Potatoes	5.00	Sacks	7.50
Planting	1.50	Marketing	6.00
		Total	<u>\$35.00</u>

This estimate is rather low, as some years it costs nearly that much for seed alone when it has to be bought, but if the producer grows his own seed the cost will be lower. This estimate does not indicate that any fertilizer was used.

I  
Table I8

Seed (3.98 cwt)	\$5.80	Paris Green	\$1.28
Plowing	1.90	Bluestone	.58
Harrowing	.18	Dipping	1.18
Cutting Seed	.80	Picking up 4 T.	
Planting	.82	at 1.20 per ton	4.80
Weeding	.55	Hauling & storing	2.60
Cultivating (3 times)	2.77	Machinery cost	3.00
Spraying (3 times)	.30	Total	\$27.12

These figures show a very low cost, compared with B.C. cost of production as given in Bul. 86 Dept. of Agriculture where the cost is estimated at from \$95 to \$205 per acre.

2  
Table I9 Cost of producing Potatoes. 22 Empire State

Potato Club Accounts-- 1928

	Per Acre	Averages	% Total Cost
Seed	19.5 bu.	\$35.73	26.6
Material for treating seed		0.78	0.6
Fertilizer		15.39	11.5
Manure		7.76	5.8
Material for Spraying and dusting		7.36	5.5
Man Labor	61 hours	24.22	18.1
Piece Work		8.02	6.0
Horse Labor	59 "	11.60	8.7
Tractor Use	3.1 "	3.14	2.3
Equipment Use	59 "	6.02	4.5
Truck Use		0.45	0.3
Miscellaneous		1.24	0.9
Use of Land		9.70	7.2
Interest on Investment		2.62	2.0
Total Cost		\$134.03	100.0
Yield	302 bu.		
Cost per bu.		\$ 0.453	
Cost " Ton		\$ 14.95	

Seed represented over one-fourth the total cost of production, exceeding the amount paid for man labor, which was about 24%. The average total cost per acre was \$134.03, the range in cost being from \$92 to \$172. Labor costs are less closely related to yield than the other factors studied.

1. North Dakota Agri. College Exp. Sta. Bulletin No. 90

2. American Potato Journal, March 1929. Vol. VI No. 3

I  
Table 20 Cost of Producing Potatoes on the Illustration  
Stations. Vancouver Island.

District	Year	Yield per ac. tons	Cost per ton	Ave. Cost per ton	Ave. Profit per acre
Alberni	1927	15.33	10.40	17.02	100.16
"	1928	6.45	17.30	17.11	68.32
"	1929	6.14	18.18	17.37	84.73
Courtenay	1927	11.66	14.56	13.13	270.80
"	1928	10.17	15.68	13.64	175.04
"	1929	10.36	14.52	13.79	189.85
Comox	1927	7.25	25.16	24.17	62.18
"	1928	7.60	21.80	23.65	36.70
"	1929	5.25	21.78	21.79	51.43
Duncan	1928	5.38	22.97		37.83
"	1929	5.48	20.71	21.84	99.16

Prices of potatoes used in figuring average profit were as follows:- 1927 and 1928 \$20 per ton except Duncan Station where price was \$30 per ton for early potatoes. Price in 1929 \$40 per ton. Duncan Station \$50 per ton (early potatoes). No price quoted for Comox Station for any year. The above costs of production show that it is necessary to have a good yield if grower hopes to make any profit. The largest yields are produced at lowest cost, but it is necessary to get a good price to show a reasonable profit. The small yields however gave a profit in these cases on account of good prices received, but cost of production was too high to be profitable in ordinary years.

The distance from market is also a factor in cost of production. Many potato growers claim a potato crop is not profitable when grown more than five miles from market. The useful employment of teams, and labor when they might otherwise be idle enters into the calculations. If potatoes are cheap, five miles

miles is no doubt the limit that they can be hauled without incurring too great an expense, unless labor is also cheap. But if potatoes are a good price they will stand a greater transportation charge.

Since the advent of motor truck we find that potatoes are hauled 50 to 75 miles at a cost of \$4 to \$5 per ton, this is not out of the way with potatoes at \$25 to \$30 per ton. But is too great a proportion with potatoes at \$15 per ton, as they then would be produced and sold at a loss in most instances. The cost of transportation will be a determining factor, also the location of warehouses in potato districts, to rail or cheap water transportation.

Stations

Fertilizers:- The use of fertilizers on the Illustration has demonstrated their value in the increased yields obtained, and increased profits over the unfertilized plots, showing a lower cost of production. Results obtained are shown in tables 13, 14, & 15 in previous chapter, pages 97, 98, & 99. These tables illustrate that fertilizers have in nearly all instances given a larger yield, and gave an increased profit over the unfertilized plots. This is one of the most effective methods of increasing yields and profits, but fertilizer will not do the work alone. It requires good soil, good seed, fertilizer, and thorough cultivation with good management to get maximum results.

Quantity to grow:- The answer to "quantity to grow", is just the amount that will be consumed, but owing to the abundance of nature at times and niggardliness at other times, it is impossible to produce the required amount. If nature is abundant there is a surplus over actual requirements, which is usually very closely associated with low prices, if the crop is short high prices result.

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 " Prosperity and hard times have some effect on the supply-price relationship. Large crops of winter fruits and vegetables may sell for a higher price when wages are high than when they are low. Potato prices probably reflect similar circumstances." "With seed crops that are inter-changeable such as corn and oats there is a tendency for prices to move up and down together. If production is large there is a tendency for more to be fed to livestock with an increase in livestock products. But substitution is not so easy with such mostly human foods as wheat and potatoes. Consumers want about the same amount each year, regardless of whether yields are high or low. They are willing to pay high prices in order to obtain their usual quantity, and will not buy more than usual when prices are low. Large crops consequently sell for very low prices, and small crops for very high prices. In 1925 when the potato crop was very small, prices in Boston rose to a peak of \$5.79 per 100 pounds in April, compared with 99 cents per 100 pounds the preceding April. The 1922-24 were so low that many potato crops were not harvested." In British Columbia during a scarcity in the spring of 1920 potatoes reached a price of 10 dollars per 100 pounds.

I. Agricultural Reform in U.S.A., Black.

I  
The average price during 1925 was \$2.35 per 100 pounds whereas it was only \$1.04 in 1924 and went below \$1.00 in 1928. So the problem of weather surpluses is therefore serious for potato growers. This situation is intensified on account of the nature of the crop. A small crop and high prices will draw potatoes from a distance, as freight rates remain fairly constant but large crops and small prices mean no movement at all. In many cases the potatoes would not pay the freight, so it would be foolish to ship them. A similar situation has developed on the prairies this year in regard to the cereal crops, much of the low grade wheat and coarse grains cannot be moved as the railways want the freight charges in advance, as they are afraid of the grain not selling for enough to pay same. Much of it could be moved and fed to good advantage if the freight rates were lower, but in some cases the producers are burning it in place of coal or wood.

Grain can be carried over from one year to another but it is not a wise policy to follow. Potatoes are much more perishable than wheat and cannot be kept from year to year, so it is necessary to consume them as they will become unfit for food by the time the next crop is ready for digging.

