A BASIS FOR THE TAX ASSESSMENT OF ORCHARDS IN THE OKANAGAN VALLEY OF BRITISH COLUMBIA

by

EARL WALKER STEWART

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Abstract

The methods of valuation that are available for real property in general have not been fully adapted to the particular problem of farm land assessment for taxation purposes. The main method upon which the assessment of farms is based is an analysis of the prices received for comparable properties in the market. Although this method is widely used for property other than farm land, because of several inherent weaknesses in the method it is usually supplemented by, if not subordinate to, the income capitalization method which bases value on the income producing ability of the property. This method, however, has found limited use in farm valuations. The present study is concerned with the adaptation of the income capitalization method to farm lands as a basis for tax assessment with a detailed analysis of the specific problem of orchard assessment.

A review is made of the basic concepts of value and the underlying principles of property valuation which have been influential in the development of the present valuation methods. The application of these methods as they are found in various countries is also reviewed.

The analysis involves the construction of yield, price and cost schedules for two main apple varieties, Red Delicious and McIntosh. From these schedules the annual net incomes of a tree are calculated; these in turn are capitalized to obtain the present value of a tree at different ages in its life cycle.

The present level of prices for McIntosh apples is found to be too low to realize a positive net income from these trees.

Under these circumstances the only value of such an orchard lies in its basic site value for alternative uses. For the Red Delicious variety positive net incomes are obtained after the trees reach fourteen years of age. The annual net incomes are discounted back from forty years of age to the various age groups within which the trees are commonly placed. This procedure provides a level of values based upon the earning power of the trees.

In order to apply these values it is necessary to adjust them for variations in the physical characteristics of the orchards such as soil types, topography, erosion and frost.

The use of this method of valuation as a basis for tax assessment would provide a more sensitive reflection of the real differences in value between varieties and kinds of fruit as well as those attributable to the variations in the physical characteristics of the orchard. This would result in a more equitable distribution of the property tax.

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Department of Agricultural Economics

The University of British Columbia,
Vancouver 8, Canada.

Date April 15, 1959

Preface

The methods that are used in assessing property for taxation purposes have certain advantages and disadvantages which make them suitable to a greater or lesser degree depending upon the severity of the limitations under particular circumstances. In view of this situation it seems desirable to employ the method which has the least number of limitations as a basis for assessment and to employ other methods as checks on the first. In most cases, however, only one method is used to indicate the level of values. When this is done, the limitations of this method undoubtedly play an important part in the final determination of value although the effects of such limitations may not be evident because of the absence of checks.

The present study explores the possibilities of adapting another method of valuation, the income capitalization method, to the assessment of orchard lands for taxation purposes. The reason for the adaptation of this method is to supplement or replace as the main basis, the sales analysis method which is presently in use. It is felt that the income capitalization method would establish more equitable assessments because of its greater sensitivity to value determinants than that which can be obtained by the sales method because of the lack of a sufficient number of representative sales of orchard properties.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I
THE BASIC CONCEPTS OF VALUE

The word value is commonly used as a synonym for price but even in an economic context it is sometimes used to mean something quite different. The "value" of a commodity relates to its power to command other commodities in exchange and may be expressed in terms of its power to exchange for goods or money. The "price" of a commodity refers to its power to command money, specifically, in exchange. It can be said then that the term "market price" is a name for market value expressed in terms of money.

In reference to the value of a commodity, Adam Smith said that value depended upon the amount of the commodity produced. Since producers tended to employ their resources in the production of the more valuable product Smith emphasized cost of production as a basis of value and maintained that the "natural" price of a commodity was determined when it covered the "natural" costs of wages, rent and profits.[1] It is stated by Ricardo that a commodity must be useful to have exchange value, but its value will not be in proportion to its usefulness but rather to its scarcity or to the quantity of labor required to obtain it. In the case of rare paintings, for example, he believed that scarcity determined value; in the case of reproducible commodities, value depended upon the "comparative quantity of labour expended on each".[2]

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[1] Adam Smith, The Wealth of Nations (1776), London, Methuen, 1904, Book 1, Chapter 5.

[2] David Ricardo, Principles of Political Economy and Taxation (1815), London, MacMillan, Chapter 2.

