SMALL FRUITS IN CANADA

(An economic survey with particular reference to British Columbia)

by

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A thesis submitted as a partial requirement for the

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in the Faculty of Agriculture

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Approved Head of Department
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I INTRODUCTION

General Statement

The first record of small fruits being produced in Canada on a commercial scale was less than 50 years ago. Before 1885 there was little or no attempt to market small fruits through such channels as we have to-day. Although limited areas of small fruits were grown for home consumption before that time, since then there has been great advances, and at the present time large acreages are devoted to the growing of small fruits in all parts of Canada, except on the prairies. Excellent transportation facilities have been provided for long distance shipping, and the means of preservation of the small fruit has reached almost a state of perfection. Trained horticulturists are devoting their time to a study of small fruit production problems, production of new varieties, the limiting factors of growth and possible means of increasing yield.

The small fruit industry has become so specialized that it warrants attention from the point of view of market, and the potentiality of future demands. Before such a study can be carried through successfully, a complete knowledge of past and present conditions must be reviewed. These conditions must be co-ordinated with production problems in order to make any prediction or recommendations about future
production or marketing influences. Canada is a country which is largely dependent on her agriculture and natural resources for her income. In past years emphasis has been laid on the depression in 1929-1932, the consumption for all agricultural crops decreased because the people of Canada, and the countries to which Canada exported did not have the purchasing power. In the present day, besides an increase in acreage there has been an increase in the output per acre for many crops. According to Wilcox (51), this increase in output per acre is due to man's progress over the factors which go to make up for production; and as a result it will be necessary in the near future to curtail acreage in order not to have a continual surplus.

In this respect small fruits in Canada are in the same position as all other agricultural crops. The production is so much above the actual market demand that it is necessary to fix a low price in order to move these small fruits and with this low price it is hard for the farmer to make a profit. It remains then to be seen whether it is possible to increase the consumption of small fruits.

With these thoughts in mind this study has been pursued, and most of the factors pertaining to the successful marketing of small fruit in Canada are shown. Surveys of a similar kind have been conducted in Washington and Oregon, and from the results obtained there, it is obvious that the problems with which they are confronted are similar to those
which apply to Canadian conditions.

The problems are dealt with first from the standpoint of the entire Dominion. But as certain necessary statistical data are not available for the Dominion at large, the Province of British Columbia has been selected, not only because data are available, but also because British Columbia is about equal to Ontario, the other great fruit growing province in Canada.

Under the classification of small fruits comes the strawberry, raspberry, loganberry, blackberry, currant and gooseberry. Of these only the first three, namely strawberry, raspberry, and loganberry are of any great commercial importance. Of these three the latter, namely the loganberry, is of importance only in the province of British Columbia, being limited to that area by climatic requirements. Thus the study is really limited first of all to the two most important small fruits, the strawberry and the raspberry, and secondly to all other small fruits.

The most important points that are dealt with include first, climatic and soil requirements and their relation to the marketing problems; secondly, the ideal type of berry that is desired from the standpoint of the consumer; thirdly, the means of disposal of the berry crop -- both fresh and processed; fourthly, the actual marketing problems are taken into consideration with a review of present organization insofar as it is applicable to local conditions; and
finally, recommendations for a more successful handling are suggested.

Botanical Classification of Small Fruits

Before a study of the small fruit is undertaken, an outline of their relationship botanically is shown and the characteristics of the families to which they belong are noted.

The strawberry forms part of the rose family Rosaceae, and it is closely related to Potentilla, from which it differs chiefly in the receptacle of the fruit becoming fleshy and edible. The plants are low perennial herbs which propagate easily by runners and seed (45).

It belongs to the botanical species Fragaria chiloensis. The fruit of the strawberry, the only part with which we are concerned, is an achene which has a thalmus as the edible portion. The carpels are spread over the surface.

All brambles including the blackberry, loganberry and raspberry belong to the family Rubus. They have been described by Bailey (1) as being low and diffuse mostly woody plants usually producing canes and grown for the edible fruits, for ground cover and for the more or less ornamental character of habit foliage and bloom.

The plants are trailing, decumbent, ascending or
erect, the tips of the long growth usually recurving even if otherwise erect. The stems are glabrous, hairy or variously glandular, mostly thorny or prickly, usually short lived and pithy, sometimes semi-herbaceous.

Rubus is closely allied to Rosa, the family to which the strawberry belongs, and it differs chiefly in the structure of the flower. In Rosa, the torus or thalmus is hollow and contains the dry fruit or achenes. In rubus, the torus is convex, conical or elongated and bears mostly soft or pulpy fruits on its surface.

In raspberries and blackberries, the cases bear the second year and then die or become weak. The fruits are an aggregate of carpels. The drupels are usually more or less coherent at maturity, the collective body forming the fruit or berry of the horticulturists. In raspberries, the coherent drupels separate from the torus at maturity, causing the berries to be concave or hollow on the under side. In this respect it differs from the blackberry in which the coherent drupels adhere to the torus which separate at maturity and tend to form the "core of the berry".

Nearly all red raspberries cultivated for their fruit in North America have been developed from the American red raspberry, R. strigosis and from hybrids between this species and the European red raspberry R. idaeus (53).

Currants and gooseberries belong to the third family Ribes. Bailey (1) states that, the plants are usually
low, upright or less often procumbent, deciduous, rarely evergreen shrubs with prickly or unarmed branches, small or medium sized, and usually lobed leaves with rather small solitary or racemose flowers often greenish or reddish and insignificant, but in some species white or brightly colored in shades of red, scarlet, orange or yellow. The fruit also are often attractive and are either black, purple, scarlet, yellowish or greenish. The flowers appear in the spring with the leaves and the fruits ripen in June or July.

It is possible to see from this that small fruits are a horticultural rather than a botanical distinction. While Rubus and Rosa might be classed together, the family Ribes has not the characteristics of either family, and botanically would be classed separately. However, for the convenience of this study the three families Rosa, Ribes and Rubus are combined.
II STATISTICS OF CANADIAN INDUSTRY

General Statement

The small fruit industry of Canada has shown some remarkable trends in production since 1900 (21). The total production is no higher to-day than it was 35 years ago, and yet there has been a considerable increase during recent years in the production of the two most important small fruits to-day, the raspberry and the strawberry.

In 1900 there was a very large production of bush fruits, namely currants, red and black, and gooseberries. In that year 21,000,000 quarts were produced and apparently marketed. However, it was probably found that there was no continual market for such fruits other than jam, with the result that by 1910 the crop of bush fruits had declined to 4,000,000 quarts, and since 1920 has been considered of little commercial importance.

Estimates place the 1910 crop of small fruits at 32,000,000 quarts, and this figure remained an all time high until 1952. After 1910 the production declined and during the war and post-war years, we find production steadily declining, with a low point of slightly over 12,000,000 quarts in 1924. The post-war years saw the influx of returned soldiers, established by Soldier Settlement Boards into the small fruit industry for the following reasons,-
First: Small fruit production, unlike tree fruit production, is a short term investment, where return from capital invested can be expected in the first two or three years of growth.

Secondly: Does not necessitate a large amount of capital.

Lastly: No special training is required, as is the case with dairying, etc.

So it was that after 1924 the trend of production showed a steady increase until 1929. During the period from 1924-1929 while production was increasing and prices were declining until the final crash came in 1929 forcing many small fruit growers off the land. However after 1930 there was an increase until 1932, when the peak of small fruit production was reached. Since that time there has been a slight decline, which can be attributed to adverse weather factors.

Production

Figures by provinces were not available before 1924, but for the period from 1924-1934, these are shown in chart form in Fig. 1 in quarts. This chart shows that from 1924-1932 Ontario and British Columbia produced 75-80% of the total production in Canada. Since 1932, however, Quebec has been rapidly increasing acreage and yield,
Fig. 1

Small Fruit Production in Canada by Provinces

Production (1,000,000 quarts)
so that when the last data were available, Quebec had surpassed British Columbia's production, and was equal to that of Ontario. The maritimes have remained fairly constant over the entire period.

Fig. 2 shows a chart for the average percent production for 11 years by provinces, the figure being given in Table I.

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<td>Ontario</td>
</tr>
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<td>British Columbia</td>
</tr>
<tr>
<td>Quebec</td>
</tr>
<tr>
<td>New Brunswick</td>
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<tr>
<td>Nova Scotia</td>
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</table>

Values of Various Fruits Compared.

In 1952 the total value of small fruits was estimated at $2,220,700.00, (21b). This represented 18.52% of the value of all fruits. In 1932 the total value of small fruits was slightly greater, being $2,564,300.00, yet this was only 15.75% of the total value of fruits. These two years have been taken because they represent the "off" and "on" year in apple production, and as the apple production is of such importance it has a direct influence on the relative
Fig. 2

Average Relative Production by Provinces in Canada (see Table 1)
value of small fruits. An average of these two years has been taken as a fairly accurate figure for the relative value of small fruits over a period of years.

Fig. 3 shows the relative importance of small fruits when viewed from the standpoint of average value for the two years 1932 and 1933. Table II represents in detail the actual importance of each main group, and then under each heading the different fruits.

Table III represents the acreage of these same groups of fruits as outlined in the previous table, and it shows also that although the acreage in orchards decreased considerably between 1911-1933, the acreage in small fruits showed a small increase.

**Correlation of Price and Production**

In order to obtain a clear conception of the actual trend of the small fruit industry, a correlation of price and production has been made, assuming that one is directly dependent on the other. The price and production figures for the period from 1924-1934 are shown in Fig. 4. The straight line trend for both production and price is also shown. The charts show that when production increased, the price decreased; and when production decreased, prices increased. Although this is true for most years, the years from 1929-1934 show the best indirect marked correlation.
Table II

Value (estimated) of Commercial Fruit Production in Canada
(See Fig. 3)

Expressed in value and percentage for the average of the two years 1932 and 1933.

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Value</th>
<th>%</th>
</tr>
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<tbody>
<tr>
<td>Apple</td>
<td>8,721,400</td>
<td>61.47</td>
</tr>
<tr>
<td>Pears</td>
<td>432,700</td>
<td>2.99</td>
</tr>
<tr>
<td>Plums</td>
<td>242,100</td>
<td>1.74</td>
</tr>
<tr>
<td>Peaches</td>
<td>1,026,600</td>
<td>7.32</td>
</tr>
<tr>
<td>Apricots</td>
<td>108,500</td>
<td>0.83</td>
</tr>
<tr>
<td>Cherries</td>
<td>497,000</td>
<td>3.61</td>
</tr>
<tr>
<td>TREE FRUITS</td>
<td>11,043,300</td>
<td>77.97</td>
</tr>
<tr>
<td>Strawberries</td>
<td>1,643,800</td>
<td>11.97</td>
</tr>
<tr>
<td>Raspberries</td>
<td>748,500</td>
<td>5.46</td>
</tr>
<tr>
<td>SMALL FRUITS</td>
<td>2,392,300</td>
<td>17.15</td>
</tr>
<tr>
<td>Grapes</td>
<td>670,000</td>
<td>4.83</td>
</tr>
<tr>
<td>TOTAL</td>
<td>14,105,900</td>
<td>100.00</td>
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Canada Year Book, page 281, 1934-1935
Table III

Acreages in Canada compared:

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<th>1931</th>
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<tr>
<td>Orchards</td>
<td>403,596</td>
<td>297,053</td>
<td>267,925</td>
</tr>
<tr>
<td>Vineyards</td>
<td>9,836</td>
<td>7,090</td>
<td>16,159</td>
</tr>
<tr>
<td>Small Fruits</td>
<td>17,495</td>
<td>17,741</td>
<td>18,822</td>
</tr>
</tbody>
</table>

Figures from the Canada Year Book, Page 279, 1934-1935.
Fig. 3

Relative Value of Fruits in Canada (1932-1933 average) (see Table II)

1. Apples
2. Pears
3. Plums
4. Peaches
5. Apricots
6. Cherries
7. Strawberries
8. Raspberries
9. Grapes
Fig. 4
Correlation of Production and Price of Small Fruits in Canada

Production (millions of quarts)  Price (cents per qt.)

Year 24 25 26 27 28 29 30 31 32 33 34
This same trend is brought out more clearly in Fig. 5, which shows the deviation of the actual from the straight line trend in the case of both production and price. These are shown to have reverse deviations showing that they are closely correlated.

The coefficient of correlation between price and production for the period 1924-1934 is -.8509. This shows a very high indirect correlation between the two variables (as -1.00 is perfect correlation).

Studying this chart more closely, it can be seen that each of the peaks of heavy production follows periods of favourable prices as in 1926 and 1930. The unfavourable prices received for small fruits during those years of high production caused a subsequent reduction in acreage as in 1929 and 1932. The reason for the apparent lag in 1931 and 1933 is due to the fact that raspberries and all other small fruits except strawberries take two years to come into bearing, and therefore increased planting does not change production immediately. Because of these cycles the growers do not receive such a large return as they would if their production were kept constant.

It is seen from this short study that production and price are indirectly correlated, and if production and price are both to be increased it is necessary to increase the third factor, namely consumption. Means by which consumption might be influenced will be discussed later.
Fig. 5

Deviation of Price and Production from Normal Trend
Small Fruit Products

Although small fruit products would normally include all products which have small fruits as a base, in this statistical analysis, it will include only that amount which is used in the canning industry. This is necessary because statistical data for all products are not available. However, this available data will give a fairly accurate representation of the trend. Fig. 6 shows the amount and value of small fruits used for canning in Canada from 1925-1934, (20). As may be seen, there are decided irregularities not only in amount canned, but also in the amount in relation to the value. In only 3 years has there been an increase over the year before -- an increase of 50% in 1926, 42% in 1929, and 56% in 1934. All other years showed a decided decrease from the previous year with the period from 1929-1933 showing a very rapid decline in quantity as well as value. Value, however, dropped far lower and out of all proportion with the fall in the quantity.

In the 10 years from 1923-1934 the average amount of small fruit canned was about 139,852 cases, with an average yearly value of $608,245.00.