Methods of disposing of the surplus and processing them will be dealt with in the next chapter.

The only sure market is our home market including domestic requirements, the amount required for seed, and what can be used for feeding purposes. The Consumption of potatoes in B.C. is approximately .55 pounds per capita daily, this amounts to  
I Canada Year Book 1930.

to about 200 pounds per capita yearly. With a population of approximately 600,000 in B.C. it is easy to figure the annual consumption  $\frac{600,000 \times 200}{2000} = 60,000$  tons. Vancouver and New Westminster area will use about 30,000 tons annually, Victoria about 5000 tons, and the balance of 25,000 tons by the other cities, towns, villages and rural districts. About 16,000 acres are planted to potatoes annually in B.C., this requires about 8000 tons for seed, so the total requirements are 68,000 tons. To get this amount it is necessary to grow about 80,000 tons to allow for waste by rotting, shrinkage, small, culls, mis-shapen and cut tubers. A large part of this can be used for feeding purposes.

In years when we have a surplus, and prices tend to be low there may be an opportunity to export or ship to the prairies. Early potatoes are often shipped there, and late potatoes as well depending on their crops.

It is often necessary to ship in potatoes from south of the line to meet local demand, some years it runs into hundreds of carloads. But these shipments will not be so frequent now on account of the increased tariff, now \$15.00 per ton, unless prices go very high when it will pay to import and pay the high tariff and freight.

Owing to a dry season during 1929 there was a crop failure on the Canadian prairies and large quantities of potatoes had to be shipped in. British Columbia supplied 518 carloads that year, which netted the farmers a good price here, as they received from \$35.00 to \$40.00 per ton at shipping point. This took care of the surplus that year and kept a good healthy mar-

market locally, which absorbed large quantities of potatoes from Washington. It is estimated that about 300 carloads came into B.C. out of 1180 cars entering Canada.

This season prices have remained low, from \$15.00 to \$22.00 per ton, since soon after the main part of the early crop came on the market. The crop was not a large one but the price has stayed low, no doubt in sympathy with the general depression and reflects the lowered purchasing power of the people. At present prices it is not at all likely that any potatoes will come in from across the line.

## Chapter IX

## Disposal of Surplus Potatoes or Utilization of the Potato.

Among the methods of using up surplus potatoes we find the most general one is feeding to stock. Large quantities are disposed of each year in this way. Fuel alcohol is an important industry in Germany and might be adopted here to use up the culls if there is an excess over feed requirements. Cull potatoes are used in the manufacture of potato starch, which is used in large quantities in the textile industry. Glucose is a product that can be made from potato starch and used for sweetening and candy making. Dried potatoes and potato flour are other ways of disposing of the surplus, and the pulp left, after the manufacture of some of these by-products is valuable for stock food. In Germany the development that take up the surplus is one of the most important causes of the phenomenally large production.

Table 2I

U.S.A. total production 343,587,000 bushels (1929)

	Utilization, for table purpose	68%
	stock feed	5%
II	seed	11%
	starch manufacture	1% (or less)
	Lost by decay	<u>15%</u>
		100%

Germany, total production 1,653,403,000 bushels

	Utilization, for table purpose	28%
	stock feed	40%
I	seed	12%
	alcohol manuf.	6%
	starch etc.	4%
	Lost by decay	<u>10%</u>
		100%

I. U.S. Dept. of Agric. Bulletin No. 47.

II. U.S. Dept. of Agri.

## I

Use for stock feed.

Wisconsin -- 442 lbs. potatoes = 100 lbs. corn meal for/  
pigs.

Oregon - 350 lbs. steamed " = 100 lbs. barley for pigs.  
" 552 " raw " = 100 " " " "

" Average yield of barley in Alberta - 26.81 bushels. "

" Suppose that in a good potato district, like that around Edmonton, the yields might be 40 bushels barley, or 400 bushels potatoes per acre, i.e. 24,000 lbs. potatoes to 1920 lbs barley, or more than 12 to 1. "

## II

" The problem of preservation may be overcome by ensiling Best results when washed, pulped, and mixed with 2 to 5% corn meal (improves fermentation). "

" U.S. Bureau of Animal Industry found potato silage, used as part of a mixed ration for hogs, in comparison with corn meal at 3 cents per lb., was worth \$25.22 per ton, or 250 lbs. silage = 100 lbs. corn meal. "

" For dairy cows potato silage and good corn silage were of approximately equal value. Potato silage, therefore, is more profitably fed to hogs. "

## III

Potato Silage--How to Make and Use

" The outfit for making potato ensilage is simple and not expensive; six barrels, good big ones, vinegar or molasses barrels, a root cutter and a sack of corn meal. "

" A day or two before making the ensilage the corn meal is put into a barrel and enough water added to thoroughly saturate it but not to make it sloppy. Let stand in a warm place to sour

I. Foster, Exp. Sta. Saanichton B.C.

II. U.S. Bureau of Animal Industry.

III. American Potato Journal, April 1929. Vol. VI. No. 4

sour or ferment; it will soon begin to look and act like yeast or starter; this is the function it has to perform in making potato ensilage. Potatoes alone will not ferment but spoil; therefore, from 2 to 5 per cent corn meal must be used. Get your barrels and your starter (corn meal) ready, wash the dirt off the potatoes (do not use rotted or decayed ones), run them through the root cutter, and put a bushel of the chopped potatoes into the bottom of the barrel, a little of the fermented corn meal, some more potatoes, and pack down with a heavy piece of wood or anything that will serve the purpose. Alternate potatoes and corn meal till your barrel is full, and be sure it is well packed, the harder the better. Place some boards, cut to fit inside the top of the barrel, and place a stone on top to weight it down. Add no water or salt, just the potatoes and corn meal, cover with chaff or cut straw to exclude the air from the ensilage as the mixture settles in the barrel."

"The potatoes furnish enough water and the fermented corn meal acts as yeast; fermentation sets in, and after about three weeks (sooner if weather is warm) your feed is ready. This method makes it possible for the man with a few cows and a few pigs to have a real silo in his barn--a poor man's silo, if you please."

"Keep your barrels covered when you begin feeding. Potato silage, like any other silage, will turn black and mold when exposed to the air. As soon as a barrel is empty, scrub it and refill it."

I

"Alcohol"

Cull potatoes, such as those used in starch production,  
I. U.S. Dept. of Agri. Bul. No. 47

are also suitable for alcohol production. Potatoes are made into a mash and fermented, and the alcohol distilled from the resulting liquor. Only the starch is used up. The proteins and remain in the mash, and make a valuable by-product for stock feed.

The potato alcohol industry has not been developed in America, but in Germany we find many co-operatively owned distilleries run by the farmers, for the production of denatured alcohol."

I  
Yield of alcohol from potatoes -

"According to European statistics we find that three million tons of potatoes produced seventy-five million gallons of 100% alcohol or approximately eighty-three million of 90% alcohol. From these data, one ton of potatoes would produce about twenty-seven gallons of 90% alcohol. This agrees fairly well with calculations from a theoretical standpoint. The starch content of potatoes varies from 15.5% to nearly 30% i.e. one ton contains from 310 pounds to say 500 pounds of material convertible into alcohol. One pound of starch produces, theoretically, one-half pound of alcohol, therefore one ton of potatoes would produce from 150 to 250 pounds alcohol (100%) or 165 to 275 pounds alcohol (90%), equivalent to 20-40 gallons 90% alcohol."