Jevons, of the "marginal utility" school, emphasized the principle that cost of production affected value only as it affected supply. He said that cost was derived from price and was not the cause of price, that the effective use value of any commodity decreased as the supply expanded, and that it was the use value of the last or marginal unit which determined the value of the entire supply. The "marginal utility" of a commodity, then, was the usefulness of the last unit added to the supply which presumably would be put to the least important use of all the units available. Since all the units were interchangeable, however, competition would reduce the value of all of them to the value of the last or marginal unit.[3]

From the standpoint of value theory, Marshall merged the cost of production and marginal utility concepts. Not utility alone, nor cost of production alone, but both of these factors were necessary to explain value according to Marshall. "We might as reasonably dispute whether it is the upper or the under blade of a pair of scissors that cuts a piece of paper as whether value is governed by utility or cost of production."[4] A further refinement was provided by dividing the problem of value and price determination into different periods of time; the short-run, the long-run, and the very long-run periods during which secular trends were involved. He placed the greatest emphasis on the "long-run normal" situation.

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[3] W.S. Jevons, The Theory of Political Economy, 2nd ed., London, MacMillan, 1879, p. 201 ff.

[4] Alfred Marshall, Principles of Economics, 8th ed., London, Macmillan, 1925, p. 348.

Marshall tried to find the point of equilibrium or tendency toward equilibrium of the prices (and values) of specific commodities. By considering one commodity only in a static situation, he said that the value of that commodity could be defined as the point of balance between the supply and demand forces.[5]

Most of the references to value, by the classical economists at least, centre around the term "exchange value" rather than "market value". John Stuart Mill declared this tendency, "The word value, when used without adjunct, always means, in political economy, value in exchange."[6] This may be because the adjunct "exchange" expresses more clearly the concept of value than the adjunct "market" which itself is often not clearly defined.

The acceptance of exchange value as the basic concept by the earlier economists has been expressed somewhat differently by various authorities. This is illustrated by the following quotations.

> The value, that is exchange value, of one thing in terms of another at any place and time, is the amount of that second thing which can be got there and then in exchange for the first. Thus the term value is relative, and expresses the relation between two things at a particular place and time.
>
> Instead of expressing the values of lead and tin, and wood, and corn and other things in terms of one another, we express them in terms of money in the first instance and call the value of each thing thus expressed its price . . . .[7]

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[5] Ibid., Bk V, chap. III, IV, XV.

[6] John Stuart Mill, Principles of Political Economy, ed. Asley, New York, Longmans, Greene and Co., 1926, Bk. III, Chapter 1, Section 2.

[7] Alfred Marshall, Principles of Economics, 8th ed., London, Macmillan, 1927, p. 61.

> The value of a commodity means in economics its power of commanding other commodities in exchange. It means the rate at which the commodity exchanges for others. . . .By the price of a commodity is signified the amount of money which it will command; in other words its value in terms of the accepted medium of exchange.[8]

> Value is the power which an article confers upon its possessor irrespective of legal authority or personal sentiments, of commanding, in exchange for itself, the labor, or the products of labor, of others.[9]

These definitions are not widely divergent in their intended meanings but the exact implications of each are subject to interpretation. In a discussion of value definitions Bonbright states that Marshall's definition is the least satisfactory in that it seems "to imply that the value of a commodity is the physical thing for which it can be exchanged. This violates the accepted notion of the nature of value, which regards value as an attribute or quality of an object rather than as an object itself."[10] He says that Taussig's definition, although preferable in this respect, implies that the commodity possesses the power to exchange itself. Walker's definition avoids this implication by stating that such exchange power lies with the possessor of the commodity. Bonbright points out that in defining exchange value in terms of the price for which a specific commodity can be sold, Walker's definition is the most satisfactory.

Another explanation of exchange value is the current price

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[8] Frank W. Taussig, Principles of Economics, 3rd ed., New York, Harper, 1922, vol. 1, pp. 111-113.

[9] Francis A. Walker, Political Economy, New York, Crofts, 1886, p. 5.

[10] James C. Bonbright, The Valuation of Property, New York, McGraw-Hill, 1937, vol. 1, p. 45ff.

per unit, multiplied by the number of units included in the commodity to be valued. Fisher defines price as the quotient of two quantities exchanged for each other and further states:

> Having obtained the price of any kind of wealth, we may compute the value of any given quantity of that wealth without supposing that particular quantity to be exchanged. The value of a given quantity of wealth is found by multiplying the quantity by the price. In other words, the value of a certain amount of one kind of wealth is the quantity of some other kind for which it would be exchanged, if the whole amount were exchanged at the price set upon it.[11]

This definition of value is the one accepted by statisticians who attempt to find the value of the nation's wealth, or the value of the wheat supply. However, to use the value of any given commodity off the market as determined by the current sale prices of similar commodities on the market to represent the true value of the commodity would be misleading; it is rather an imputed value.