The trend in this case shows very little as to what future demand is likely to be. Small fruit canning is so dependent on outside factors that it is hard to predict what will be the actual amount canned. It is dependent
Fig. 6

Quantity and Value of Canned Small Fruits in Canada from 1925-1934

Quantity (thousands of cases)  Value (thousands of 900 dollars)

Years 1925 26 27 28 29 30 31 32 33 34
upon such factors as weather conditions at harvest, condition of the fresh fruit market, the stock remaining of the previous year's output, and the trend of the demand for small fruit products. The amount canned each year is closely correlated with all these factors. It would seem that the small fruits are looked upon by many as luxury products. This may be seen from the period between 1929-1933, although the price declined, the demand also declined. It was not a case then of the regular supply and demand curve, which can represent the stable commodities, and shows that when prices increased, demand decreased, and vice versa.

Considering now the amount per province, we find that Ontario and British Columbia show by far the largest quantities canned. Although Quebec has been increasing its total production in recent years, the amount used for commercial canning has decreased to such a point that it is practically negligible. On the other hand, because of the increased quantities of loganberries being canned, British Columbia has assumed the lead in small fruit canning, and in 1933 and 1934 produced over twice as much as Ontario, or between 66-70% of all small fruits canned in Canada.

Trade — Imports and Exports

Of the nine provinces in Canada, six only produce small fruit in any quantity. Of these six, two provinces
(Prince Edward Island and Quebec) produce only enough to partially satisfy the wants within their own province. This leaves four provinces with a surplus. The Ontario crop is usually trucked to the market inside the province, but Ontario also supplies a large part of the Montreal market; as in 1935, when 62 carlots of small fruits arrived at this market from Ontario, (39).

The situation in New Brunswick has been summed up by M. Cummings of the Department of Agriculture, (10), when he said that in certain years around fifteen carloads are shipped to Boston and to Montreal, and quite large quantities to their own city markets. In 1935, 17 carloads were shipped to St. John, N.B., and 7 carloads to Montreal, besides those which went to Boston. However, in 1935, 7 carloads were shipped to Halifax from New Brunswick, which offset partially those which had been shipped into that province.

The British Columbia crop is disposed of usually at home and in the three prairie provinces, Alberta, Manitoba and Saskatchewan. In some years, however, when the British Columbia crop was earlier than the eastern crop, several carloads have gone to the Montreal and Toronto markets.

Besides the movement of fruits between the various provinces in Canada, there is also a movement of imports and exports to and from Canada from the United States. Due to the early season, the United States manages to place the
fruit on the market first and obtain the best market; and so by the time local fruit is available, the demand and the price is not as keen as it would have been, if the berries from the United States were not allowed in.

During the 10 years under observation both imports and exports show a decided decline, (19). While the quantity of imported berries has increased slightly, the value of such imports has decreased to about half their original value. The exports, on the other hand, have shown not only a decrease in value but also in quantity.

Fig. 7 shows very clearly the trend of imports and exports in Canada, but besides this, it brings out another point very clearly, namely, that of average value. Between 1924 and 1934 the average value of fresh small fruits imported into Canada was 13¢ per pound, while the average value of fresh fruit exported was only 9¢ per pound. This shows clearly that the imports that came from the United States obtained the high price market, probably that at the first of the year, while that which was exported was the later crop when the United States crop was finished.
Fig. 7

Quantity and Value — Imports and Exports

Quantity (millions of lbs.)  Value (10,000 of dollars)

Export Quantity  Export Value  Import Quantity  Import Value

Year: 24 25 26 27 28 29 30 31 32 33
III PRODUCTION PROBLEMS

General Statement

The production of small fruits is so closely correlated with the actual marketing that this study of the limiting factors of production has been undertaken. It will include a general statement of climatic, soil, and site factors, but will go on to discuss these factors in detail in regard to each of the three small fruit groups, strawberries, brambles, bush fruit. Indeed this individual study will be carried further to include questions of fertility, pests, diseases, and the influence of cultural methods on commercial production.

Limiting Factors of Production

Climate

The limiting climatic features are practically the same for all small fruits. The main features which will be dealt with are temperature, length of growing season, rainfall distribution, and wind.

The small fruit varieties popular to-day are not resistant to extremes in temperatures. A mild winter is necessary as the plants will not stand zero weather or alternate freezing and thawing. Temperature, however, must be considered with humidity in determining the amount of
winter killing, because humidity having a direct influence on the seriousness of low temperatures. A moderate summer is preferred as high temperatures tax the ability of plants to transpire enough water to remain cool, \((25)\), and several days of hot weather reduces the yield materially. Seventy-three degrees \((73^\circ)\) mean average is considered an optimum, but 68-79\(^\circ\) is satisfactory for growth,\((43)\). Although small fruit growing is carried on to some extent in the southern states, the berries ripen in the early part of the year in the cool season, \((25)\), whereas in the northern states and in Canada the berries ripen during the months of May, June and July.

Another factor which is tied up with temperature and also with the length of the growing season is that of the time of frost. It is an absolute necessity that there be no late frost at the time of blossoming. Those plants most susceptible to spring frosts are strawberries that are unmulched, varieties of all small fruits that bloom early, and berries planted on southern exposures, \((43)\).

The length of the growing season is generally measured from the last killing frost in the spring until the first in the fall. The length of time between these two must always be enough to allow for blooming and ripening of fruit and developing of the new canes or plants that will fruit the following year.

Rainfall is another very important climatic factor. Not only must the total yearly rainfall be adequate,
but the amount during the growing season must neither be too
great nor too little. It is a very poor policy to grow small
fruit under irrigation, because as well as being expensive,
it affects the quality of the fruit. An inadequate supply of
water will not allow the fruit to fill sufficiently; as a
result, yield is reduced and the berries have a dry taste.
On the other hand, too much water is injurious, as it makes
the berries too soft and severely impairs their keeping and
shipping quality. The ideal time for rain is while the
berries are growing, before they have begun to take on any
colour. A good rain at this time should be enough to take
the plants through the ripening season, providing the
moisture can be conserved in the soil.

The last climatic feature to be considered is
that which is not likely to be important in many sections,
namely that of wind. Hot drying winds in the summer cause
a drying out of the soil and also of berries, reducing the
moisture content and in this way affecting the yield.
Severe winter winds may cause damage, especially in the case
of cane fruits, as these may easily be broken unless
adequately protected, however, more damage is probably caused
by the winds drying out soil in winter and the plant is not
able to obtain moisture and dies, (4).

These general conditions with regard to climatic
features apply to all small fruits, and any exceptions
thereof will be discussed later after soil, fertility, and
site have been discussed.
Soil

Not only the type of small fruit but also the variety will vary, according to type of soil. However in general, the four main essentials for soils for small fruits are that the soil be well drained; that it be deep with retentive sub-soil; that it be well supplied with humus, and that it have available mineral elements and nitrogen essential for plant life. These problems are discussed in relation to each group of small fruits.

Site

Under this heading are included such factors as slope, position with respect to atmospheric and water drainage and shade. Besides these, there are other factors which have to do with marketing problems rather than production problems, and which will be taken into consideration later.

The slope of the ground influences to some extent the earliness of any crop, the earlier the crop the greater the influence. However, while this is important for earliness, it is not as important for the successful growth of any small fruit as are proper atmospheric and soil drainage. Berries should not be planted in low lying places where there is likely to be a late spring frost, or where ground will remain cold and wet far on into the summer. While it is not always possible to remedy improper atmospheric drainage, it is often possible to provide proper soil drainage
either by installing a closed drainage system or by opening a furrow between the rows -- the latter sometimes being enough to prevent damage by water. The shading effect of trees or mountains or by other means must be watched if successful growing is to result. The small fruits must be provided with as much sunlight as possible during the growing season.

**Limiting Factors as Applied to Small Fruits**

**Strawberry**

Strawberries are different from other types of small fruits in that they are low growing, have a root system that does not penetrate far into the ground, and therefore require a rich supply of organic matter close to the plant, (43). In regard to climatic features, the strawberry is no different from other small fruits. The ideal soil conditions are summed up by Macoun, (31), when he states that "the strawberry will thrive on a great variety of soils, from a very light sand to a heavy clay, but when possible to make a selection a moderately light pliable soil is preferred. From the standpoint of physical texture a light soil is satisfactory, but being generally deficient in humus and plant food, it is not as valuable as a heavier sand loam or a very light clay loam". Besides these factors already mentioned the soil should not pack hard, as it is necessary for strawberries to form new plants by sending out runners. It is
also important that the soil be well supplied with humus in the decomposed state, (25). The strawberry is not particularly sensitive to soil reaction although it thrives best on soils giving an acid reaction, (43).

An important factor which limits strawberry production in many areas is the strawberry root weevil, Brachyrhinus ovatus L., or some other pests or disease. However, if proper precautions are made in selecting a site and proper control measures are practised once the plantation has been started these pests and diseases can be controlled. A difficulty in strawberry marketing which is essentially a problem traceable to production is that of misshapen berries and nubbins. The main reasons for such berries are namely, unfavourable weather conditions and faulty pollination, and also certain virus diseases. The unfavourable weather conditions can be influenced by the grower if he mulches his plants, and does not remove the mulch until all danger of frost is passed. Improper pollination can be lessened to a large extent if perfect varieties are selected in the beginning and mixed with any imperfect sorts which may be grown.

Another factor that plays a large part in successful production is a knowledge of proper cultural methods and fertilization. Strawberries are often grown commercially as a companion crop in orchards. This has its advantages and disadvantages, and it will depend probably upon local factors whether it can be done successfully or
not. Proper fertilization is a problem of great importance. Manure is the ideal fertilizer, but as it is not always available, it is necessary to substitute either a green manure crop or an artificial fertilizer. However, much has been written (12, 32) regarding the effect of fertilizers on the firmness and flavour of berries. Some writers claim that nitrogen causes plants to make softer berries of inferior keeping quality, (43). If such be the case, it is of the utmost importance, as the fruit of strawberry is normally a highly perishable commodity. However, it is not yet an established fact that such is the case, and E. W. Greve says after much experimenting with this problem that results did not seem to indicate that fruit was so soft and of such inferior handling quality that nitrogen fertilizer might not be warranted if it improved the yield, (12).

In regard to flavour, it has been said that fruit from plants treated with phosphorous and nitrogen seemed best flavoured, while that from plants treated with potash was poorest.

All these factors must be considered from the point of marketing conditions.

Brambles

Although the brambles include all types of raspberries; the red, the black and the purple, the blackberry, dewberry, and loganberry, only three of these are of importance in Canada, namely, the red raspberry, the blackberry, and the loganberry.
The loganberry is less hardy than other small fruits, and cannot stand zero temperatures, (49). For this reason it is confined in Canada to the coastal regions of British Columbia, and cannot be grown in the interior of that Province or in Eastern Canada.

The red raspberries as a group is hardier further north than the other brambles, but is less hardy to the south, (25). However, there are varieties that are exceptions to this rule, such as the Guthbert which is very tender and subject to heavy winter killing in even mild sections.

The best type of soil for all brambles is essentially a light loam soil that is well drained, but in which the moisture supply must be maintained. Due to the deep rooting systems of the brambles the sub-soil must be deep and retentive, (41).

Disease in brambles especially in raspberries is perhaps more of a problem than with strawberries. Not only are diseases in raspberries harder to control but also harder to eradicate. Raspberries, once they have been planted, are left for ten to fifteen or twenty years before they are removed. This eliminates any chance of rotation to rid the soil of any particular disease and pest as in the case of strawberries. Mr. J. J. Woods at Agassiz, B. C., (52), assumes that after a number of years the soil tends to become lacking in certain elements, and is then very subject to disease and it is not possible to increase the yield pro-
fitably by using commercial fertilizers.

The same problem has been found by Dr. W.H. Rankin working in New York, (38), and he sums up by saying "More and more during a period of many years raspberry growers have been finding that their varieties are gradually losing their vigor and are not profitable; and that reputation of red raspberries is suffering greatly because the berries from the sickly bushes are flavourless, smaller and scarcely palatable unless disguised by sugar and cream. Canners are unable to maintain their desired quality in their raspberry product because of this trouble".

Such diseases as yellow or orange rust, and mosaic may have a devastating effect. However, besides these factors, it is probable that there is some disease or bacteria that is slowing up root growth and preventing the proper development of the plant. Raspberries to be grown successfully should be started on new raspberry soil from certified stock, available in certain provinces at the present time, and should have a definite set rotation. This rotation can be accomplished by removing part of the crop each year, planting a green manure crop and replanting. This is only possible, however, in large growing areas.

**Bush Fruits**

This class of small fruits includes currants and gooseberries. At one time bush fruits were the most
important small fruit, but in the last twenty-five years have decreased very rapidly in production due to the decline in demand. Currants are slightly different from the other small fruits in regard to their climatic requirements. These berries thrive best in the north temperate zone, (4), where the mean summer temperature is relatively low. They can be grown successfully in most parts of Canada and in southern districts in high altitudes which more closely approximate northern conditions. They will even thrive in partial shade. Soil conditions for gooseberries and currants may be such that they are slightly too wet for any other small fruit, but such that must not be situated in low air pockets, (25). It is preferable that bush fruits grow in heavy soil because a light soil is not conducive to coolness. The chief limiting factors of bush fruit production have been summed up by Shoemaker, (43), as follows:

First:  As a group they prefer a cool soil, but will not stand drought and require a continuous supply of moisture.

Second:  Due to the fact that the cane maggot is a serious pest for which there is not any guaranteed control, it tends to limit production until such time as a permanent control measure is found.

Third:  The market is limited, and while this is actually not a production problem, it still
ties in with it for in order to have maximum production it is necessary to have a market for the entire crop.

Production problems as related to small fruits in general and to the different classes have been summed up very briefly and no attempt has been made to elaborate on any one phase. It is not meant that such a study should be regarded as being complete, but rather it is desired that a general knowledge as to what extent the production problems tie in with marketing be obtained. If such a feeling is realized, the writer feels that the purpose of this part of the thesis has been successfully accomplished.
IV MARKETING PROBLEMS

General Statement

Aside from actual production problems, the one of marketing is the largest which confronts the small fruit industry to-day. It is on this problem that the writer plans to place most emphasis and to analyse all the problems of marketing with which the grower is confronted. The factors which will be dealt with include the variety problem, perishability including the transportation methods, the market demand, competition with other fruits and the relative merits of the uses to which small fruits may be put -- consumed fresh, as jam or canned, frozen or preserved by SO₂.