"Assuming that one ton of potatoes produced 27 gallons of 90% alcohol (this is the yield obtained in actual practice) and comparing it with gasoline at 20 cents per gallon, the gross return from one ton of potatoes would be approximately \$5.40/<sup>from</sup> which must be deducted the cost of material and manufacture."

I. F. Shutt, Dominion Chemist, Ottawa.

I  
Potato Starch-

" The principal food starch of Western Europe, and the raw material for glucose manufacture in Holland and Germany.

Germany, 1911, produced 383,019,708 lbs. of potato starch  
124,332,385 " " glucose.

Total annual production was over 600,000,000 pounds.

Japan, 1918, exported to U.S. 21,806,975 lbs. potato starch.

U.S. produces about 20 to 25 million " " "

Cull potatoes are used in Maine, at  $8\frac{1}{2}$  to 17¢ per bushel yielding 15% starch, worth about 5 cents per pound.

During a 10 year period (previous to 1920) the farmers of Aroostock County, Maine, received \$4,500,000, for cull potatoes, worthless except for starch manufacture. Even partially rotted potatoes can be used for this purpose. The potatoes are washed, ground, sifted, and the starch recovered by settling in vats. In Germany the starch factories are mostly owned co-operatively by the farmers."

Dried Potatoes-

"Dried potatoes are used both for human food and stock food. If intended for human food, they must be parboiled or cooked with steam, to kill enzymes and prevent subsequent darkening. Even then, slow browning will occur unless moisture content is reduced to 6.5% and potatoes are stored in air-tight containers at cool temperature. Their value is not fully appreciated, as they are a great convenience in hotels, dining cars, on boats etc. At present the principal use in the U.S.A. is as the chief ingredient for dehydrated soups.

"Method of preparation-- Raw potatoes are washed in large paddle machines and peeled, followed, in some methods, by cooking. They are then treated in one of these ways:

(a) Raw potatoes sliced or riced, dried in thin layers by a current of hot, dry air.

(b) Cooked potatoes (by steaming) dried by passing between rollers internally heated: (potato flakes). This is the popular method in Germany, the required plant costing less. Most plants are owned by farmers, singly or co-operatively.

(c) The U.S.D.A. worked out a process in which potatoes were finely pulped and pressed into large "cheeses", to be further dried. This is the simplest and cheapest process. Used for stock food only."

" Value of dried potatoes--Kellner found they resembled corn meal closely in composition, and could replace it pound for pound."

Note- 400 bush. potatoes (at 22%) = 5,280 lbs. dry matter  
 40 " barley (at 88%) = 1,690 " " "

" Potato flour--The flakes, manufactured as in the German process are ground into flour. In 1921, there were eight factories in the U.S. each using about a carload a day, over a working season of 150 to 200 days. Price to farmers 60¢ per bushel. Yield of flour, about 20% of wgt. of Michigan potatoes.

" 25% " " " Idaho "

Capacity per factory, about 8000 lbs. of flour per day.

Use of flour, chiefly as a bread improver.

Price about 9 cents per lb."

The possible utilization of surplus potatoes in these ways offers an outlet for all our present surplus, and the surplus of many years to come, if the growers can be organized, and produce with the definite object in view of supplying the domestic market, and turning all the surplus into by-products of one form or another. Before any one by-product is manufactured it will be necessary to make a complete survey of the situation and enter on the line that offers the greatest possibilities. A plant that could handle several lines of manufacture would be the most suitable, but it would have to develop as the need arose

Several small plants in the potato districts might be the solution, or one near tide water where potatoes could be shipped by scow with the advantage of cheap freight, it should have rail connections also.

## Chapter X

### Functional Services

#### Storage.

Farm Storage- A great many systems of storage on the farm are in use, barns, basements, root cellars, and pits. Most of these systems give satisfactory and cheap storage.

There is often spare space in the barn, that can be used for a few months, the potatoes are handy to get at to grade if bad weather sets in, and the culls are handy to feed to the stock.

Basements are also used in many cases, and afford good storage. A basement has similar advantages to a barn, but has a few disadvantages, and chief among these is carrying the potatoes up out of the basement to ship. The culls have to be carried to the barn or to the stock.

Potato or root cellars are similar to the basement for storage purposes, both in advantages and disadvantages.

When any of these methods are used, the potatoes should have a free circulation of air around them. This can be accomplished by using a false, or slatted floor made in sections, so that it can be easily removed for cleaning after the crop is taken out. The walls should be stripped and slatted, this will allow a free circulation of air up outside and through the potatoes. Slatted partitions about every six feet are also desirable. This method allows for the potatoes to be piled to a depth of six or seven feet. It will be found that they will keep dry and come out in first class condition. Potatoes placed

placed in bins like this when wet will dry out thoroughly if there is not too much mud or earth sticking to them.

The pit is a common and cheap method of storage, but has many disadvantages. The potatoes cannot be touched in cold weather and often the high-priced market is lost. With the heavy rainfalls here at the coast, they require more watching and attention, as the earth covering gets wet and is apt to freeze through in a cold spell. Many of these pits have a covering of boards overlapping to keep out the rain, but it means considerable trouble, to make the pits, earth them up, and put covers on them each year. This method is not as satisfactory as the other methods mentioned, but is often adopted for part or all of the crop. Potatoes in a pit will keep much better if raised up a few inches from the earth by cedar rails. They also require some ventilation which may be closed during a cold spell.

Each production area should have a warehouse close to rail or water where a large quantity of potatoes can be stored. There should be local storage warehouses for about 25% of the crop of the area, unless large quantities are being processed in some way. Even then storage is required as the processing will or should extend over six months or so, in order to operate efficiently. The processing plant and storage warehouse should be together so that all potatoes graded out, will not have to be moved again before being used up in some manner. This part of the subject, processing, was dealt with in a previous chapter.

It is necessary to have about six weeks to two months

months supply, on hand in warehouses, either in the consuming areas or production areas. It may be found of the greatest advantage to have warehouse capacity for three or four months supply, as a large part of the crop could then be moved direct to the warehouse and save any further handling.

Warehouses in the centres of population would vary according to the size of the cities. Vancouver would need warehouse room for five or six thousand tons, New Westminster 500 to 1000 tons, Victoria 1000 tons, to tide over a cold spell or bad weather. Shipments would come forward from the country warehouses as the supplies were drawn out for consumption.

#### Grading

Grading is a very important factor in the movement of potatoes from producer to consumer. Potatoes well graded are more attractive and will encourage consumption, but potatoes poorly graded will discourage consumption. A mixed lot of potatoes with cuts, bruises, rots, and small, large, and rough potatoes all put in together are not attractive. There is a lot of waste in such potatoes and they are dear at \$1.00 per sack of 100 lbs. when "A" grade are selling at \$2.00 per sack. The cull potatoes are of some value on the farm as stock feed, but are not desirable for human consumption, and often have to be destroyed. Freight has to be paid on them, so there is a double or treble loss to the farmer, in not having the potatoes and paying freight on them to the city.