In economics, objects have value in accordance with their capacity to perform services. In relation to property, then, it may be assumed to have value in accordance to its capacity to perform services for the people who use it through ownership. An object of wealth such as property has the capability of giving different advantages to different owners. If this is accepted then it is not accurate to speak of the value of property in general but rather of its value to a specific person or group of persons.

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[11] Irving Fisher, The Nature of Capital and Income, New York, MacMillan, 1912, p. 13.

Property Value

The classical economists are primarily responsible for the identification of value with market price. This may reflect the associations they had and the conditions under which they were acquainted with value, such as the stock exchange in Ricardo's case. It is necessary to recognize, however, that two rather distinct concepts of property value have arisen, one referring to the sale or market value and the other referring to the value to a specific person or group of persons.

If the value of property is to be interpreted to mean the price at which the property in question can be sold on the market there are many questions which must be asked in relation to the market conditions.[12]

One of the first important considerations is the time involved in the negotiation of the sale. The market conditions under which the concept of market value was established was probably one in which trade took place rapidly such as with grains and stocks with no significant loss of time between the offer for sale and the completion of the transaction. Such conditions are not typical of property transactions. Under usual conditions a property will bring the owner a higher price on the market when he experiences a time lapse between the offer for sale and its completion than if he is required by circumstances to sell the property immediately. Value has been defined earlier as the power to command a price, not as a power to command a price only after an interval of time has passed since the owner's decision

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[12] James C. Bonbright, The Valuation of Property (N.Y. 1937) vol. 1, p. 49ff.

to sell and the conclusion of the sale. By this definition both the conditions of property sale reflect market value.

Another consideration is the exact time of delivery and payment of the property. A property sold on credit with a mortgage to the vendor may realize a much higher price than the same property sold for cash within a few days. Both of these sales prices may be used as market values under the definition which identifies value with power in exchange.

Other considerations in relation to market conditions are whether the price in the market is that at which the owner of the property would replace it or the price at which he would sell it. Also, the pressures the buyer and seller may bring upon each other in their bargaining process are important. The market value of property may or may not include selling commissions and other expenses.

In view of the various qualifications that must be placed on any formal definition of market value, the one used in clarifying property market value must be reasonably flexible. As a result the conditions of the sale are left to be selected in accordance with the purpose for which the valuation is to be made.

The basis of market value lies in its reference to exchangeability. It is assumed that there is an ownership transfer and value is related to the price at which the real or assumed transfer takes place. This feature of market value considerably restricts its useage in the valuation of property. Many types of marketable properties would have a very small market value because of the special adaptability and desirability to the present owners. This is not to say, however, that the value of property to a

particular owner is necessarily a fair basis for its valuation. In certain cases, such as for taxation, the market value may be the fairer basis because it can be argued that the value for tax purposes should not exceed the price that the owner could realize for his property.

Once the intended usage of value has been established the problem of how to estimate it arises. Marshall's writings illustrated the three basic methods of estimating value which are in use today: replacement cost, market comparison and capitalization of income.[13] He states ". . . the aggregate "site value" of any piece of building land is that which it would have if cleared of buildings and sold in a free market. The "annual site value". . . is the income which that price would yield at a current rate of interest". He also says". . . the capitalized value of any plot of land is the actuarial "discounted" value of all net incomes which it is likely to afford. . ."[14] Marshall also recognized the problem of overimprovement and underimprovement of land and the difficulty of segregating joint returns to land and buildings.

Fisher expanded on the views of Marshall that the value of durable goods is represented by the present worth of future returns.[15] He also discussed the discounting process and its place in the income theory of value.[16] This has since become one of the main techniques in modern appraisal.

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13 Marshall, op.cit., Book V, Chapters V, XI, XV, Appendix H.

14 Marshall, Principles of Economics, Chapter XI.

15 Fisher, op.cit., p. 188ff.

16 Ibid., Chapter XIII.

Another significant contribution of economic theory from the "neo-classical" economists has been the principle of substitution. As applied to property it states that "when property is replaceable, consumers will offer no more on the market than the cost of replacing the property itself, or a comparable substitute. If replacement costs are below market prices, producers will be induced by prospective profits to construct buildings for sale. These tendencies will bring market prices in line with new construction costs."[17] This principle has formed the basis for the valuation of improvements under present appraising methods.

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[17] Paul E. Wendt, Real Estate Appraisal, New York, Henry Holt and Company, 1956, p. 50.