Variety Problem

The producers of any variety of fruit must, if he hopes to be a successful grower, not only grow that variety which is best adapted to his land and cultural methods but must also grow a variety of fruit that the consumer will demand. The grower should find out before he ever starts production, the market to which he will have to cater, whether to the fresh fruit market, either local or distant, or to the market for processed fruit.

In selecting a variety for any market, consideration must be taken of its general appearance, its shipping
quality, its productiveness, as well as its adaptability to the land to be used.

The best way to really analyse this problem is to take each variety of small fruit and consider it separately.

**Strawberry**

The strawberry differs in its botanical make-up from the other kinds of small fruits. In picking, the hull is left on the berry and there is no hollow receptacle left by the core as is the case of raspberries, or a hard core as in the case of loganberries. It also differs from raspberries in that the market does not demand any specific variety. This is a good thing because varieties are not universally popular from point of view of production, but must be adapted to every district.

However, in buying the strawberry the consumer is influenced by the colour, size and general attractiveness of the fruit, (41). If the grower keeps this in mind, it should be possible to grow a variety of strawberry that will meet with the approval of the consumer.

Another problem facing the strawberry market at the present time is that of the feasibility of the ever-bearing strawberry for long distance shipping. The ever-bearing variety comes on the market after the main crop of strawberries and of raspberries has finished. Many producers have held the viewpoint that by marketing strawberries at this time there is not so much competition with other
berries. However, those that do take this stand fail to realize that tree fruits are by this time coming onto the market and there is no great demand for strawberries after the main crop has passed. It would then be to the advantage of the grower that he turn his attention away from the growth of everbearing varieties.

**Raspberry**

Of all the small fruits the raspberry presents the most difficulties in regard to variety difficulties. In general it can be classed in two groups, the Cuthbert and the sour varieties. Sour varieties, include all varieties except the Cuthbert, are not comparable with the latter in flavour or in general texture for canning or fresh fruit purposes.

However, the consumer, who is not educated to distinguish from outward appearance between varieties does not know what is being purchased. People who know the Cuthbert prefer them, but if the consumer has no knowledge of variety, the sour variety will probably retard the demand for raspberries of any type. These same problems have been dealt with by Farquhar, (24), and he states that "while the so-called sour variety has been satisfactorily marketed during the various past season on the fresh market, I nevertheless maintain that we have no measure by which to gauge how much damage, if any, the marketing of these sour variety raspberries on the fresh market has done to the general marketing of red raspberries in their fresh state". This statement was made con-
cerning the State of Washington, U.S.A., and it is the opinion of the writer that this is a vital problem in the marketing of raspberries in Canada. If carloads go out containing five or six varieties of berries, and the consumer does not know the different varieties, he does not know what to buy and what to reject. It should, therefore, be the aim of the producer to produce only that variety of berry which will meet with universal approval and create a taste so that more raspberries will be consumed.

Not only the consumer of the fresh fruit but also the canneries are influenced by variety. The canning operators, however, know and demand first the Cuthbert, then the Newman, and last, the Lloyd George, no other variety being wanted, (42).

There is, of course, a very good reason why Cuthberts are not grown exclusively. The Cuthbert is not as satisfactory in its growth or productive habits, and is more susceptible to disease than are other varieties. It will not stand severe winters, whereas such varieties as the Latham and Newman are very winter hardy. As a producer the Cuthbert stands only in a second class, and cannot be compared with such varieties as Lloyd George, Latham, and Count.

The Cuthbert is not resistant to such diseases as yellow rust and mosaic as are other varieties of berries. Taking all these factors into consideration, one can readily see why the grower prefers growing other berries to the
Cuthbert; however, growers realize that the consumer has the power to demand only the best, and requires not only a variety that will be agreeable to his taste, but also one that has good texture, has an attractive colour, and is otherwise as nearly perfect as possible. Such a berry can only be obtained by growing the right variety and making sure that it has proper fertilization, cultivation and is harvested at the right time and marketed through the proper channels.

Blackberry and Loganberry

With the rest of the small fruits, variety is not an important factor from the consumer's point of view, mainly because they are of little commercial importance. If the demand for blackberries is built up it might become important, but until such time there is no need to worry. The blackberries are used chiefly for jam and home processing, a very little amount being consumed as fresh fruit.

The loganberry is really a blackberry of the trailing type, which has been domesticated from the wild species. It is, therefore, considered, (11), "as a redfruit variety of the wild trailing blackberry of the Pacific Coast".

Gooseberry and Currant -- Bush Fruits

Similar conditions exist with regard to bush fruits as with strawberry, namely that different varieties are adapted to different climatic conditions. It has been
recommended in a British Columbia Provincial Bulletin, "Currant and Gooseberry Culture", (6), that "Before setting out any number of bushes it is often advisable to find out just what varieties have been doing well in the district". The bulletin goes on further to state that white currants, except for home use, should not be planted as there is no market demand. The outstanding red currant varieties seem to be the Perfection and Fay, while the most widely recommended black currant in British Columbia are the Boskoop Giant and the Victoria. The American varieties of gooseberries are grown in preference to the European, as they are more resistant to mildew. The variety of gooseberry most widely used is the Oregon Champion.

Youngberry (Wonderberry)

Although all the varieties that are being studied from the commercial standpoint have been dealt with, there is one other berry which might be mentioned here in connection with variety. The writer refers here to the youngberry or wonderberry, as it is sometimes called. This berry is a cross between Phenomenal loganberry and Mayes dewberry. According to a grower in Oregon, (2b), the fruit of the wonderberry is larger and sweeter than the loganberry, in reality the largest berry among the cane fruits that he had seen. It has a flavour similar to that of the loganberry, but it does not have the strong acid taste of that variety.
Although the taste is hard to describe, it is a fine flavoured fruit for eating fresh, and is excellent for sauce or pies. For jelly it is considered by many who have tried it as being excellent.

The berries themselves are a dark wine colour and appear almost black when fully ripe and present a very pleasing appearance when in the box.

Besides the qualities already mentioned an outstanding feature is its absence of seeds. This shows a distinct superiority over the raspberry, loganberry and blackberry.

The youngberry is grown chiefly in warm climates, such as California, and is not hardy to zero temperatures. However, if proper care were taken to protect it from disease it might be possible to turn it into a commercial berry in those parts of Canada which can successfully grow the loganberry.

The berry is a good shipper and should meet with the approval of both retailer and consumer. An objectionable character in its growth is the prevalence of needle-like barbs on the canes which make them extremely difficult to handle.

**Perishability**

Under the heading of perishability will be discussed harvesting and storing problems.
The final condition of berries is governed by the care with which each step in the handling of the berries is taken; from the time they are picked off the bush and even before, until it reaches the actual consumer, care must be taken to see that the berries are not handled more than necessary.

Measures which must be taken at harvesting time include first of all picking at the right stage of maturity. If picked for the fresh market or canning, the degree of ripeness depends on the distance from the market. Especially is this true of the strawberries which are a soft-fleshed variety (43) of berry and must be picked before ripe in order to get them to market in good condition. If the berries are being used for jam or wine, the stage of ripeness is not as important. In the case of the loganberry, the fruit is not picked until ripe, as it is not necessary to preserve the form of the berry, but rather the best flavour and aroma possible, (49). In the case of the blackberry the berry must be absolutely black before it is ripe, (41). Because there is such a slight difference in degrees of blackness, blackberry picking is made very difficult.

In picking currants and gooseberries for jam purposes, one may use the stripping method, but if for the fresh market more care must be taken, especially in the case of the currants which must be picked with the stems remaining on the berries. If using the currants for jelly, the berries are picked slightly under-ripe and only a few pickings are
Another important factor affecting harvesting is that of climate. No berries should be picked while wet, as they will not stand up for transportation. Some berries, such as the raspberries will not stand picking even while the dew is on, whereas the strawberry, on the other hand, is not injured if picked while slightly wet.

The time at which picking is done must also be considered. Picking during the hottest part of the day is generally not advised as it increases the perishability considerably. To obtain the best results picking should be done in the morning after the dew has disappeared and in the later part of the afternoon after the heat of the day has passed. At any rate, the berries should not be allowed to stand in the sun, but should be removed immediately to cold storage.

For small fruits it is advisable, if catering to the fresh market trade to grade the fruit and yet to do so in such a way as to avoid excess handling because that impairs the keeping quality. When grading is desired it is often advisable to have two pickings during the day, the first picking taking only those which are classed as marketable berries and secondly, all others -- these later being used for jam. Growers or communities which are shipping berries year after year under a special Trade Name would do well to make use of this method as graded berries command the best market, and it generally results in repeated orders and
a steady market. The example of Kentucky may be quoted in this case and it has been stated, (43), that "Reputation of Kentucky berries has been built up because of good supervision of pickers of shipping berries at the right stage, and the discarding of all culls".

Summing up the causes for perishability of small fruits, we find that the length of time they will keep depends on,-

(a) Species and also variety of berry,
(b) Degree of ripeness when picked,
(c) Care with which handled,
(d) Temperature at which picked,
(e) Temperature at which held after picking.

Transportation and Storage

First-class berries held under optimum conditions cannot be expected to keep more than ten days, if held in the fresh state, (25). Thus the problems of transportation and storage are fairly closely linked together.

Trucking

Although berries are an extremely perishable fruit they are adapted to truck transportation on smooth roads over a reasonable mileage,(43), that is to say, any fruit that is
shipped in this way must be handled with extreme care so there will be no injury done by bruising. Since the start of trucking, there has been a decline in berry growing in the immediate vicinity of large cities and production has tended to take the cheaper lands further from the city.

Trucking should be done during the cool of the night to obtain the best results. The one big disadvantage with trucking is that it causes great fluctuation in price owing to the bringing of large quantities on the market without any advance reports, thus causing a serious glut.

Shipping Freight

Most berries at the present time are still shipped by freight either in straight or mixed cars. Berries, if they are to be shipped any distance must be "pre-cooled" before shipping, and then transported in refrigerator cars.

Experimental work on pre-cooling has been done by Overholser and Moses, (34), in California and their findings are presented as follows. - "The term "pre-cooling" refers to the process of cooling the fruit soon after harvesting and before it is shipped. The degree of maturity at which the fruit can be picked and the condition in which it arrives at its destination depends greatly upon its temperature after harvest, both before and during transit. The more nearly fruit is picked at the proper stage of maturity for the best developing of cooling and highest subsequent eating quality, the greater is the necessity for cooling".
Although this was a general statement made for all fruits it applies directly to small fruits, as does also the statement which follows: "Fruit when picked from the tree is not inert. After harvesting it continues metabolic or ripening activities for a varied period of time, depending upon the conditions that surround it. As a result of these metabolic activities, the tissues of the fruit gradually become over-ripe and break down. These changes may be retarded and decay checked, by cooling the fruit promptly after it has been harvested and keeping it at a relatively low temperature until used. The rate at which fruit ripens may be reduced as much as one-half for each 15° Fahrenheit drop in the temperature at which it is held within ripening temperatures”.

Overholser and Moses went further and found that raspberries at a temperature of 68° generated heat at the rate of .06 calories per second per kilogram because of their own self-heating. This was about five times as much as apples and fifteen times as much as oranges.

They, therefore, concluded that "The self-heating of fruit and relatively a small amount of refrigeration required to check it, and the value of rapid reduction of field temperatures of fruit seem to justify pre-cooling by mechanical refrigeration, particularly when it is placed in insulated compartments provided with limited refrigeration, such as refrigerator cars".
When these factors are applied specially to small fruits, we find that special care must be taken. Besides pre-cooling, the car must be loaded properly to allow for proper circulation of air. Not more than four packages deep should be allowed, otherwise poor circulation of air and damage by deterioration will result. The berries must also be braced to make sure the fruit is not damaged. As it is impossible to salvage berries as we do other fruits, great care must be taken for prevention rather than repair.

One shipping trouble especially in the case of raspberries is the development of moulds, because once they have started to form they spread quickly and cause decay on over-ripe and soft berries, (24). Consequently, it is to the advantage of the grower to see that no mould is allowed to develop, and this can only be achieved by proper pre-cooling and proper shipping facilities.

Market Demand

In a previous part the correlation between price and production has been shown. There is no reason, however, why the consumption can not be increased so as to affect this price and production correlation. The market could be increased quite markedly if the right methods were to be employed.
An example of this was shown by the Associated Growers of B. C. Ltd. Proper advertising was carried on, a trade brand O.K. was directly used and by different means the cumulative effect of advertising became evident as the years passed.

But before advertising is carried on, it is necessary to have a product which can be guaranteed year after year. For this purpose, if no other, it would be necessary to form co-operatives in the different sections of the country, and advertising must be provincial or dominion wide if results are to be obtained. Advertising methods which might prove successful for small fruits are as follows,-

(a) Newspaper advertising at time of crop movements.

(b) Show cards for retailers and banners for trucks of jobbers, or on freight cars.

(c) Radio broadcasts, giving attractive recipes.

(d) Registered trade brand which has a good name, and which represents the highest quality of berry sold.

(e) Films for theatres showing all stages in the harvesting and the marketing of the small fruit.

Due to the high perishability of small fruits, it is not possible to have window displays or to show in exhibitions. However, it might be possible to advertise a
Strawberry or Raspberry Week" similar to the "B.C. Lamb week". This "week" would have to coincide with the time when the largest quantity of fruit was coming on the market.

Very little advertising aside from that done by private stores is carried on at the present time except in certain particular instances, as will be shown later. Not only is the advertising necessary for the fresh fruit market, but it is also essential for fruit as jam, canned or frozen pack.

Consumers who do not at the present time know the taste of good jam must be encouraged to use it even at a cost of putting samples in the homes. For such goods it is not the domestic market that would be affected, but rather the export and foreign market.

The grower must be made to realize that it is to his advantage that the berries be advertised. Consumption must be increased if the price is to be strengthened. Some plan, however, would have to be formulated to pay for such advertising. The best way would probably be a small charge on each crate.

**Competition**

Competition is a vital factor to-day in the marketing of small fruits, and is of three kinds; (1) competi-
tion between different small fruits, (2) competitions with other fruits, (3) competition with the weather factor.

Between May 15th and July 15th small fruits constitute the largest volumes of all fruit coming on to the market. The only other fruit on the market at this time is the cherry.