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 " Potato Experiment in Grading -- In agricultural products, as elsewhere, a part is frequently worth more than the whole, as

as is illustrated by the following experiment. Seventy bushels of Irish Cobbler potatoes were graded, and sold to a retailer at the following prices.

Table 22			
"A" grade--	55	bushels at \$1.25 per bu.	\$68.75
"B" "	10	" " .75 " "	7.50
Culls	5	" " .40 " "	2.00
Total			\$78.25

Current prices for these same potatoes, field run (ungraded) except for removal of culls, were as follows.

65 bushels at .95 per bu.			\$61.75
5 "	"	" .40 "	2.00
Total			\$63.75

"In other words, 55 bushels of potatoes sold for substantially more than the 70 bushels. The 70 bushel contained the 55 bushels plus 15 bushels of undesirable stuff. The market paid 14.50 more for having the lot graded, or 20 cents a bushel in favor of farmer grading, a sum ample to pay grading costs and leave a good margin. It may be stated as an economic principle of agricultural price, that a part is always worth more than the whole, the whole meaning the entire supply "field run" before any grading, culling, or cleaning has taken place; the part, meaning the supply after standardizing, grading, cleaning, culling, or removal of foreign material, as the case may be. To this extent the farmer has control of quality and quantity, production, particularly when use is made of co-operative marketing machinery. While nature, therefore, determines largely the quantity produced from the soil, the farmer himself may control within wide limits the quantity and quality put on the market, by the simple process of keeping the low quality stuff at home."

An important factor in connection with the grading is a psychological one. If poor grade potatoes are on the market at \$1.00 per sack of 100 lbs., people get the idea that, that is the price of good potatoes, and many consumers are slow to appreciate the increased value of the good potatoes, which are often much the cheapest when loss in preparation is considered.

According to the grading regulations, potatoes must be of a certain size, free from blemishes, scab etc. to be "A" grade. The next grade, "B" grade, allows for a percentage of, off type or grade, and "C" grade, a lower standard still. They all must be tagged, showing the grade that is in the sack and have the grower's name/<sup>or number</sup> as well as variety.

Potatoes look best, when graded according to color, size, and variety. Most consumers want potatoes of one variety, as few varieties will cook in equal time. Color of flesh varies too and we find that a mixed lot of potatoes are not wanted, except by the poorer classes, where cheapness is the main factor in purchasing.

There is a potato for practically every soil, and a soil for practically every potato. When potatoes are grown on the wrong type of soil, it usually results in a poor quality product, or a small crop. Some potatoes require a dry soil, others a moist or even wet soil. Some varieties do best under irrigation, that is they require moisture or irrigation in order to get a paying crop. But the same potato will produce the best quality on the soils that are well supplied with mineral matter. Peaty soils will produce a large crop of Netted Gems if moisture is

is available, they will be greatly improved, however, if plenty of potash and phosphoric acid is added. Burbanks also do well under these conditions, as both these varieties are suitable for irrigated lands. The Sir Walter Raleigh, if grown on low lands gives a big yield but they are so bitter that they are not in demand for table use.

A great many farmers do not understand the grading regulations and there seems to be an inherent weakness among producers to try to sell the total crop, including as much of the low grade stuff as they can get away with. Each farmer will have a different idea of what constitutes "A" grade, so a great many grades or rather potatoes that should be named "No" grade are put on the market. The only way to get a standard and uniform grade, is to have the same graders do all the grading at a central warehouse in each district, and return all the culls or low grade potatoes to the grower, or sell as stock food if there is no other way provided to use up the surplus.

The grading regulations have done much to improve the potato industry, but there is room for improvement on the present system. The real test of the quality of potatoes is in the cooking. Poor quality potatoes invariably reduce consumption.

#### I Culinary Quality in Potatoes-

" The factors affecting the culinary properties of the potato have not been made the subject of much study or investigation. However it is common experience to find lots of potatoes which obviously have very poor cooking qualities--they are dark in color, soggy, disintegrate on boiling, or have an unpleasant

unpleasant flavor. The present investigations were undertaken to obtain definite information on factors affecting culinary value of potatoes."

"Culinary quality in any article of food is difficult to define, and potatoes are no exception. Furthermore, the standards in Europe are different from those in America. East states that in France sogginess is desirable, since the accepted method of cooking is deep fat frying, for which a tuber which holds its form is desired. In the United States probably nine-tenths of the consumption is of boiled or baked potatoes, which are desired dry and mealy. Langworthy defines and explains mealiness as follows:"

"In this country the chief test of excellence is mealiness, which means that when cooked, a potato should form a crystalline-like mass with almost distinct starch particles. This quality depends largely upon the proportion of starch present. If it is abundant and evenly distributed throughout the tuber, the cells burst open in cooking and a light, flaky, uniform mass results. If the proportion of starch is small in any part of the potato, water is likely to replace it, which will make the potato soggy when cooked. Fresh mature tubers hold more starch than young or long-stand ones, and the inner medullary layer or core is more likely to be poorer in starch than the outer layer, therefore, well-developed, and well-ripened tubers are more likely to be mealy when cooked than new or watery tubers, or those which have a large core with many long arms branching into the outer part of the tuber."

### Methods of Cooking--

Considerable preliminary work was done on the methods for boiling or baking potatoes for experimental purposes. The procedures finally decided on were as follows:

**Boiling--** Four potatoes of uniform size were selected from each lot. The potatoes were peeled as thinly as possible and dropped into a pan of cold water. As soon as the four were peeled, they were placed in a small enameled pan and three cups of boiling water added (enough to cover), the pan was kept covered and the water was kept boiling without vigorous bubbling. They were considered done when, pierced by a fork, they were found to be quite tender. As soon as cooked, they were drained and judged immediately. No salt was added as the natural flavor was desired.

**Baked Potatoes--** Four potatoes of uniform size were washed, thoroughly dried, and placed upon a rack in the lower half of an oven having a heat regulator set for 475° F. They were baked until done, as judged by pressing with the hand. It required about thirty minutes for small potatoes, forty-five for medium, and sixty for large. When done each potato was pierced at each end with a sharp knife to allow the steam to escape and thus to keep the potato from becoming soggy.

Dry matter was determined on a Maercker potato balance.

It was generally agreed that only four degrees of quality in any one character was feasible in potatoes. It was seldom found, for example, that there was any real need of an intermediate value between "soggy" and "slightly mealy", or between "white

"white or cream"and"gray or yellow".

" In explanation of the terms used to describe color it may be said that many people consider a cream color just as pleasing and desirable as a clear white,whereas a decided yellow or gray is inferior. Dark streaks and areas make for still less desirable appearance. "

" Potatoes that show high quality for boiling will probably show it for baking. Higher dry matter tends to be accompanied by better texture and by better flavor. "

The cooking qualities can be determined by a cooking test. Where there is any doubt about a variety,a sample should be forwarded to be tested before any shipments are made. All new growers should have this test made. The consumer is entitled to the best,so all the low grade potatoes should be kept off the market. They are valuable for other purposes and should not be offered for table use until all the best grades are used.