The tendency is for the different types of small fruit to crowd each other on the market. The strawberry is the first berry of the season, the actual time of course depending on weather conditions. Before these have finished, the raspberries and bush fruits have started coming on a market that has lost its keenness for berries. Slightly later the loganberry starts coming on to the market and competes with all the other berries. Finally before this group is finished the blackberries and everbearing strawberries are on the market. It is possible to see from this that the different small fruits do actually compete with each other for the market.

However, besides this tendency for competition between small fruits, there is also competition between small fruits and tree fruits which come on the market at the same time. For example, cherries start on the market at the same time as raspberries and continue on the market through the whole period. Although it is impossible to measure such competition, it does nevertheless exist. This is one of the reasons why everbearing strawberries have not been so popular.
Although there are no other small fruits on the market at this time, apricots, plums, peaches and pears practically monopolize the market. Also the consumer's desire for berries have been largely satisfied until the next season.

The last competing factor is not really a competing factor in the true sense of the word, but it does help limit consumption. Berries reach their highest demand by the consumer when the weather is fine. They are essentially part of an early summer diet. If the weather breaks and wet, rainy weather prevails the consumption is going to be adversely affected. Not only that, but rain will limit the keeping quality of berries, so that they will not store properly for even a short length of time. It is possible that a large part of one week of cold, wet weather during the rainy season is liable to ruin a large part of the crop movement.

These competing factors cannot as a rule be controlled except in the case of the everbearing strawberry, as already mentioned. The growers in this case would be advised to change from everbearing to a main crop variety.

**Processing Problems -- Relative Merits**

Canada must rely to a large extent upon other uses besides fresh consumption for the disposal of the production
of small fruits. Such means as jamming, canning, jelly-making, freezing or processing with SO$_2$ must be depended upon to relieve Canada of her surplus. These are now dealt with in the order as named.

(a) **Canning** is the preservation of fruit whole, in a 55-70% syrup,(9).

(b) **Jam** is prepared by boiling the whole fruit pulp with sugar to a moderately thick consistency without retaining the shape of the fruit,(9).

(c) **Jelly** is made by boiling fruit with or without water, extracting and straining the juice, adding sugar and concentrating to such consistency that gelatinization takes place on cooling,(9).

(d) **Frozen Pack** consists essentially of placing the fruit in barrels or other containers with or without sugar and freezing and storing the pack at relatively low temperatures,(18).

(e) **Processing with SO$_2$** is a means of preservation by which berries are put up in a solution of SO$_2$, water and lime, the latter being used for hardening.

This gives a fair conception of the methods in question. It remains to be shown what influence each has on production, consumption and price.
Fruit is processed primarily to extend the marketing season of the fruits and also to prepare it in its most attractive form.

For canning only the highest grade of berries are accepted, since the cannery man has had experience with poorer grades, he wants only the best. The fruit must be fresh, of a certain variety, certain maturity, whole and of uncrushed and uniform in appearance, colour, and size. Canned berries are a delicious dessert and should have a universal appeal to the appetite. Although all small fruits are canned to a certain extent, only the berries are canned commercially. Climate is an important factor for canning berries. For flavour and texture the berries that are grown in a medium precipitation area are preferred. Those grown in a dry belt area do not seem to have the same flavour, and while they will generally keep longer during the rush of a berry season, they do not appeal to the canner.

Zavalla, (54), has said about canning berries that "In order to increase the demand on the market the canning operation should be performed as carefully as possible. Berries are very tender and can be easily bruised. Therefore the handling of them has to be done with great care, otherwise considerable waste will occur and the yield per ton of high grade will be low".

It is noted by all that berries cannot be packed in ordinary tin cans, but must be canned in enamel or lacquered
cans in order to prevent pinholing and subsequent corrosion and spoilage due to the high acidity of the fruit.

Berries for canning are picked into shallow boxes that are larger than those used for fresh fruit trade, and if possible the berries are picked and canned daily in order that fruit may be at the optimum rate of maturity.

Blackberries to be used for canning are merely sorted and washed, with little attempt made to grade, as to size, as most of the fruit is used for pies rather than for dessert purposes. (9)

Loganberries are large in size and deep red in colour. As the fruit is in demand chiefly for pie making, there is no necessity for grading, and they are mostly packed in large tins. (9). It is the opinion of some that, if the loganberries were canned more in a light syrup and an extensive selling campaign carried on, that there would be a tremendous increase in consumption.

Raspberries for dessert purposes must be graded and are packed in a heavy syrup. For pies they are generally ungraded and packed in water.

Strawberries for canning must be firm in texture; this is absolutely essential because of the characteristics of the fruit, which made it break down more easily than the other berries, and they must be of good flavour, of good colour and of large size. As they are used generally for dessert purposes, they must be graded. The chief difficulty
in the canning of strawberries is the softening during the sterilization which results in the can containing only from 1/3 to 1/2 of its volume of berries, (9). Strawberries should be canned in a heavy, rather than light syrup.

**Jam (5)**

Jams are normally made from small fruits; the entire fruit is cooked with sugar to the desired constituency, which should be soft or jelly-like, and contain practically no free liquid. Fruit for jam must be well ripened in order to give the characteristic flavour and colour to finished jam. Jam is the main outlet for currants and gooseberries and plays an important part in disposing of the surplus of other small fruits which, because of shape or quality, are not suitable for the fresh fruit market, and of those which, because of the weather conditions at the time of ripening, will not ship; of varieties not accepted for canning; and of mixed varieties which are shipped to the jam factories provided they are free from decay and are not stale.

The price for jam berries is naturally not as high as for those used for other purposes, but a fair price is always assured.

The number of berries that are canned each year depends therefore on many factors; (1) climatic -- the weather at picking time will determine whether or not berries may be shipped satisfactorily over long distances;
(2) price -- the difference in the spread between jam and fresh fruit must be considered, and the narrower this spread, the greater the amount of berries that will be used for jam. In order to determine this spread, transportation and crate costs must be taken into consideration as well as slightly increased cost for picking; (3) carry-over from previous year -- while it might be thought by some that the jam factory is dependent on the producer for its supply, such is not the case. Jam factories can only handle a certain amount of fruit at any one time, and while it is possible to process fruit and keep it as jam during slack times, there is always the necessity of having to make the sales equal the manufactured production. If a stock or carry-over begins to accumulate, the amount of berries to be used as jam will be seriously curtailed.

There is no fixed rate in the amount of sugar for jam. A reduction of the sugar will give the jam a tart taste, and such jams are much to be preferred to those which are too sweet and tend to appease the appetite quickly,(5). If the jam is kept tart there will naturally be a higher consumption. There is no need here to go into the actual jamming processes, but it might be well to mention in passing that the fundamental processes are the same for all small fruits, except currants and gooseberries.

There are three types of currants, the black, red, and white, but only the first two are grown commercially in
Canada. The black currants must be blanched to remove part of the very heavy aroma. All currants must be well ripened before picking. If too green, the flavour and taste will be impaired. However, they must not be too ripe or the jam will tend to be syrupy or gummy.

If the seeds of the currants or gooseberries are objectionable, it is possible to strain the pulp through a sieve before the sugar is added.

Jelly Making

The essentials of good jelly are determined by the pectin, acid and sugar content of the fruits. Small fruits that are high in pectin and acidity are loganberries, sour varieties of blackberries and currants.

It is possible to make jellies from all small fruits, but it is necessary to add pectin or sugar to some in order to maintain the right balance.

Many commercial firms carry this processing still farther, and prepare jelly powders, which on the addition of water, give a standard flavour of jelly.

"A perfect jelly" as described by Cruess, (9), "is clear, sparkling, transparent and of attractive color -- when removed from the glass it should retain its form and should quiver and not flow. It should not be syrupy, sticky, or gummy, and should retain the flavour and aroma of the original fruit. When cut it should be tender and yet so firm that a sharp edge and smooth sparkling cut surface remain".

Jelly making is a highly specialized industry at the present time, and a demand has been created for the product chiefly through the means of advertising. One should think then that other products of the same fruits could not have their consumption similarly increased.

**Frozen Pack**

In the past the frozen pack method was thought of as a means only for preserving the fruit until it could be used by the processing plant or commercial firms such as restaurants, hotels, etc. However, with the developing of new methods, new containers and proper storage conditions, there is no reason why this method should not be used in marketing the fruit directly to the consumer.

The Oregon and Washington growers have realized what an asset this frozen pack method could be. Between 1918-1928 the output for strawberries alone increased from 3,000 fifty-gallon barrels to 70,000 barrels,\(^\text{(18)}\). Later they also realized the importance of the consumers' trade and from 1928-1930 in the midst of the depression the output of all small fruits increased from 434,000 one and two pound cartons to 1,872,876 cartons,\(^\text{(50)}\). However, special facilities are needed by retailers to handle the frozen pack fruit, as a temperature of 10\(^{\circ}\) or lower being required, so there is little likelihood of a further increase until means of proper retail storage conditions are perfected.

In Canada, progress along this line is decidedly
behind that of the Pacific Northwest, and is confined mainly to the large containers. However the sooner the manufacturer and retailer realize the potential consumption for fruit in small containers, the better it will be for small fruit growers.

The fruit preserved by the frozen pack method is used very largely in the commercial manufacture of preserves, jams and jellies. Considerable quantities are employed in the preparation of crushed fruit and fruit syrup for soda fountain use, and in pie baking by large restaurants and bakers. The manufacture of ice cream with fruit flavours also utilizes an appreciable part of the total frozen pack, especially of strawberries, and a small quantity is used in preparation of fruit extracts and flavours. This summary in the U.S.D.A. bulletin, (18), gives a concise statement concerning the wide uses to which frozen pack may be put.

The frozen pack method has a very good future and should be developed in the interests of the small fruit grower. Not only is it a means of strengthening consumption but it also furnishes a means for orderly marketing when the berries are found unsuitable for other purposes or when it is impossible to handle them during the main season rush.

Before freezing can be attempted the berries must be sorted and all other fruit debris, mouldy berries or those otherwise unsuitable for barrelling removed. Berries are frozen with or without sugar, dependent on the type and variety. The barrels are then removed to the freezing storage,
where temperature ranging from 0° to 15° is maintained,(18).

For the smaller cartons the vacuum closed containers are recommended as they prevent absorption and air interchange, thus producing acceptable products,(50).

Variety is important in the freezing method as it is necessary to have berries which will hold their colour and flavour during freezing. The varieties recommended by Wregand are the Marshall strawberry, the Cuthbert raspberry, and the Evergreen blackberry as being satisfactory with regard to colour, firmness and good texture. At the present the cold pack means of disposal is not feasible for loganberries for two reasons; first, the berry itself has a hard objectionable core, and secondly, it has no appetite appeal on the frozen pack market.

The sugar content must also be considered, as the highest density syrups generally detract from the flavour of the product by over-emphasis of the sweet taste.

Processing with SO₂

A relatively new method of processing which has met favour with the canneries and the jam factories is the preservation of berries by sulphur dioxide.

Berries which cannot be used immediately, or those for which there is a need of transporting long distances with no refrigeration facilities may be preserved excellently by this means.
Sulphur dioxide has long been used extensively in the dried fruit industry as it is toxic to moulds and bacteria, (29). However, it is only in recent years that it was discovered that it could be used in the liquid form for the preservation of small fruits without injury to the flavour. Consequently, there is an increasing utilization of such a method for besides being cheaper than the frozen pack, it is less trouble because no special precautions need to be taken until the berries are ready for use.

Berries are put up in barrels and are used for the processing trade. On standing they become bleached, but once the $SO_2$ has been driven off they resume their natural colour, and may be used for all products excepting those canned.

It might be well to mention here one specialized use for which loganberries are used in British Columbia. A large percent. is consumed each year in the fruit juice industry, with its centre on Vancouver Island, (49).

Loganberries must be fully mature and must have attained their maximum colour and sugar content. The fruit is soft and ferments quickly and therefore must be pressed soon after picking. From this point on in the processing depends on the use to which it is to be put either fresh or fermented.

In order to see exactly what part these different processing methods play in Canada, the following extracts from The Agricultural Situation and Outlook, (23), 1934 and 1936 are given. In 1936 a comment on strawberry conditions
reads, "A very heavy crop necessitated the introduction of measures to stabilize prices. A very large quantity of fruit was processed. The estimated pack of canned strawberries was 45,000 cases, a sharp advance over the 1934 pack of 39,000 cases. Larger quantities than usual of strawberries were packed in sulphur dioxide and shipped abroad. A preliminary estimate indicates that some 3,500 barrels of berries so treated were shipped during the past season. This method of treating berries has been practised in British Columbia for some years, but was an innovation in the province of Ontario. It is estimated that in Ontario and Quebec 60,000 pounds of berries are annually held as frozen pulp for jam manufacturing."

In the 1934 report we find mention made of the frozen pack method of preservation and at that time the statement was made that "A comparatively new innovation which may be expected to reach quite large proportions is the merchandizing of fresh frozen strawberries. The added cost of freezing and storage is very moderate" -- further the fact is stated that "Processing of strawberries for storage and domestic or export disposal for canning, jam making and freezing etc. already has attained large proportions. This method affords the grower an escape from crop and weather abnormalities as well as affording the manufacturers their supply for year round operations".
SALES ORGANIZATION AND MANAGEMENT

General Statement

The commercial small fruit crop in Canada is handled almost entirely through local co-operative organizations. The reasons for this means of organizations and the benefits that may be brought about by such are dealt with in this part of the work and means of reducing cost of marketing is suggested.

Advantage of Co-operatives

Small fruit production is a community enterprise and as generally only two to five acres are devoted to small fruit growing on any one farm, there is the need to combine the berries of many growers for economical transportation and refrigeration,(35).

Since berries are the more perishable fruits, it is necessary to see that they are loaded into cars as quickly and as economically as possible. Generally only co-operatives have the necessary supply to ship carloads of berries, and this, besides cutting down costs, will insure a faster and better means of transportation. It is to the advantage of the grower to keep cost down.

The usual type of co-operative is the small fruit
areas is one in which the patrons of the organization are members. A manager is employed, and all members share in the profit or loss of the body as a whole. All the costs are pooled, either on the basis of variety or grade.

The business of the co-operative is handled through one broker and when the final returns are available, the costs are subtracted from the returns and the members are paid off on the basis of the number of crates shipped into the co-operative. If there is an efficient manager this is the best method for the group as a whole to market the fruit.