The grower should be taught what constitutes a good grade, if he is detained at the grading station,while his potatoes are graded,he will see what is graded out,and will perhaps grade more carefully at home,and avoid hauling part of the load both ways.

#### Standardizing and Packages--

All grades of potatoes should be standardized for quality, size and grade. A uniform product of high quality is very attractive,has less waste in preparing for the table and will bring the top price on the market. If a uniform grade was maintained year after year,the consumer would soon learn to order

order by grade and brand knowing that they could depend on getting a good article.

All potatoes should be regraded, just before they leave the warehouse in order to be sure that there are no bad or poor quality potatoes going to the consumer. Potatoes are a perishable commodity and even two weeks will allow for considerable deterioration. If they are looked over just before going into the retail trade, it will be an assurance of good quality and grade going to the consumer.

Potatoes should be put up in suitable containers. For the retail trade 15 to 25 pound packages, cartons or sacks are quite suitable. Cartons can be burned when empty but sacks are not so easy to dispose of. The container should be new and plainly stamped with an attractive brand. A uniform package is much more attractive and enticing than a nondescript lot of dirty sacks, which very often would spoil purchases if such sacks were seen. New cartons or sacks are more attractive and appeal to the consumer.

#### I

Small Bags as Consumer Packages-- The trend in merchandising groceries is toward the use of small standardized packages in which the identity of the manufacturer's product is carried through to the consumer. The formerly familiar barrels of crackers, molasses and sugar in the grocery stores have been replaced by cartons, cans and small sacks in which the consumer carries home his purchases.

The use of closed consumer packages in marketing such highly perishable commodities as fruits and vegetables presents

presents many difficulties. The idea has been tried out in distributing the late potato crop. Considerable quantities of Idaho baking potatoes have been packed in cartons, and in the small bag, as a consumer package has been tried.

The Bureau of Agricultural Economics, U.S.D.A. conducted a survey in March 1929, to determine the extent to which small bags were being used as consumer packages in marketing potatoes, and the wholesale and retail trade opinion as to the advantages and disadvantages of this practice.

This survey disclosed that Idaho was the principal State in which small bags were being used in packing potatoes. In fact, it was the only State in which any considerable quantities were packed in this way although, small shipments, mostly of an experimental nature, were reported from Montana, Washington, Michigan, and Prince Edward Island, Canada. There was a pronounced increase in the use of the small bag in Idaho during the 1928 or crop season, and it was estimated that about 700 cars from this State were shipped in these packages. Repacking of potatoes into small bags in the markets was reported in a few instances, but this practice was not general."

Where quantities are wanted for sale by the sack or small orders, as in the retail trade, the 100 pound sack should be provided. This size is also most suitable for selling to camps, hotels, restaurants etc., these should be in clean new sacks, and of good quality, so as to eliminate waste.

There is always a big loss in using sacks, in moving potatoes to the markets. This could be overcome by shipping in

in bulk or in crates as it is an important item to supply sacks at from 8 to 10 cents each for hundreds or thousands of tons. Bulk potatoes are more slowly handled than when in sacks or crates. Sacks could be returned, but usually they are not. There is a big loss even then as they wear out quite readily. Crates are the handiest and easy to handle, they allow free circulation of air in the car, they are fairly expensive, but could be used many times. Two carloads of crates could be returned in one car, the freight may be fairly high, unless some special rate is in existence for the return of empties, as in the case of milk cans, egg crates etc. Where potatoes are brought direct to the warehouse by truck, the crate is very efficient and easy to handle. Empty crates could be returned when the truck goes for the next load.

## Chapter XI

### A Plan for Marketing the B.C. Potato Crop

The first question is, how many potatoes does the population of British Columbia use in a year? The amount varies from year to year owing to the various food fancies that develop, but it will be found that the consumption is fairly constant.

The production of potatoes as shown in a previous chapter is 4.5 Cwt. per capita, while the consumption is 2 Cwt. per capita. With a population of 600,000 this means that 60,000 tons is the amount we need to produce yearly to supply the domestic demand.

A portion of this will be grown in the home gardens, and with what is used by the producers on the farms will account for about 15,000 tons, leaving about 45,000 tons to come into the larger markets from the farms. Practically every year we produce from 80,000 to 100,000 tons or more, so there is a big surplus. About 8000 tons are required yearly for seed, and there is a loss from shrinkage and rotting of about 10 to 12%. Culls are not usually included in the production figures, as they are mostly fed on the farm or disposed of for feeding purposes.

Vancouver requires in the neighborhood of 30,000 tons per year, so it is folly to ship in 50,000 tons, pay freight, storage, and finally cartage on the surplus to the incinerator. This part of the market can be regulated, through a proper selling agency, which would bring into the central storage warehouses enough to supply the demand.

It will be a big step forward when a "feeding the market" plan is put into effect and "supply the demand" intelligently rather than depend on the old rule or law, of supply and demand. The old system of competition may be the life of trade, no doubt it is during a period of prosperity, but it is also the death of profits, and puts many an honest and good business man out of business in times of depression. Profits secured during a boom usually vanish during a depression.

Who is entitled to the domestic market? This is a natural question, and I will answer it in this way. I maintain that the consumer has a right to the best that can be produced, and that only "A" grade potatoes should be allowed to come onto the market if there is enough of this grade to supply the demand. This would eliminate growers of "C" grade potatoes and many of the "B" grade growers. But if "A" grade was short, then "B" grade could be used. Growers that have soil that will not produce the best grade of potatoes should cease growing them. It may be that they have the wrong varieties, if so they should take steps to find out which variety suits their soil, as suggested in a previous chapter, and get these new varieties. They should try out several varieties, and use fertilizers that will assist in producing the best quality of potatoes.

A central selling agency would be in a position to employ the best experts to assist the growers in this matter, whereas it is impossible for the growers to provide the service for themselves when unorganized.

So the question of who shall supply the domestic market

market narrows down to the growers who can produce the best quality potatoes. Distance from market should be no barrier. Potatoes are a bulky crop, consequently transportation charges are fairly high, but it should be left to the discretion of the grower to decide if he will ship to a market or not. That is to say, if growers at Ashcroft, who have shipped potatoes to Vancouver for years, wish to continue shipping their allotment, they may continue to do so, and growers from any other part of the province who decide on Vancouver as their market, should be allowed to share in it. But the price would be F.O.B. Vancouver so they would have to pay the freight, and the man farther away from the market would get less per ton for his potatoes on account of the increased freight. He would not be allowed to ship to any market he desires, but would have to take his share of the market he selects.

No grower has the right to sell <sup>in</sup> any market, just because he lives near it, but is entitled to a share of it, if he can produce the quality or grade of potato in demand. He should be responsible for his share of the surplus and for all low grade potatoes that he produces, and should not be allowed to put them on the market at sacrifice prices, and spoil the market for his fellow growers.