Individual independents not dealing through the co-operative may at times receive a better price by catering to the best market, but this is not being fair to the other fruit growers.

**Standardization**

It is possible for the co-operative to efficiently carry on practices which the individual grower cannot hope even to attempt. Such practices as standardization and advertising are essential.

Phillips and Card of Kentucky, state that "Standardization of quality and method of preparation for market are important considerations in strawberry marketing. Indifferent packs and poor quality fruit cause wide differentials in prices and lower the price level".

Herein lies the major difficulty of the marketing problem in Canada to-day. It is true that berries have to
come up to certain grades as set forth by the Dominion Fruit Branch,(26), but there is no stipulation made as to the variety of fruit that may be sold on a market. As already mentioned, it is the duty of co-operatives to standardize their products, and sell them by a brand name, and make that brand name mean something. Examples of trade names that have come to be recognized as of superior quality are the "Eatmore Cranberry" and "O. K." or Okanagan Apples. How has such recognition been achieved? Chiefly by naming a product by advertising it as being superior and then by making sure that the product can be depended upon. There is no reason why the customer, for example, can not be educated to the fact that Cuthberts are the best variety of raspberry, and those that are marketed under the name of say "Fraser Valley Cuthberts" are superior. Once the customer has found out that the brand can be relied upon, repeat orders may be depended on and a premium might even be possible.

Advertising

The British Columbia growers have already carried on an advertising programme; the use of the radio and other means have been used to induce the consumer to eat more berries. The cost of such advertising was defrayed by carlot shippers and jobbers agreeing to a deduction of $\frac{3}{4}$ per crate. This was attempted only with strawberries in 1935 as there was in that year a very large production, and with a late season, making it necessary to market a large quantity in a
short space of time.

There is no reason why a programme like this should not be carried on every year for all berries. The advertising costs would soon pay for themselves in a higher price for the berries.

Marketing associations can carry out such a plan far better than an individual grower. Not only that, but it is possible for such organizations to educate the grower himself to put up a graded first-class pack.

Perhaps, if any such programme as the one mentioned above were to be attempted in Canada, the progress would be very slow, and even though it would be beneficial, it would meet with protests at all stages from producers to consumers.

**Middlemen Operation**

In many sales organizations, the independent always voices the argument that the "middleman prices" are too great and he can get a better price for his product by dealing directly to the consumer. Unfortunately such is true in individual cases, but it would be impossible if all growers were to attempt to carry out such a plan.

The number of middlemen between the producer and the consumer will depend, of course, on the method of marketing. Assuming that the co-operative is the producer
organization, and the consignment sales or F.O.B. method is the general practice, there are usually three steps between the producer and consumer. These are shown by Converse, (8), Page 110, and are diagrammatically represented as follows:-

```
Producer Co-op. Assoc. \rightarrow \begin{cases} 
\text{Broker} \\
\text{Buying Agent} \\
\text{Local Buyer} \\
\end{cases} \rightarrow \begin{cases} 
\text{Wholesaler} \\
\text{or} \\
\text{Jobber} \\
\end{cases} \rightarrow \text{(Retailer)} \rightarrow \text{(Consumer)}
```

```
Producer Co-operative \rightarrow \begin{cases} 
\text{Wholesaler} \\
\text{or} \\
\text{Jobber} \\
\end{cases} \rightarrow \text{(Retailer)} \rightarrow \text{(Consumer)}
```

Diagram:

```
Grower

\begin{array}{c}
\text{Co-oper.}
\end{array}

\begin{array}{c}
\text{Wholesale Broker}
\end{array}

\begin{array}{c}
\text{Retailer}
\end{array}

\begin{array}{c}
\text{Consumer}
\end{array}
```

**Broker**

The broker's job is to find a market for the fruit. He may be represented by a buyer at a local shipping point, but he deals with wholesalers and jobbers and makes no attempt to divide the fruit. He is the go-between for a producer in a distant city, and the buyer, and according to law must represent the seller. Certain restrictions are passed by the Dominion Government which prevent malpractices by brokers. He does not actually handle the berries.

**Wholesaler**

The wholesaler actually starts the process of division. He buys the fruit in carload lots, and receives a profit on the berries going through his hands. The price he receives is usually so much per car or so much per crate. He deals with the retailer.

**Retailer**

The retailer is the store-keeper who deals directly with the consumer. He receives his goods from the wholesaler in fairly large allotments. Because of the high perishability of berries, the retailer is forced to demand a high rate for handling because of the risk of loss by spoilage or deterioration.

The actual function of the middleman is dealt with later. Here again the advantage of co-operation is shown. The wholesaler and jobber when handling a limited amount of
fruit fix a price that is relatively high. Whereas if a large amount of fruit is handled, it is generally done on the percentage basis and the cost is lowered considerably.

Thus far we have dealt with the co-operative, only as it might affect the fresh fruit market. However, with co-operation it would be possible to make contracts with jam factories and divert to jam that portion of the fruit, which was not suitable for the fresh market, or which would cause a glut on the market. By doing this, not only could quality but also quantity and thus price be regulated.

It should be the object of any co-operative to keep low-grade fruit off the market, even if it should have to be destroyed, because besides having a depressing effect on price, it tends to have a similar effect on consumption.

Then again, closely associated with this, is the possibility of co-operatives having market information not available to the individual producers. Because of the accurate system that is in effect to-day, it is possible to know what is the supply on any market, and the amount that is en route to that market, except in the case of those berries that are shipped by truck. By taking supply into consideration, and correlating it with the price factor, the co-operatives can ship berries to that place which will have the best demand.

An example of this might be such that a co-operative at Hatzic has reports that strawberries are late ripening in
Ontario, and that there are none en route from any points in the United States. Then if the Vancouver market and the many prairie markets were taxed to the utmost, and any additional supply would force the price down, immediately berries could be dispatched for Ontario, and a good price realized; whereas, if no information had been available the berries would probably have been sent to an already overloaded market, and the market for berries would have been badly disrupted.

Method of Sale (27)

Thus far we have dealt only with the functions of the co-operative, but to complete the picture a survey of actual marketing steps is necessary. The co-operative has two alternatives when marketing berries, whereas the independent dealer not having a large volume generally has three.

Consignment

The first method of sale is consignment sale to commission agent or broker. Under this method the broker sells the berries for the producer at the best price possible on the market, deducts freight and sales charges and remits the remainder to the producer. In this way the risk is entirely in the hands of the grower and any deterioration in the product or unfavourable market price will have a
direct influence on his final net price. The broker does not receive any more than handling charges.

**F.O.B. Method**

The second means is the F.O.B. method of sale by which the berries are sold at a certain price at the loading point. The buyer bears the cost of transportation, accepts the risks of transportation and market and any decrease in the market price. However, the price set is generally low enough for the broker to make his own charges, and sometimes a profit on the berries. This is really a method of hedging and the grower is willing to part with a portion of his profits in order to insure himself a reasonable price. It is necessary in this connection to maintain an inspector at both shipping and terminal points, but his duties will be discussed later.

**Shipping Point -- Local Sales**

The last method of marketing and the one that can only be used to advantage where production is low and consequently where there is no co-operative association, is that of sale for cash at the shipping point. In this way the grower is relieved of all further responsibility, and at the same time, has ready cash to pay for the harvesting of his crop. In some localities this is essentially an asset. The price they will receive for their fruit in this way will depend upon whether there is a "buyer" or a "seller" market, or in other words, what the market demand and supply is.
There is very little difference in price over a period of time, between the first two methods, but because of the fact that the risk is transferred from the seller to buyer with F.O.B. sales, this method is preferred by many shippers.

Application of Natural Products Marketing Act to Small Fruits

The Canadian Government has realized the advantages and necessity of the co-operative for agricultural products, and provided a scheme in 1934 whereby if the growers in any particular area producing 70% of a given product could formulate a scheme for marketing, then all producers would be required to fall in line with the scheme. However, as yet no small fruit areas have taken advantage of such a scheme, due perhaps for two reasons; first, the legal aspect of the Act is still in doubt, and secondly, the present method of marketing seems satisfactory.

Thus far there have been two schemes approved and put into effect under the plan. The first is the Canada Jam Marketing Scheme,(3) which aims at stabilizing of price and improving the quality of the regulated product. Through an increase in the returns to the manufacturers, it is believed that growers will secure better prices for their fruit which
is processed. The second scheme approved was the Processed Berry Marketing Scheme, (37). This scheme provides that a local board may regulate the time and place, and designate the agency through which the processed berries are marketed. This measure was necessary in 1935 in order to market an unusually large crop of strawberries. Because of an early frost in Great Britain destroying the crop, there was a demand for any berries that Canada was able to export, with the result that this scheme proved a distinct success in 1935.

A scheme for local berry growers would have to be one which would involve the following points:

(1) A pooling of returns in any given area -- not necessarily one pool, but perhaps three to five pools, depending on the different seasons and different species of berries.

(2) A systematic grading and labelling of fruit to make it attractive.

(3) An efficient manager.

(4) An educational campaign to educate the consumer concerning the type of berries that are best for the different needs either for consumption as fresh fruit, or for preserving, jamming or jelling.

Inspection

The Dominion of Canada has a very competent inspection service at the present time of two kinds, terminal
and shipping inspection. It became necessary to establish this in order to insure fair practices between shipper and buyer. The grades of fruit are set by those of the government standards, and both parties must abide by the grades set by the inspector unless either one of them apply for re-inspection.

Not only does it prevent disputes, but it also prevents false representation of berries that are being exported or imported. This is really the first step towards the standardization of berries. However, it does not attempt to distinguish between varieties, and grades are either Grade I or ungraded.
VI BRITISH COLUMBIA’S SMALL FRUIT PROBLEMS

General Statement

Although British Columbia has been specified in general outline for detailed study, it does not necessarily follow that the problems of that province are any greater or diversified than those of any other province in the Dominion. This province was selected mainly for the following reasons.

(1) More data are available with regard to the marketing, and also for detailed production of varieties in any other province.

(2) A very large percentage of the fruit is shipped out of the province, hence the problems involved in marketing are very important.

(3) It is one of the two most important small fruit producing provinces.

Statistical Study

In order to get a clear picture of the small fruit industry in British Columbia, the total production, (15), for each variety is shown in the Appendix, and these figures for the various small fruits are charted and compared in Fig. 8. It is possible to see from this the relative importance of these crops. With the exception of two years, strawberries
Fig. 8
Production of Small Fruit in British Columbia.
(Production in carlots)
are the most important crop. In these years, 1925 and 1926, more raspberries were produced. Since this latter year the raspberries have shown a steady decline until in 1933, when more loganberries and bush fruits were produced than raspberries. Loganberries are quite an important crop in B. C., being chiefly centered on Vancouver Island, which is the center of the wine making industry.

In Fig. 9 - 12 the amount of each fruit that is used for manufacturing and that amount which is marketed fresh is compared for each small fruit, except bush fruits which show a similar trend to strawberries.

Fig. 9 shows the relative importance of processed strawberries in relation to the amount consumed fresh. For the twelve years studied, there is practically the same amount manufactured as consumed fresh, with the fresh fruit market taking a slight lead.

Fig. 10 shows a comparison between the processed and fresh fruit consumption of raspberries. A very similar trend to that of strawberries is shown.

Fig. 11 shows the way in which the loganberry crop is disposed of, and it can be seen that a different problem is presented. A comparatively small percentage of loganberries are consumed on the fresh fruit market in British Columbia. At no time in the twelve years did the fresh fruit consumption exceed 600,000 lbs., while on the other hand,
Quantity of Different Fruits --
Processed and Fresh Fruits Compared

Fig. 9
Strawberries

Fig. 10
Raspberries

Fig. 11
Loganberries

Fig. 12
Blackberries

Fresh Fruit
Processed
the amount of loganberries that have been processed reached the amazing total of almost 2,200,000 lbs. in the years 1926 and 1934. Any future increase in consumption will have to be of the manufactured product, as little increase can be expected in the amount consumed fresh.

Fig. 12 shows the trend of blackberry production. Although there has been a variation in the quantity processed in the last thirteen years, the amount sold on the fresh fruit market has remained fairly constant with the peak year of selling being in 1925, when 33,688 crates were disposed of in British Columbia and export points, while the low year was 1933 when 18,404 crates were marketed.

The amounts processed on the other hand have shown larger fluctuations from year to year with 1926 being the high year of production, with 458,834 lbs. of blackberries going to the processing plants.

**Crop Movements**

As has already been mentioned, British Columbia markets a large percentage of its berries outside the province, the prairie provinces, Alberta, Saskatchewan, and Manitoba, being its chief customers. The marketing plan that has been in effect in British Columbia for the last two years has worked out satisfactorily.
The plan as outlined by B. Dickie,(17), is one in which all earlots are handled through one sales agency in Vancouver, which used brokerage facilities of the Canadian Fruit Distributors, in Vancouver; C.H. Robinson Ltd., United Brokers and Grant Distributing Co. on the Prairie; Frank Gibson in Toronto; and Mutual Brokers Ltd. in Montreal. The shippers agreed on a principle of central selling with no stipulations other than that the Pacific Co-operative Union insisted on United Brokers and Grant Distributing Co. having full access on volume.

Each market on the prairies eventually agreed to a certain percentage and to economize and avoid overlapping. Each market received and dispatched under the heading of "Winnipeg Berries; and Edmonton Berry Sales".

The movement of small fruits in British Columbia is not only divided into district pools, but also into three main crop movements,(16).

The first consists of the main crop of strawberries. In 1935 this consisted of 153 earlots, all but one of which were shipped to the prairie. In addition to these 153 earlots, there were 500 tons of berries processed with SO₂ and sent to the United Kingdom as already mentioned.

The second movement includes loganberries and blackberries, as well as the main crop of raspberries. In 1935, 47 earloads were shipped from British Columbia to the prairies.
The last crop is known as the late crop, and consists of everbearing strawberries and blackberries. The total amount shipped from the Lower Mainland to the prairie was 44 carloads.

The following table, (16), shows the number of crates of each variety that was shipped in each movement.

<table>
<thead>
<tr>
<th></th>
<th>Main Crop</th>
<th>Raspberries</th>
<th>Late Crop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberries</td>
<td>123,780 crates</td>
<td>3,316 crates</td>
<td>25,744 crates</td>
</tr>
<tr>
<td>Raspberries</td>
<td>-</td>
<td>29,892 &quot;</td>
<td>2,556 &quot;</td>
</tr>
<tr>
<td>Loganberries</td>
<td>-</td>
<td>4,023 &quot;</td>
<td>-</td>
</tr>
<tr>
<td>Blackberries</td>
<td>-</td>
<td>-</td>
<td>6,597 &quot;</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1,490 &quot;</td>
<td>2,280 &quot;</td>
<td>690 &quot;</td>
</tr>
<tr>
<td></td>
<td>125,270 crates</td>
<td>39,311 crates</td>
<td>36,266 crates</td>
</tr>
</tbody>
</table>

This table deals only with carload lots. Besides these, there is a large movement of berries in less than carlot shipments (L.C.L.). These are tabulated in the following table, together with the carlot movements and the central market where the fruit was sent for distribution.
<table>
<thead>
<tr>
<th></th>
<th>Calgary</th>
<th>Edmonton</th>
<th>Saskatoon</th>
<th>Regina</th>
<th>Winnipeg</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main Crop</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strawberries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carlot</td>
<td>25,035</td>
<td>20,414</td>
<td>16,179</td>
<td>26,937</td>
<td>35,859</td>
<td>124,424</td>
</tr>
<tr>
<td>L.C.L.</td>
<td>23,030</td>
<td>13,110</td>
<td></td>
<td></td>
<td></td>
<td>36,140</td>
</tr>
<tr>
<td>Total</td>
<td>48,065</td>
<td>33,524</td>
<td>16,179</td>
<td>26,937</td>
<td>35,859</td>
<td>160,564</td>
</tr>
<tr>
<td><strong>Raspberries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carlot</td>
<td>6,315</td>
<td>4,407</td>
<td>3,797</td>
<td>12,232</td>
<td>12,560</td>
<td>39,311</td>
</tr>
<tr>
<td>L.C.L.</td>
<td>12,452</td>
<td>4,255</td>
<td></td>
<td></td>
<td></td>
<td>16,707</td>
</tr>
<tr>
<td>Total</td>
<td>18,767</td>
<td>8,662</td>
<td>3,797</td>
<td>12,232</td>
<td>12,560</td>
<td>56,018</td>
</tr>
<tr>
<td><strong>Late Crop</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Loganberries</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carlot</td>
<td>4,311</td>
<td>4,297</td>
<td>2,946</td>
<td>6,812</td>
<td>9,114</td>
<td>27,480</td>
</tr>
<tr>
<td>L.C.L.</td>
<td>2,383</td>
<td>537</td>
<td></td>
<td></td>
<td></td>
<td>8,362</td>
</tr>
<tr>
<td>Blackberries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L.C.L.</td>
<td>4,560</td>
<td>882</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>11,254</td>
<td>5,716</td>
<td>2,946</td>
<td>6,812</td>
<td>9,114</td>
<td>35,842</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>78,086</td>
<td>47,902</td>
<td>22,922</td>
<td>45,981</td>
<td>57,533</td>
<td>252,424</td>
</tr>
</tbody>
</table>
Table V, besides showing the type of small fruit movement, either carlots or L.C.L. brings out some other important problems in the marketing of small fruits.

Middleman Charges

In certain areas because of the fact that the middleman attempts to charge too much margin for doing business, the sale in that area is definitely curtailed. Not only does the middleman suffer, but also the producers. The table shows that prosperous Saskatoon territory sold relatively few berries compared even to the Regina Dry Belt. Evidently the jobbers in Saskatoon attempted too high a margin on a high volume. In cases such as this, it might be advisable to have government supervision of jobbers, and to determine that amount which is considered a fair margin for the various fruits. This would eliminate, to a large extent, too high margin by jobbers, and should encourage consumption.

Problems of L.C.L. Shipments

Table V shows also that the two Alberta markets, Calgary and Edmonton, are deluged with L.C.L. shipments. Although these are chiefly shipped by independent growers, and from the lower producing areas, they do nevertheless constitute a large enough volume to wreck the Alberta markets. Of these L.C.L. shipments, approximately 5,000 are from Clearwater, 3,000 crates from Salmon Arm, and 5,000 from Creston, Wyndell, and Kootenay. However, even taking these
into consideration, the L.C.L. movement from the Lower Mainland is still sufficient to entirely ruin the Alberta market. This problem could be eliminated if the small berry growers would take advantage of the Natural Products Marketing Act. By this way the actual board could influence the movement of all berries within any area, and thus eliminate the deluge on all markets.

So far we have dealt only with the difficulties of handling berries in general. It might be advisable here to give an idea of the actual problems that the producers meet, taking 1935 as an average year, and considering them from the point of view of the the three movements.

Main Crop - Strawberries

The main strawberry crop in British Columbia was exactly two weeks later than it was the previous year, while the Eastern Canada crop was early. This deprived British Columbia of any hope of marketing any berries in Eastern Canada, although in 1934, 13 carloads had been shipped to Montreal and Toronto, which helped immensely in relieving the prairie congestion. However, there were the two redeeming features; first, prospects of good grain harvest on the prairie caused a general optimistic buying market; and secondly, shipments of 500 tons of SO₂ berries to the prairies helped to relieve the market. Because of the shortage of rain in British Columbia, when the strawberries
should have had moisture to enable them to fill out properly, the quality of the first berries shipped was adversely affected. However, the rain came just in time to save the main strawberry crop from failure. Prices for strawberries were fairly high for berries that were shipped, and the grower was netted six cents a pound.

Raspberry Crop

The marketing of the British Columbia raspberry crop was very unsatisfactory from the point of view of returns. There was not one cause, but a series of causes, responsible for these poor returns. First of all the main crop of strawberries was still going onto the market when the raspberry crop started. The raspberries, too, were of inferior quality, necessitating that they be sold immediately even at a poor price. Thus not only were the raspberries deprived of a clean market, but also the price had to start lower than it otherwise would have. Next, because of weather conditions at the shipping point, it was not possible for the growers to ship berries that were capable of standing up for several days, and being in good condition upon arrival at the market. Another main reason for the poor price was that grain prospects during this interval of time changed from excellent to very poor; pessimism was widespread, and buying was depressed. Still another reason was that the British Columbia crop was late, while the Eastern Canadian crop was
earlier than usual, and there was no possibility of relieving the prairie congestion. The last reason was that one which has already been discussed, namely, that because of the several varieties that were shipped this season, there was a lack of uniformity upon arrival. The Cuthbert berry, although the best all-round shipping berry, was declining in production, and the growers had been attempting to grow other varieties, with the result that in each earload of raspberries there were from three to five different varieties of berries.

Late Crop

This crop also suffered due to the prairie crop conditions. Not only that, but the prairie markets were attempting to dispose of the largest volume of berries ever distributed in such a short period of time just prior to the commencement of the late crop. At the same time, shipping point conditions were extremely poor, and a heavy rain, followed by a high humidity, made berries very poor shippers. The season was also late, and this resulted in a serious competition with the main crop of deciduous fruits from Washington, Ontario, and British Columbia.

The last reason for the poor returns is one which has not been mentioned before, namely, that of terminal conditions. By the time that the last fruit came on the market, rains had set in and there were early frost, all of
which tended to have a devastating effect on the price. Although Eastern Canada used ten carlots, the market was at no time satisfactory, and it proved just a means of relieving the congested prairie markets.

It is possible to see from this brief review given that Canada is definitely divided into zones for small fruits marketing. Any discouraging reports such as crop failure, weather conditions, or other outside influences that might be a decided setback for the growers in one part of the country might be creating a market and causing an advance in price, prove an absolute boom to those in another part. It would be almost an impossibility to eliminate such a condition, as it prevails not only for small fruits, but for all crops, and at the same time, is not only nation-wide, but world-wide.
VII CONCLUSIONS

From this study of small fruits, the writer has drawn the following conclusions, as being adaptable in a general way to all small fruits in Canada.

Indication of any widespread expansion in the near future seems to lie primarily in the hope that the consumption of processed berries can be increased, or that the grain crop on the prairie becomes improved.

Production of small fruits in Canada follows definite cycles. Being generally a short-term crop, it is possible for rapid contraction and expansion of acreage on the basis of the previous year's low or high price respectively.

Because of the earliness of the crop the United States is able to export to Canada at a time when the price is highest, and destroy the urgent demand for berries by the time the Canadian crop is ready. This causes a low starting price for the Canadian berries.

There are many production problems which still have to be studied in British Columbia to-day. The most outstanding one is probably the condition of raspberries "Running-out" or "Mining of Raspberry" soils, although fungus and virus diseases of all small fruits are by no means under control.
Production problems are closely related to marketing, and many of the marketing problems to-day are intensified by the grower who has not been educated as to the variety or to best means of cultivation and harvesting. In general, the grower who does not know the best way to handle the berries before they leave his hands.

The consumption of small fruits could be increased if all middlemen would give their full support to the co-operative associations, and not demand too large a margin for handling the fruit. It is to the advantage of all groups that the spread between producer and consumer be reduced to the minimum.

The chief hope for increased consumption in the future is from the increase in processed fruits, as in the past few years only the Frozen Pack method of preservation has shown any real advance. There should also be a hope for an increased demand in Canada as soon as the retailers install equipment to keep the fruit at a low enough temperature.

The latest method of processing on a commercial scale is the use of \( \text{SO}_2 \). This method can be employed commercially in times of stress in an effort to bring about orderly marketing. This is a far more satisfactory means than even the Frozen Pack method.

The grading of small fruits is not adequate in Canada to-day as variety should be taken into consideration.
The producer should be advised to join up with a small fruit co-operative in order to benefit not only himself, but also the small fruit growers as a group.
VIII RECOMMENDATIONS

Recommendations made here are based on the points that have been developed in the previous part of this essay, and are classed under five main headings; production, harvesting, marketing, controlled production, and co-operation.

Production

While this is actually not a survey from a horticultural standpoint, nevertheless the writer feels that he is justified in offering his views on how the small fruit crop might be improved to benefit the producer, not only in marketing berries, but also in reducing the cost of production.

Contrary to general belief a grower should not go into small fruit growing unless he has had some experience along this line. Small fruit growing as a main crop enterprise with no supplementing enterprises, gives a poor distribution of labour during the year. Such a farm would keep the owner employed at the most, only about six to eight months during the year. Whereas if the farmer combined small fruit growing with poultry raising, he would have a farm which could still be kept to the small farm size, and yet one
which could yield a maximum return per acre, (39). Poultry raising is preferred as a supplementary enterprise to dairying, because the latter would tend to have its labour conflict with the labour in small fruit growing.

Some of the advantages of such a combination of berries and poultry are briefly as follows: there would be an average distribution of labour over the year, plentiful supply of manure for cultivation of berries, and the risk of income being entirely cut off would be reduced. These form the main reasons why berries can best be grown as a supplementary crop.

There are other reasons why an inexperienced man should not attempt small fruit growing. Pests and diseases are very serious handicaps which the grower is faced with, and any grower not knowing the actual symptoms, may be confronted with a situation with which he is not able to cope. It is, of course, true that the government publishes bulletins on such subjects and maintains men throughout the province to deal with such problems; yet the grower who has not made himself acquainted with such factors as nutritional deficiencies and excesses, fungus and virus diseases, and the way in which pests injure the plants, would be under a serious handicap and not be likely to succeed.

At the present time, the Dominion Government maintains experimental and illustration stations in all
provinces and in most districts. In most of these stations, where small fruits can be grown, the problem is studied by competent horticulturists. In spite of the fact that such work is done in the interest of the small fruit grower, very few growers take the time or the trouble to visit such stations to find out just exactly what cultural methods are being carried on. Instead, the grower prefers to grow the fruit the same way he has done in the past, with the result that it often results in disaster.

Such questions as fertilizer mixtures, proper cultural practices, methods of combating diseases and pests, and the value of certified stock can only be solved by experiment and experience. The experimental stations should save the farmer the trouble of using untried methods, and it would be to his advantage to follow their advice.

Another phase of work which the government is carrying on through its experimental stations is the improving of varieties by experimentation in the breeding of small fruits. Such a programme as this entails vast crossing experiments and only about one seedling in ten thousand is worth keeping. It can be seen that a private grower could not hope to carry on such improvement work.

Although work is being carried on for all species of small fruits, the raspberry variety problem is the most important at the present time for British Columbia at least.
Some raspberries are favourable from the point of view of production, and others from the consumer's angle, but the ultimate aim in breeding work is to obtain a berry that is suitable to both classes concerned. Such a raspberry, according to J.J. Woods, would have to combine "The quality of the Guthbert, the yield of the Lloyd George, the hardiness and habit of growth of the Latham, and the colour of the Viking". It will probably be some time before such a berry is obtained, as breeding and multiplication work, though faster than tree fruits, is a slow process, and yet growers should make themselves acquainted with the improvement work as it progresses, in order to be ready to grow the ideal berry when the time comes.

**Harvesting**

Although the best harvesting practices have been discussed during the course of this study, no mention has been made of the fact that improper harvesting facilities can easily be a limiting factor of production, and one which might be improved.

The picking costs of small fruits is an important item in the total cost of production. Not only is this so, but large quantities of cheap labour must be available for short periods of the year, and small fruits can only be grown where such labour can be obtained.
For those small fruits which ripen quickly and must be picked often, special attention to picking is required. Strawberries, raspberries, blackberries and loganberries for the fresh fruit market should be picked only by experienced pickers, as the berries must be capable of standing up even under adverse shipping conditions. Pickers who are not experienced tend to sacrifice care in picking in an attempt to increase speed, and berries that have been handled roughly can be used only for jamming. Once a picker gains some experience in picking, and learns to handle the berries carefully, then it is possible to allow that picker to pick the shipping berries which pay a better price.

Loganberries, for the fresh fruit market, require also special care when picking. Because of the nature of the fruit the cell punctures very easily, causing leakage and making an unattractive package.

Marketing

Canada can roughly be classed into three marketing divisions. Western Canada; Ontario, and Quebec; and the Maritimes. We have seen that, as a general rule, each of these areas tend to be self-sufficient as far as each district goes.
Comparing the per capita consumption of each district, taking the population figures as given by the census of 1931, (21a), and the peak year of production of 1932, (19), it is found that there is a wide range of variation as shown in Table VI.