#### Establishing a Basic Supply for Each Grower--

How will the allotment for each grower be established? This an important subject, but there is a basis on which to work out his allotment. If the Vancouver market absorbs 30,000 tons of potatoes during the crop year of 1930-31 and the producers

producers in the area supplying this market, produce 60,000 tons then each grower will have as his basic supply for the crop year of 1931-32, 50% of what he grew the previous year. It would not make any difference if a man grew one acre or fifty acres, his basic supply would be figured on his previous year's production. So if a man grows 100 tons of potatoes during 1930-31 and 50% was the percentage of the crop consumed, his basic supply for 1931-32 would be 50 tons. He would have to grow more than this to be sure of having 50 tons of good potatoes, but he would be sure of a market for that much, if he failed to produce the amount through reduced acreage, his basic supply for the following year would be reduced. But if it was through a crop failure, he should be allowed the same basic supply for the following crop.

The man with one acre and the man with one hundred acres would be treated in the same way, and thus it would be possible to make every man responsible for his own surplus. He would tend to reduce acreage unless he had stock that he could feed the surplus to. In the course of time a regular supply would be planted.

If a grower wished to increase acreage, he could do so but his basic supply would not be increased until the following year, this would tend to curtail acreage increases. New growers would be treated the same way, except that they might be, or could be allowed 25% of their first year's production, as their basic supply for that year. This could also apply to the growers who wanted to increase acreage, as having to feed 75% of the supply

supply of the increased crop would hold down any increases. A grower could reduce acreage and maintain his basic supply for that year, but would have it reduced for the next year.

Feeding the market just what it could consume, would make for a stabilized price. A grower with 100 tons of potatoes and selling 50 tons of them for \$25.00 per ton at the farm, and using the other 50 tons for seed, feeding stock etc. would be much better off than to try to market them all, and get probably \$15 per ton for them at point of delivery. A surplus market is a buyer's market and you take what they feel like offering. A regulated market is a seller's market and brings the higher price. The potatoes are worth around \$10.00 per ton for feeding purposes, so \$1250.00 for 50 tons, and \$300.00 feed value of 30 tons, leaving 20 tons for seed, loss through shrinkage, rots etc., is much better than 80 tons at \$15.00 at point of delivery which would be only \$1200.00 and cartage to be paid out of this. It would be much easier to get the \$25.00 per ton at the farm or \$30.00 delivered, for what the market requires than the \$15.00 per ton for all the crop.

Table 23.	50 tons at \$30.00 per ton	\$1500.00
	30 " " 10.00 " for feed	300.00
	<u>80 tons</u>	<u>Total</u>
		\$1800.00
	Less cartage at \$3.00 per ton	150.00
		<u>\$1650.00</u>
	or \$20.63 per ton	
	80 tons at \$15.00 per ton	\$1200.00
	Less cartage on 80 tons at \$3	240.00
		<u>\$ 960.00</u>
	or \$12.00 per ton	

Another item to be considered is the extra sacks used for the larger amount, which will amount to at least \$1.50 per ton, re-

reducing the returns by another \$45.00.

This demonstrates that a part of the crop is worth more on the market than all of the crop. Most producers have not made any study of this side of the case, and feel they are being discriminated against if they cannot sell all their crop. So the only way to help them is to make such a system as I have outlined compulsory. It cannot be accomplished in any other way. The many attempts at co-operative marketing has demonstrated this fact. There is a small percent of the producers, who do not care what happens to the other fellow, they would be pleased to see many of them fail, and would be satisfied to take less than they would otherwise get by having a stabilized market, hoping that at some future time prices would go high and they would get a big revenue for a season. This class of producer is a menace to society, just the same as many of our criminals are, and it is to control the few that we need a compulsory measure to handle the produce efficiently.

A great deal of cross shipping is carried on at present, which could be eliminated. Many shipments of potatoes are shipped twice and sometimes three times. Much of this extra shipping could be done away with, by having a central selling agency, the orders would be filled from the nearest centre, to where the potatoes are wanted, shipping connections taken into consideration.

While I lived on Vancouver Island, I was in close touch with the potato industry and saw much cross shipping. There were two reasons for this, the first one was that local growers often

often asked more than the product could be purchased for in Vancouver, and shipped in. Secondly, the purchasers did not know just where they could get a supply, so sent orders to Vancouver. I have known of potatoes grown at Comox, that were shipped to Vancouver, and sent back in a few days to Deep Bay about twenty miles from Comox, that could have been delivered by truck, and in much better condition, than they were after making the trip to Vancouver. Paying two freights, dock charges, and handling charges by firms in Vancouver made the potatoes pretty expensive or much higher than they could have been bought for in Comox.

Another instance of extra shipping was a case where six tons of potatoes were shipped by boat from Victoria to Port Alberni, a district that grows good potatoes, and in quantity. The boat after discharging the cargo, picked up another shipment of potatoes at Port Alberni and took them to Port Alice. This is good business for the transportation companies, but means higher prices for the consumer, and smaller prices for the producer. A central sales agency would eliminate much of this extra shipping.

To handle the crop most efficiently, the province should be divided into districts, around the consuming centres, each district to include all the area that naturally ships to that centre or market, with a warehouse in each consuming centre that will hold from 20 to 50% of the crop, according to the local conditions. Vancouver would need warehouse space to hold approximately 5000 tons, this would be about six weeks supply. As the supplies were drawn on, more would be shipped in from the producing areas,

areas, so there would never be any shortage, and if cold weather sets in, as it occasionally does here in the winter, there would be a large enough supply to carry on for a month or six weeks. With another 5000 tons in warehouses in the producing areas, which should be located on the railway or on tide water, shipments could come forward even in cold weather and a three months supply would be assured.

Producers in the production areas might want greater storage facilities, probably large enough to hold 50% of their crop, or they may find it cheaper to store at home, and haul in as required, to keep up the supply. It would depend on whether providing the storage facilities would cost more than the extra handling entailed in farm storage.

One warehouse in Victoria could look after that area, another but smaller one at Naniamo, for distribution purposes, as well as for storage, taking potatoes direct from the farm. Comox would require a storage warehouse, as most of their production would go to Victoria, Naniamo, Vancouver, or to camps and towns along the coast line up to Prince Rupert. There might not be much to come to Vancouver, from this source.

Vancouver would need two or three warehouses on account of the large area to be supplied, one of these should be at New Westminster. These warehouses could get supplies as far as possible direct from the farms by truck, the balance coming by rail. In the Fraser Valley the farmers might find it most convenient and cheapest to provide their own storage, and haul direct to the warehouses in the city. It might be necessary to

to have some warehouses to hold a car or two at some of the points up the valley at Sumas or Chiliwack, or they might prefer to load direct into the cars and save the cost of warehouses and expense of operating, except that it would be necessary to have a supply on hand to meet the local demand. This could be arranged for, with some local dealer who would supply all the stores in the district and fill any local orders coming from camps etc.

To regulate the flow to market, - It would soon be found out, what proportion is moved into consumption in the fall, that is the proportion which the consumer stores up for winter use. This along with what the warehouses would hold, may take as much as 50% of the quantity used for domestic purposes. The balance of the requirements could be sent in at the rate of 10% each month, so that all supplies would be in storage in the central warehouses by the end of March or during April. Each grower could deliver 10% of his crop at a set date each month, and very little trouble or expense would be incurred in notifying growers when to ship.