Table VI

<table>
<thead>
<tr>
<th>Per Capita Consumption in Quarts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Canada</td>
</tr>
<tr>
<td>Ontario and Quebec</td>
</tr>
<tr>
<td>Maritimes</td>
</tr>
<tr>
<td>Canada Average</td>
</tr>
</tbody>
</table>

These figures in Table VI show, of course, only the berries that are produced on a commercial scale, and there is probably in the older settled parts of Canada much more produced on a domestic scale, so these figures would tend to become more uniform. However, if proper advertising were carried on, per capita consumption should be increased to five quarts per capita per year, if the proper stimulant were given to the consumer. This increase might come through stimulation in the demand for fresh fruits, jam, jellies, or canned berries, but in any case, if the production were increased to five quarts per capita it would require fifty-one million quarts to satisfy the demand. This would indeed
prove a boon to the small fruit producer, and would have an indirect effect of increasing his income.

In a general way it has been discussed how such an increase might be forthcoming if proper advertising methods are pursued. However, aside from this, there are several ways by which consumption might be increased for the different small fruit products.

Considering first, the jam berries. At the present time it is the general practice to use for jam berries, those which cannot be used on another market. Whether such a policy is advisable is very questionable. Berries obtained in this way are generally the culls of the field; the small and misformed berries, and those in which the flavour is not absolutely the best. To illustrate this point, it might be well to refer to the Howe Sound berries. Because of the lack of transportation facilities, it was found that they could not be marketed satisfactorily in Vancouver. However, as the berries produced were of excellent quality, a manufacturer built a jam factory and jammed all the berries just as they come from the field. This fact proved to be a good advertisement, and when made known, there was a demand for jam. This jam proved to be of a superior quality to most brands, as the berries were large and seemed to have the natural berry flavour. With such superior quality it would be possible to obtain a premium for such jam.

The demand for first-class jam, the writer believes,
could be increased by such a procedure as mentioned above. In many districts it might be advisable to ship all berries for jam instead of skimming off the cream of the crop and shipping to the fresh fruit market, and then selling the rest for jam. Although the grower would probably receive a smaller price, it is doubtful whether it would not be as far ahead in the end, because he would be saved expense of crates and of packing and of other incidentals necessary in shipping.

Another angle which should be investigated further is the problem of shipping quality. This has been carried on to a very limited extent in Canada, and generally by people whose opinion is biased. Berries of all varieties and types should be shipped under all conditions by government men, and the results obtained should be made available to the small fruit grower so that he will know what variety is the best for shipping and under what conditions it is advisable to ship.

Besides conducting shipping tests, it would be to the advantage of the producer, if the government would make tests for the different varieties for their jamming and canning quality.

Controlled Production

As has already been seen, fluctuation in the price of small fruits are certain to occur as long as there is no
restriction on production. To stop these wide fluctuations, it would be in the interest of the small fruit producer if the government were to set up a committee which would allot production to different areas. The small fruit producers' associations within the areas would have to do the planning for the individual farms. Such a plan as the one suggested has been tried for other crops with varying degrees of success. The costs of such a plan as this might be greater than the benefits derived. However, it would do no harm for the small fruit growers to make a survey as to the feasibility of controlled production.

It might be that control of the market rather than acreage might have a depressing effect on production, but this could only be shown through actual experience.

If a programme of controlled acreage were put into effect, it would be necessary to maintain a reserve supply of berries, preserved by freezing or other means in case of adverse weather conditions, to keep the market steady.

Co-operation

Little has been said thus far concerning the advantages and disadvantages of co-operation, and yet this is really a part of a programme of controlled production. Acreage can best be controlled through co-operative organization in a district, if the co-operative represents enough of
the producers in the area.

It would be to the advantage of growers even in an area with only nine or ten producers to market their fruit as a group, because as such they can market fruit regularly and have a certain selling power.

However, thus far only the advantages of selling collectively have been mentioned, and this is but one of the benefits that may be derived. The buying of materials, such as commercial fertilizers, crates and certified stock can be bought at a lower cost if a larger quantity is ordered. Although it is not a sound economic practice to be granted such privileges, the producer, nevertheless, should take advantage of such conditions when they do exist. The margin between the cost of production and the net receipts for berries is so slight to-day that any decrease in the cost of production would help the producer.

The only reasons a grower might give for marketing his crop independently to-day are: first, that he can market directly to the consumer; and secondly, that the co-operative to which he would have to belong is inefficiently managed.

The first reason can be offered in only a few cases and even then, it would be to the advantage of the small fruit producers as a whole if the independent shipper would market through the co-operative. The independent shipper, when he sells directly to the consumer, tends to offer the berries
at a lower price and thus causes a general depression on the market. The independent shipper must be made to realize his obligations to the small fruit producer as a group.

The second reason, namely that of inefficient management, is entirely in the hands of the small fruit producer. If any grower is not satisfied with results and can show proof that poor returns are the result of inefficient management, it is probable that the fruit producers would demand a change in management.

It is time that co-operatives limit private initiative as far as marketing is concerned, but it is perhaps a good thing to leave it in the hands of those who know something about it. As long as the producer receives a satisfactory price for his berries and runs the production end, he should be satisfied. However, many growers to-day are not receiving what they consider a satisfactory price, and they attempt to place the blame on middlemen charges.

Summary of Recommendations

Summing up measures which might be taken to help the small fruit industry we find that,

(1) An educational campaign should be conducted by the government in the interest of the producer to show him
which are the best methods of cultivation, disease control
measures, supplementing enterprises, harvesting methods and
suitable varieties for shipping and marketing.

(2) A similar campaign should be carried on to educate
the consumer in regard to the best type of berry, and the
different uses to which berries might be put.

(3) The quality of jam must be improved in an effort
to increase the quantity consumed.

(4) Controlled production or marketing should be
investigated, together with the advisibility for the small
fruit grower to operate under the Natural Products Marketing
Act in certain areas.

(5) Co-operation for buying as well as selling will be
to the advantage of all small fruit growers. The independent
shipper is often strong enough to destroy the bargaining
power of co-operatives, and in this way spoils the market and
causes a lower price.
Berry production has shown some remarkable trends since 1900 with the highest point of production being in 1932 when thirty-two million quarts were produced in five provinces. Ontario and British Columbia produced 77% of the total commercial fruit production in the years 1924-1934.

Commercial small fruit production is confined chiefly to strawberries and raspberries, which comprised about 18.5% by value of all fruits in Canada in 1932-1933.

Price and production of small fruits show a very high indirect correlation.

Processed berries are a very important means of disposing of the small fruit crop. This is particularly so in the Province of British Columbia.

Competition with berries from outside is confined mainly to the small fruits from the United States at the beginning of the season, when the price is high.

Production problems, such as climatic, soil and site factors influence the marketing of all small fruits. There are also many minor problems such as disease and nutrition which must be considered in regard to the individual fruit.

The marketing problem which is foremost in the minds of those interested in small fruit growing is that of variety. It is necessary to find a variety which will
satisfy the consumer for consumption, and the producer from the standpoint of growth habits. A new berry which has been introduced and shows promise is the youngberry or wonderberry as it is sometimes called.

Because of the extreme perishability of berries, care must be exercised in their handling, harvesting, packing, transportation, and storage.

It should be possible by means of advertising and other stimulations to increase the demand for small fruits, not only that of fresh pack, but also those which are processed.

Small fruits are processed by jamming, canning, jellying, freezing, or by placing in a solution of $\text{SO}_2$. The last two methods named are recent developments and should show an increase in the near future.

Small fruits are handled most satisfactorily through co-operative organizations, as it is possible for such an organization to carry on the practices of standardization and advertising.

The functions of marketing are the same as with other small fruits, as they pass through the hands of co-operatives, wholesaler, retailer and then consumer.

The three methods of sale that are in common practice are the consignment method, F.O.B., and direct selling. Where possible the last method, that of direct selling, is preferred, but where it is not feasible to market
in this way, the grower tends to prefer the F.O.B. method, as it relieves him of all risk of marketing.

Inspection at terminal and shipping points is carried on by government employees in the interest of both the shipper and the consignee.

In British Columbia, it was found that each small fruit showed a different trend in regard to the percentage that was processed. About 50% strawberries, raspberries, and blackberries were consumed as fresh fruit, whereas only a very small percentage of the loganberries were sold in the fresh market.

The three crop movements in British Columbia are the main crop strawberries, raspberries, and late crop. Such problems as middleman charges and L.C.L. shipments are dealt with, and also the individual problems in connection with each crop movement.
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*(53)*

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(48) **Thompson, R.L.**


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(51) **Wilcox, O.W.**


(52) **Woods, J.J.**


(53) **Variety Key**


(54) **Zavalla, J.P.**

## APPENDIX

### Table 1

Total Production by Provinces expressed (1) in quarts; (2) in %

<table>
<thead>
<tr>
<th>Year</th>
<th>Canada</th>
<th>N. S.</th>
<th>N. B.</th>
<th>Que.</th>
<th>Ont.</th>
<th>B. C.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1924</td>
<td>12,464,450</td>
<td>342,000</td>
<td>639,500</td>
<td>600,000</td>
<td>5,557,000</td>
<td>5,325,950</td>
</tr>
<tr>
<td>1925</td>
<td>12,487,000</td>
<td>325,000</td>
<td>537,000</td>
<td>585,000</td>
<td>5,700,000</td>
<td>5,250,000</td>
</tr>
<tr>
<td>1926</td>
<td>18,678,000</td>
<td>615,500</td>
<td>990,000</td>
<td>2,000,000</td>
<td>5,650,000</td>
<td>9,426,000</td>
</tr>
<tr>
<td>1927</td>
<td>19,915,200</td>
<td>561,700</td>
<td>1,260,000</td>
<td>1,910,510</td>
<td>5,965,000</td>
<td>10,218,700</td>
</tr>
<tr>
<td>1928</td>
<td>18,995,340</td>
<td>525,000</td>
<td>878,000</td>
<td>2,832,000</td>
<td>5,005,300</td>
<td>9,755,040</td>
</tr>
<tr>
<td>1929</td>
<td>24,039,000</td>
<td>2,152,000</td>
<td>840,836</td>
<td>3,447,900</td>
<td>8,638,000</td>
<td>9,044,202</td>
</tr>
<tr>
<td>1930</td>
<td>17,039,700</td>
<td>237,000</td>
<td>520,000</td>
<td>2,946,500</td>
<td>6,912,556</td>
<td>6,423,644</td>
</tr>
<tr>
<td>1931</td>
<td>23,235,400</td>
<td>826,000</td>
<td>1,135,000</td>
<td>3,896,500</td>
<td>10,656,000</td>
<td>6,721,900</td>
</tr>
<tr>
<td>1932</td>
<td>35,661,000</td>
<td>1,135,000</td>
<td>1,136,900</td>
<td>6,955,000</td>
<td>13,616,000</td>
<td>10,704,000</td>
</tr>
<tr>
<td>1933</td>
<td>28,063,120</td>
<td>1,016,000</td>
<td>845,000</td>
<td>7,470,000</td>
<td>13,314,000</td>
<td>5,418,120</td>
</tr>
<tr>
<td>1934</td>
<td>24,610,030</td>
<td>359,000</td>
<td>1,037,500</td>
<td>8,140,000</td>
<td>8,569,410</td>
<td>6,524,120</td>
</tr>
</tbody>
</table>

Average: 3.14% 3.94% 15.87% 38.62% 58.41%

Reference: Dominion Bureau of Statistics -- Fruit Branch.
**APPENDIX**

**Table 2**

Average Price of Small Fruits in Canada -- 1924-1934

Not Weighted Average

<table>
<thead>
<tr>
<th>Year</th>
<th>Cents per Quart</th>
</tr>
</thead>
<tbody>
<tr>
<td>1924</td>
<td>19.0</td>
</tr>
<tr>
<td>1925</td>
<td>20.0</td>
</tr>
<tr>
<td>1926</td>
<td>13.0</td>
</tr>
<tr>
<td>1927</td>
<td>14.0</td>
</tr>
<tr>
<td>1928</td>
<td>14.0</td>
</tr>
<tr>
<td>1929</td>
<td>14.0</td>
</tr>
<tr>
<td>1930</td>
<td>16.5</td>
</tr>
<tr>
<td>1931</td>
<td>12.5</td>
</tr>
<tr>
<td>1932</td>
<td>7.5</td>
</tr>
<tr>
<td>1933</td>
<td>10.5</td>
</tr>
<tr>
<td>1934</td>
<td>12.0</td>
</tr>
</tbody>
</table>
APPENDIX

Table 3

Total Production of Small Fruits in Canada before 1924

<table>
<thead>
<tr>
<th></th>
<th>1900</th>
<th>1910</th>
<th>1920</th>
<th>1921</th>
<th>1922</th>
<th>1923</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strawberries</td>
<td></td>
<td>18,686,662</td>
<td>15,441,188</td>
<td>10,149,000</td>
<td>8,678,200</td>
<td>8,652,200</td>
</tr>
<tr>
<td>Currants and</td>
<td>21,707,791</td>
<td>3,830,609</td>
<td>2,002,136</td>
<td>7,522,950</td>
<td>6,271,725</td>
<td>4,496,840</td>
</tr>
<tr>
<td>Gooseberries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td></td>
<td>9,000,208</td>
<td>843,407</td>
<td>2,931,790</td>
<td>2,837,549</td>
<td>2,527,700</td>
</tr>
<tr>
<td>Raspberries</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>21,707,791</td>
<td>31,517,469</td>
<td>26,665,449</td>
<td>20,603,740</td>
<td>17,787,474</td>
<td>15,676,740</td>
</tr>
</tbody>
</table>

-
## APPENDIX

### Table 4

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity</th>
<th>Value Import</th>
<th>Value Export</th>
</tr>
</thead>
<tbody>
<tr>
<td>1924</td>
<td>5,162,961</td>
<td>$762,326</td>
<td>$372,116</td>
</tr>
<tr>
<td>1925</td>
<td>5,289,980</td>
<td>776,313</td>
<td>384,424</td>
</tr>
<tr>
<td>1926</td>
<td>3,207,335</td>
<td>613,572</td>
<td>(Not Known)</td>
</tr>
<tr>
<td>1927</td>
<td>4,200,400</td>
<td>705,809</td>
<td>133,388</td>
</tr>
<tr>
<td>1928</td>
<td>6,530,659</td>
<td>870,245</td>
<td>105,113</td>
</tr>
<tr>
<td>1929</td>
<td>9,450,763</td>
<td>1,099,746</td>
<td>59,547</td>
</tr>
<tr>
<td>1930</td>
<td>9,006,041</td>
<td>1,027,854 (App)</td>
<td>84,648</td>
</tr>
<tr>
<td>1931</td>
<td>4,350,542</td>
<td>655,091</td>
<td>89,128</td>
</tr>
<tr>
<td>1932</td>
<td>4,936,202</td>
<td>610,065</td>
<td>73,575</td>
</tr>
<tr>
<td>1933</td>
<td>4,421,567</td>
<td>397,489</td>
<td>68,460</td>
</tr>
<tr>
<td>1934</td>
<td>5,204,951</td>
<td>254,238</td>
<td>20,826</td>
</tr>
</tbody>
</table>

Fresh Fruit only -- imports -- chiefly from U.S.A.
exports -- chiefly to U.S.A.