If it was found profitable to manufacture some of the surplus into by-products, it would be necessary to have the processing plants established in the production areas, and save the expense of transportation by rail. With a good price for what is required for domestic use assured, it might prove to be quite profitable to increase the supply, and manufacture some by-product. If the crop was increased to such an extent, that 40% of the total would supply the domestic market, it would leave about

about 40% of the crop for by-products, and 20% for seed and feeding purposes. The 40% going into by-products may only bring \$16.00 per ton, but with the domestic potatoes at \$30 per ton, (less cartage of \$3 per ton) the average price for 80% of the total crop would be \$18.50 per ton, as shown by the following table.

Table. 24

50 tons at \$30.00 per ton	\$1500.00
50 " " 10.00 "	500.00
<u>100</u>	<u>\$2000.00</u>
Cartage on 50 tons at \$3 Per Ton	150.00
	<u>\$1850.00</u>

Thus 100 tons brings \$1850.00, one ton is worth \$18.50 and the market is kept in a healthy condition, this is much better than the previous figures of \$12 per ton, that 80 tons would bring on an unregulated market, as shown in Table 23.

The following tables show the possible returns of a still greater increased production.

Table. 25

50 tons at \$30 per ton	\$1500.00
100 " " 10 "	1000.00
<u>150</u>	<u>\$2500.00</u>
Cartage on 50 tons at \$3 per ton	150.00
	<u>\$2350.00</u>

Thus 150 tons brings \$2350.00, one ton is worth \$15.66.

Table. 26

50 tons at \$30 per ton	\$1500.00
150 " " 10 " "	1500.00
<u>200</u>	<u>\$3000.00</u>
Cartage on 50 tons at \$3 per ton	150.00
	<u>\$2850.00</u>

Thus 200 tons brings \$2850.00, one ton is worth \$14.25

this is still a better price than \$12, as shown in table 23.

Certified Seed Potatoes-- The certified seed potato business could be handled by a central selling agency, as they would be in close touch with all the growers, and could find the largest market for the seed which passed all the inspections, they could also find a market for the seed which was not quite good enough to pass as certified seed, but still better than ordinary seed for the commercial grower. As a rule certified seed does not move until February or March but all should be moved by May 1st or put in with the commercial supply. Certified seed would be handled by variety pools, with an advance of 50% of selling price, when received in good condition, and the balance when pools are wound up during May or June. Variety pools are necessary with certified seed. These pools should be arranged in districts, as growers at a distance cannot expect to share in orders received, with other growers who are close to the consumers, unless difference in freight is allowed for. Orders would have to be allotted as near as possible in proportion to the amount each grower has of each variety in the area. Netted Gem growers could not expect any share of the sale or returns from Green Mountain potatoes and visa versa. But each Netted Gem grower in the districts as arranged, would share in the orders for that area according to the proportion that each has of that variety. A grower with 10% of the total of a variety, should receive orders for 80% of his supply, if 80% of that variety is sold or orders for 100% if total crop is sold. This plan would apply to all varieties.

The price of certified seed is usually about \$20 per ton

ton above the price the producer gets for his commercial crop, and commercial seed grown from certified seed \$10 per ton higher. Foundation stock is much more valuable than either of these classes of seed, and would probably be worth \$4 or \$5 per 100 pounds, depending on how free of disease it was.

Pooling -- An important problem in the marketing is the method of paying for the potatoes, whether to pay for each consignment as received and sold, thus completing the transaction or by weekly, monthly, or seasonal pools. If the pool method is used, there would have to be several pools to handle the various grades and varieties.

The early potato crop would be handled in separate pools. For the main part of the early crop from June 15th to July 31st pools should not be over a week in length, and two week pools from August 1st to October 1st when the main or late crop is dug. The real early potatoes should be handled as individual sales, so that each grower would get the benefit of the high price. After June 1st daily pools could be run until June 15th when three day or weekly pools would commence. A schedule should be drawn up and a copy given to each grower, so he would know just when each pool ended.

Main Crop Pools-- These would commence October 1st and each producer would be allowed to ship in that month, the percentage of his basic supply, that was determined could be sold or stored. This plan would make it a simple matter to have a monthly pool. Each month would see enough potatoes coming in to supply the demand, and each grower would get his share of the

the market. By adopting this plan, and with the market stabilized a price of \$30 per ton could be set for the month. On this basis an advance of \$20 per ton could be made. The wholesale price to stores, would be \$35 and retail price \$40 per ton or \$2 per 100 pounds, more when sold in smaller quantities, this price to be set by the retailer. These prices are based on the "A" grade potatoes. If "B" grade potatoes were needed, they would be \$5 per ton less, but they should not come on the market until all "A" grade potatoes have been disposed of. In any areas where processing is carried on, the potatoes would be paid for independent of the domestic pools, as it would be a local industry.

A plan which might increase fall sales, would be to set the price at \$35 per ton for direct delivery to the consumer, this price would apply on orders of 500 pounds or more. The retailer could book these orders for delivery during the digging season. The consumer would thus get the benefit of the amount that would otherwise be spent for handling and storage charges. The retail price for November would be \$40 per ton, this price should be increased \$1 per ton per month, to cover storage and shrinkage. By adopting this plan, the grower/<sup>who</sup>would like to hold his potatoes, could arrange to do so, and get the benefit of this increase which would amount to \$5 per ton if held until April. The retail price would increase at the rate of 5 cents per 100 pounds per month, which might induce the retailer to increase his purchases early in the season, or near the end of the month. This plan would work best with a monthly pool, and would probably be the most satisfactory system for marketing the main

main crop potatoes. By adopting a monthly pool, the producer would not be kept waiting for final payments.

A central selling agency would be of the greatest benefit if it could be developed into a general fruit and produce agency, and handled all agricultural commodities. Such an agency could operate and deliver much cheaper than if it handled one commodity.

The price paid for potatoes would be set on a F.O.B. basis, Vancouver, Victoria, or the consuming centre of each district. If it was found necessary to bring potatoes from another district to meet the local demand, the growers there would get the advantage of increased sales, but would pay the freight to destination. In case the shortage affected the whole province, a central selling agency could purchase potatoes in Alberta or across the line (U.S.) and would have any profit on these purchases to improve the price paid the local producer. It would also be in a position to make sales for export, if any demand for export potatoes developed.

Financing of the agency would be, partly out of funds provided by the growers, through the sale of shares, and partly by arrangement with a bank for advance payments. In most places warehouses can be rented, especially in the larger centres, so it would not be necessary to raise capital to build them. The earnings of the first few years should be put in a reserve fund and build up a substantial reserve, or 50 cents per ton on all sales could be deducted for this purpose. By adopting this system it would take only a few years to get enough capital ahead

ahead to make full payment for all potatoes each month. For the first year or so the initial payment could be 70% of their value . As sales were made the bank balance would grow, and the final payment could be made soon after the close of each monthly pool. By paying an advance of \$21 per ton and selling at \$35 it would not be very long until all payments were made out of the sales. If final payments of the monthly pools were set for the 15th of the following month, the advance payments could be made out of receipts from sales, as potatoes and produce generally, are practically all cash sales, at least 90% are cash. To make sure that cash came in freely, a charge of 2% could be added to all accounts not paid in 10 days, or allow a discount of 2% if paid within 10 days.

## SUMMARY

Our present marketing system is the outgrowth of the old system of barter, trade or exchange. It came into use during the development of commerce into its present state. As there was no central body to guide production and marketing, it developed in a haphazard manner, with competition between the various interests, including co-operatives. This made it impossible for co-operatives to be as successful as hoped for. With the opposition of independents, who either strive to destroy any Co-operative organization, or take advantage of any stabilization secured through their efforts, the market is kept in an uncertain condition most of the time. Entrepreneurs and speculators working for private gain, guess what future markets will be, and either encourage production through offering good prices for products, or discourage production by keeping out of the market so that they can purchase at a very low price later on.

Price fixing has been attempted in many instances, but it is almost impossible to arrive at any price based on the cost of production. Prices determined by speculators and entrepreneurs are made in a blind and haphazard way, as they have only a limited amount of information on which to base their judgment. The projected, calculated, or bargaining method is used by co-operatives and should be used by central sales agencies. To be really successful they must have 100% control of the product even 5% in the hands of the independents is a disturbing factor, as they try to sell all their product at the highest price and leave the co-operatives to handle the surplus. A co-operative is

is better off with 50% than with 80 or 90% of the product, as the independents are then responsible for their share of the surplus. With 100% control the market can be supplied with just the amount it requires and can be kept in a healthy condition. This will result in a fair price to both consumer and producer and should eventually draw just enough produce to supply the market.

100% control means the introduction of the principle of compulsion, we have compulsion in several things now so it would not be any great hardship to have marketing controlled. We voluntarily support churches, societies, associations etc. that are organized for the purpose of rendering service to others, and we are compelled to support schools, roads, governments etc. through various forms of taxation.

Co-operation or the co-operative movement covers a wide field, it includes any service we give which is for the good of all. It takes in much more than marketing, which is considered by many to be the main objective of the movement, it is in reality a religion as it puts into practice the Golden Rule "Do unto others as ye would have them do unto you".

A study of methods used in the marketing of Agricultural products show that there has been a gradual development, from the organizing of cheese factories and creameries, farmers' elevators etc. up to the present system of federated or centralized types of co-operatives, but these are robbed of their greatest success on account of the independents getting the best of the markets, while they take no part in stabilizing the market or assist in disposing of the surplus. Much has been done to improve the

marketing of potatoes by grading and improving quality, but with the supply uncontrolled prices rise and fall too much and the market remains unstabilized.

Modern trends in marketing are, to control production and marketing, through reduced production, processing of surplus, and orderly supplying of the demand. Many plans are being developed and some put into effect, to make tariffs effective in countries with a surplus, or to equalize prices. They are all based on 100 per cent control, or allotment is made in such a way that all producers get their share of the domestic market, and at the same time are responsible for their share of the surplus. The Dairy Sales Adjustment Act is a splendid example of the working out of this principle, and as a result of the success of this act the dairy farmers of the Fraser Valley are in the best position of any farmers in B.C. or Western Canada. Prices have been maintained, in the face of increasing supplies, and at the same time their cost of production is decreasing, through reduced feed prices. There are however opponents to this equalized price plan, some would destroy the act and bring in open competition again, which would be bad for all producers, and at the same time make conditions worse for all, as it would reduce their purchasing power and tend to increase unemployment. We have now reached the stage where we can do our marketing scientifically, and supply the demand, instead of waiting for the factors of supply and demand to operate through the inefficient system of competition.

Production of potatoes and marketing should go hand in

hand. Production should start with the growing of seed, the best seed is free of disease and is from high producing strains, this is the foundation aimed at in growing certified seed, and by constant effort a high standard can be maintained.

Commercial crops of potatoes should be produced from the best seed obtainable, and grown in soil that is in a high state of fertility, this accompanied by a liberal application of fertilizer, and proper cultivation will assure a paying crop. By practicing intensive methods of cultivation, using good seed etc. the total crop will be increased, so there will be the further problem of curtailing acreage, to <sup>supply</sup> make/equal demand or develop some plan of utilizing the surplus, this can be accomplished by feeding to stock, or manufacturing into starch, cellulose, potato flour, or alcohol, these are made from low priced potatoes, but by keeping the domestic market healthy, a good average price could be paid for all potatoes.

Storage, grading, and distribution of potatoes are services that must be performed in the movement of potatoes from the producer to the consumer, but these services can be given most economically by an organization with control of the whole supply, as much expense, and duplication of service could be eliminated.

The marketing of part of the crop for domestic use is of great importance, it will have to be done in such a way that all producers get their share of the market (providing they can produce the quality in demand) and at the same time be responsible for their share of the surplus. They will have to be convinced

that a part of the crop, is worth more than the whole crop if nature is bountiful. If satisfactory use can be made of the surplus in the form of by-products, it would be possible to double or treble production, and still get more per ton for the whole crop, than it would be possible to get for the present average production on an unregulated market. It is necessary to feed the market intelligently in order to get the best price it will pay. To secure this satisfactory condition, a control measure is needed, so that they can supply the demand as required. The old law of "supply and demand" has outlived its usefulness and should be repealed, and replaced by the new and scientific law of "Supply the Demand".

## BIBLIOGRAPHY

Thesis Page		Reference Page
I24	Boyle, Cornell University. Marketing Agricultural Products. Potato Experiment in grading.	
48	Clement F.M., Dean of Faculty of Agriculture, U.B.C. Report of Milk Enquiry Commission 1928.	
	Filley H.C. Univ. of Nebraska. Co-operation in Agri.	
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	Journals and Bulletins	
	American Potato Journal, Lansing, Michigan. Vol. 6	
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	Canadian Certified Seed Potatoes . Pamphlet #84	
72	New Series, J. Tucker	
	Division of Botany Report, 1927, H. T. Gussow, Ottawa	
61	Whole vs Cut Seed, Charlottetown, P.E.I.	199
64	Experiment to Develop Disease Free Strains of Potatoes, at Summerland, B.C.	224
81	Potato Inspection and Certification Service	228
	Experimental Farm, Agassiz, Report of J. J. Woods	
95	Fertilizer Tests	
II8	Yield of Alcohol from Potatoes, Dr. F. Shutt, Exp. Farm Ottawa	
	Illustration Station Reports, A. E. Richards	
	Agassiz, B.C.	
97	Potato Fertilizer Tests---Alberni, B.C. 1927-28-29	
98	" " " Courtenay, 1927-28-29	
99	" " " Duncan 1928-29	
I09	Cost of Producing Potatoes on Van. Is. 1927-28-29	

Thesis	Reference
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	Report of Whole vs Cut Seed
60	Sumas and Lulu Island, B.C. H.S. MacLeod
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	U.B.C. Report of Northern vs Southern Grown Seed
67	Green Mountain
68	Early St. George
68	P.E.I. Seed Potatoes in NEW JERSEY, Am. Potato Journal Vol. 6 #10 Oct. 29 294
	United States Department of Agriculture, Bull. 47, 1913
85	The Role of Potatoes in the National Dietary 3
86	Climate 5
115	Production of Potatoes in U.S.A. and Germany 2
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116	Feeding Value, Potato Silage, U.S. Bur. of An. Industry Exp. Station. North Dakota, Bull. 90
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