Dominion Bureau of Statistics -- Annual Statistics of Fruit and Floriculture 1924-34 (19)
# APPENDIX

Table 5

**Quantity and Value of Small Fruits Canned in Canada by Provinces**

### (a) Quantity (in cases)

<table>
<thead>
<tr>
<th>Year</th>
<th>Canada</th>
<th>Quebec</th>
<th>Ontario</th>
<th>Maritimes</th>
<th>British Columbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925</td>
<td>111,213</td>
<td>26,154</td>
<td>31,472</td>
<td>10,623</td>
<td>42,964</td>
</tr>
<tr>
<td>1926</td>
<td>160,064</td>
<td>23,908</td>
<td>64,678</td>
<td>8,441</td>
<td>65,040</td>
</tr>
<tr>
<td>1927</td>
<td>147,726</td>
<td>9,886</td>
<td>45,490</td>
<td>16,571</td>
<td>67,499</td>
</tr>
<tr>
<td>1928</td>
<td>133,408</td>
<td>14,804</td>
<td>57,882</td>
<td>5,600</td>
<td>55,122</td>
</tr>
<tr>
<td>1929</td>
<td>175,301</td>
<td>15,955</td>
<td>73,385</td>
<td>12,614</td>
<td>75,647</td>
</tr>
<tr>
<td>1930</td>
<td>164,512</td>
<td>25,159</td>
<td>55,445</td>
<td>32,101</td>
<td>53,207</td>
</tr>
<tr>
<td>1931</td>
<td>144,675</td>
<td>90</td>
<td>89,030</td>
<td>1,098</td>
<td>55,616</td>
</tr>
<tr>
<td>1932</td>
<td>118,833</td>
<td>-</td>
<td>48,573</td>
<td>-</td>
<td>69,364</td>
</tr>
<tr>
<td>1933</td>
<td>93,131</td>
<td>-</td>
<td>50,615</td>
<td>-</td>
<td>61,896</td>
</tr>
<tr>
<td>1934</td>
<td>149,653</td>
<td>-</td>
<td>45,551</td>
<td>-</td>
<td>105,879*</td>
</tr>
<tr>
<td>Average</td>
<td>139,852</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Tremendous increase in loganberries since 1930.*

### (b) Value

<table>
<thead>
<tr>
<th>Year</th>
<th>Canada</th>
<th>Quebec</th>
<th>Ontario</th>
<th>Maritimes</th>
<th>British Columbia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1925</td>
<td>$478,582</td>
<td>$64,587</td>
<td>$177,046</td>
<td>$31,840</td>
<td>$205,100</td>
</tr>
<tr>
<td>1926</td>
<td>803,514</td>
<td>68,850</td>
<td>360,076</td>
<td>27,019</td>
<td>338,569</td>
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<tr>
<td>1927</td>
<td>731,441</td>
<td>34,759</td>
<td>357,495</td>
<td>86,552</td>
<td>352,655</td>
</tr>
<tr>
<td>1928</td>
<td>639,723</td>
<td>57,028</td>
<td>274,364</td>
<td>25,855</td>
<td>284,476</td>
</tr>
<tr>
<td>1929</td>
<td>871,974</td>
<td>61,123</td>
<td>376,700</td>
<td>47,370</td>
<td>387,981</td>
</tr>
<tr>
<td>1930</td>
<td>728,060</td>
<td>75,074</td>
<td>299,521</td>
<td>78,486</td>
<td>275,159</td>
</tr>
<tr>
<td>1931</td>
<td>662,214</td>
<td>340</td>
<td>414,955</td>
<td>4,826</td>
<td>238,701</td>
</tr>
<tr>
<td>1932</td>
<td>385,225</td>
<td>-</td>
<td>161,847</td>
<td>-</td>
<td>220,571</td>
</tr>
<tr>
<td>1933</td>
<td>289,220</td>
<td>-</td>
<td>95,873</td>
<td>-</td>
<td>192,685</td>
</tr>
<tr>
<td>1934</td>
<td>492,497</td>
<td>-</td>
<td>45,551</td>
<td>764</td>
<td>336,775</td>
</tr>
<tr>
<td>Average</td>
<td>$608,245</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### APPENDIX

#### Table 6

Total Production of Different Small Fruits in British Columbia from 1922-1954

(Expressed in Carlots — approximately 10 tons to the car)

<table>
<thead>
<tr>
<th>Year</th>
<th>Strawberries</th>
<th>Raspberries</th>
<th>Blackberries</th>
<th>Loganberries</th>
<th>Bush</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1922</td>
<td>263.0</td>
<td>134.5</td>
<td>27.2</td>
<td>38.2</td>
<td>30.3</td>
<td>493.3</td>
</tr>
<tr>
<td>1923</td>
<td>300.7</td>
<td>173.9</td>
<td>27.8</td>
<td>55.2</td>
<td>29.5</td>
<td>587.1</td>
</tr>
<tr>
<td>1924</td>
<td>224.5</td>
<td>214.0</td>
<td>41.9</td>
<td>86.6</td>
<td>26.2</td>
<td>593.2</td>
</tr>
<tr>
<td>1925</td>
<td>113.2</td>
<td>186.8</td>
<td>35.6</td>
<td>44.1</td>
<td>36.7</td>
<td>416.4</td>
</tr>
<tr>
<td>1926</td>
<td>196.9</td>
<td>226.5</td>
<td>47.5</td>
<td>120.2</td>
<td>35.4</td>
<td>636.5</td>
</tr>
<tr>
<td>1927</td>
<td>326.9</td>
<td>187.0</td>
<td>38.6</td>
<td>79.6</td>
<td>46.4</td>
<td>678.5</td>
</tr>
<tr>
<td>1928</td>
<td>352.0</td>
<td>170.2</td>
<td>36.4</td>
<td>69.0</td>
<td>41.7</td>
<td>669.3</td>
</tr>
<tr>
<td>1929</td>
<td>313.2</td>
<td>135.6</td>
<td>41.7</td>
<td>80.2</td>
<td>26.6</td>
<td>597.3</td>
</tr>
<tr>
<td>1930</td>
<td>246.9</td>
<td>118.2</td>
<td>39.5</td>
<td>82.8</td>
<td>45.9</td>
<td>533.3</td>
</tr>
<tr>
<td>1931</td>
<td>272.3</td>
<td>120.7</td>
<td>29.5</td>
<td>106.1</td>
<td>48.2</td>
<td>577.3</td>
</tr>
<tr>
<td>1932</td>
<td>279.5</td>
<td>122.1</td>
<td>34.6</td>
<td>113.8</td>
<td>62.4</td>
<td>612.4</td>
</tr>
<tr>
<td>1933</td>
<td>332.2</td>
<td>74.2</td>
<td>30.5</td>
<td>89.3</td>
<td>30.7</td>
<td>606.9</td>
</tr>
<tr>
<td>1934</td>
<td>441.6</td>
<td>122.0</td>
<td>37.3</td>
<td>115.8</td>
<td>90.0</td>
<td>806.7</td>
</tr>
</tbody>
</table>

Figures as published in Provincial Department of Statistics, 1924-1934, B.C.

Figures in Tables 7 and 8 giving fresh fruit statistics, and also processed figures when combined and reduced to the same units (lbs.) give the figures for the total production. Weight of fruit in the crates of the berries is reckoned at,

- Strawberries -- 16 lbs.
- Raspberries -- 16.5 "
- Blackberries -- 16 "
- Loganberries -- 16 "
- Bush Fruit -- B.C. figure not consistent.
## APPENDIX

### Table 7

Quantity of fruit produced in British Columbia which was sold on the Fresh Fruit Market (Expressed in terms of crates)*

<table>
<thead>
<tr>
<th>Year</th>
<th>Strawberries</th>
<th>Raspberries</th>
<th>Blackberries</th>
<th>Loganberries</th>
<th>Bush</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1922</td>
<td>153,878</td>
<td>77,094</td>
<td>22,554</td>
<td>10,412</td>
<td>12,080</td>
<td>275,818</td>
</tr>
<tr>
<td>1923</td>
<td>213,987</td>
<td>114,804</td>
<td>28,173</td>
<td>22,070</td>
<td>16,280</td>
<td>395,314</td>
</tr>
<tr>
<td>1924</td>
<td>159,007</td>
<td>137,990</td>
<td>29,109</td>
<td>18,058</td>
<td>11,704</td>
<td>355,868</td>
</tr>
<tr>
<td>1925</td>
<td>85,815</td>
<td>119,573</td>
<td>33,688</td>
<td>6,740</td>
<td>15,763</td>
<td>261,579</td>
</tr>
<tr>
<td>1926</td>
<td>116,802</td>
<td>120,676</td>
<td>30,715</td>
<td>13,356</td>
<td>13,768</td>
<td>355,868</td>
</tr>
<tr>
<td>1927</td>
<td>206,764</td>
<td>139,376</td>
<td>32,075</td>
<td>12,873</td>
<td>17,087</td>
<td>408,173</td>
</tr>
<tr>
<td>1928</td>
<td>194,664</td>
<td>125,691</td>
<td>26,995</td>
<td>5,116</td>
<td>11,673</td>
<td>364,159</td>
</tr>
<tr>
<td>1929</td>
<td>217,880</td>
<td>110,855</td>
<td>32,058</td>
<td>9,421</td>
<td>8,539</td>
<td>378,753</td>
</tr>
<tr>
<td>1930</td>
<td>159,637</td>
<td>93,827</td>
<td>29,957</td>
<td>9,539</td>
<td>9,040</td>
<td>302,000</td>
</tr>
<tr>
<td>1931</td>
<td>220,556</td>
<td>88,354</td>
<td>23,450</td>
<td>11,334</td>
<td>8,175</td>
<td>351,869</td>
</tr>
<tr>
<td>1932</td>
<td>172,992</td>
<td>85,274</td>
<td>24,693</td>
<td>12,361</td>
<td>9,117</td>
<td>304,437</td>
</tr>
<tr>
<td>1933</td>
<td>220,696</td>
<td>52,976</td>
<td>18,404</td>
<td>9,512</td>
<td>7,140</td>
<td>308,728</td>
</tr>
<tr>
<td>1934</td>
<td>336,440</td>
<td>74,562</td>
<td>28,165</td>
<td>8,412</td>
<td>8,090</td>
<td>485,629</td>
</tr>
</tbody>
</table>

* See Note at the bottom of Table 6.
APPENDIX

Table 8

<table>
<thead>
<tr>
<th>Year</th>
<th>Strawberries</th>
<th>Raspberries</th>
<th>Blackberries</th>
<th>Loganberries</th>
<th>Bush Fruits</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1922</td>
<td>2,798,533</td>
<td>1,534,287</td>
<td>182,643</td>
<td>600,594</td>
<td>331,814</td>
<td>5,447,871</td>
</tr>
<tr>
<td>1923</td>
<td>2,589,539</td>
<td>1,756,141</td>
<td>105,844</td>
<td>750,078</td>
<td>217,750</td>
<td>5,419,352</td>
</tr>
<tr>
<td>1924</td>
<td>1,946,534</td>
<td>2,210,926</td>
<td>371,651</td>
<td>1,422,943</td>
<td>310,093</td>
<td>6,262,127</td>
</tr>
<tr>
<td>1925</td>
<td>891,800</td>
<td>1,943,261</td>
<td>175,076</td>
<td>775,109</td>
<td>450,216</td>
<td>4,233,462</td>
</tr>
<tr>
<td>1926</td>
<td>2,070,452</td>
<td>2,921,800</td>
<td>458,834</td>
<td>2,191,376</td>
<td>472,766</td>
<td>8,115,228</td>
</tr>
<tr>
<td>1927</td>
<td>3,229,429</td>
<td>1,649,344</td>
<td>255,652</td>
<td>1,385,767</td>
<td>638,045</td>
<td>7,162,237</td>
</tr>
<tr>
<td>1928</td>
<td>3,925,446</td>
<td>1,519,099</td>
<td>297,488</td>
<td>1,297,857</td>
<td>575,421</td>
<td>7,613,211</td>
</tr>
<tr>
<td>1929</td>
<td>2,779,796</td>
<td>1,059,176</td>
<td>321,428</td>
<td>1,453,453</td>
<td>358,076</td>
<td>5,962,929</td>
</tr>
<tr>
<td>1930</td>
<td>2,382,918</td>
<td>956,281</td>
<td>311,702</td>
<td>1,504,080</td>
<td>376,997</td>
<td>5,551,978</td>
</tr>
<tr>
<td>1931</td>
<td>1,926,735</td>
<td>1,089,663</td>
<td>214,941</td>
<td>1,941,580</td>
<td>291,821</td>
<td>5,464,740</td>
</tr>
<tr>
<td>1932</td>
<td>2,477,096</td>
<td>908,844</td>
<td>247,382</td>
<td>2,054,928</td>
<td>395,142</td>
<td>6,081,392</td>
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<tr>
<td>1933</td>
<td>2,671,570</td>
<td>530,496</td>
<td>278,718</td>
<td>1,616,220</td>
<td>422,380</td>
<td>5,519,380</td>
</tr>
<tr>
<td>1934</td>
<td>3,351,614</td>
<td>1,205,289</td>
<td>282,786</td>
<td>2,181,949</td>
<td>379,500</td>
<td>7,401,118</td>
</tr>
</tbody>
</table>

* See Note at bottom of Table 6.