CHAPTER II

THE GENERAL THEORY OF ASSESSMENT AND VALUATION

Weimer states that at the present time there are two important approaches to the study of economic problems: (1) the institutional - historical, and (2) the theoretical or policy forming.[1] The first approach aids in understanding how the present economic system evolved with particular emphasis being placed on those gradual historical changes which have brought economic institutions to their present stage of development. The second or theoretical approach is concerned with a study of the economic system for the purpose of determining the principles which explain its operation.

In order to understand value it is necessary to follow both approaches. We need to understand the institutional framework within which the value of a commodity or a property is to be determined.

Of even greater importance, however, is an understanding of the economic forces which determine value or changes in value at a given time. If value is considered as a ratio of exchange between goods and services, price and value may be considered as synonymous, except in cases where circumstances cause goods to be sold for greater or lesser amounts than would be established under conditions which approximated a perfectly competitive situation. In order to understand the forces which affect value and price it is necessary to divide the value problem into several areas.

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[1] Arthur M. Weimer, "History of Value Theory for the Appraiser", Appraisal Journal, Amer. Inst. of R/S Appraisers, Jan. 1953, vol. XXI, No. 1, p. 19.

In the first area, goods can be classed according to whether they are used up rapidly or slowly. In the second area, the forces which affect value are of varying importance depending on the period of time which is under consideration. Third, value must be considered with respect to the objective of the community or the social system.

There is no wide variation between market prices and values in the case of goods which are consumed fairly rapidly. For goods of greater durability the value problem is much more complicated since it is necessary to reflect future probable returns in present value or price through the process of capitalization. That is to say, it is necessary to determine the amount which will be derived from the property under consideration throughout the period of its productive life.

When considering the problem of value with respect to different periods of time, it is also necessary to note that various forces must be given greater or lesser weight.

In a relatively short period, such as a year or less, demand forces are of much greater importance than the forces of supply since for most goods like property it is impossible to alter materially the quantity available during such a short time. Thus an analysis of demand factors is of prime importance in pointing to the direction of changes in prices, rents and values in the short run.

However, when longer-run periods of time are considered, supply factors such as cost of production have relatively greater weight. Over a period of several years, supply factors can adjust to market changes. Given a sufficiently long period of time,

price will tend to equal the cost of producing a commodity. It must be noted, however, that costs affect price and value only to the extent that they affect relative supply.

For very long periods of time, a decade or more, it is necessary to give weight to institutional and other factors. These include the legal framework of our economic system, changes in knowledge and technology, changes in the tastes and wants of people, the development of new products, changes in the number and composition of the population and changes in the property concept.

In addition to considering the value problem according to the type of commodity and the period of time involved, the standards and objectives of the economic community must be kept in mind. The concepts of value are of necessity related to the objectives which a community sets for itself and at certain stages, some things assume greater value than at other stages.

Appraisal Theory

The development of the present appraisal theory used in North America has been led by Hurd, Mertzke and Babcock. Hurd was mainly concerned with establishing market sales as the central concept and the main evidence of value. He accepted, in theory, the capitalization of income method of obtaining value but realized there were some practical difficulties in calculating values by this method. He extablished the procedure used today for calculating the residual return to land and capitalizing these returns to obtain land value.[2]

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[2] Richard M. Hurd, Principles of City Land Values, 3rd ed., New York, Record and Guide, 1911, p. 122ff.

Mertzke, by making use of Fisher's theories, adapted the idea of "normal value", that is, value derived by long-run tendencies. He felt that the three basic approaches to value were equivalent and adapted this idea to appraisal theory.[3]

Babcock developed the idea that value represents the present worth of future returns from property. He rejected market prices as evidence of value and advocated the capitalization of income method as the sole reliable method of obtaining value.[4]

As a result of the work of Mertzke, Schmutz, May et al, the three approaches to value, replacement cost, market prices and capitalized income, have been considered equivalent at least in theory.

The use of the three approaches has led to the use of correlation techniques because of the dissatisfaction with averages. This allows the selection of one of the three approaches as the most significant for a particular appraisal problem. This has not always led to a desirable end. Wendt points out that because it is felt that the three approaches should yield very similar value estimates there is a tendency to use correlation on adjusted data in order to obtain closer agreement with a preferred method or value estimate. This "compression of differences" forces the equivalence of the three approaches and may frequently give a misleading appearance of accuracy to an appraisal estimate.[5]

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[3] Arthur J. Mertzke, Real Estate Appraising, Chicago, National Association of Real Estate Boards, 1927.

[4] Frederick M. Babcock, The Valuation of Real Estate, New York, McGraw-Hill, 1932.

[5] Wendt, op.cit., p. 71.

Purpose and Function of Appraisal

The main purpose of an appraisal is to estimate the value of goods. The classical purpose is stated by Marenghi that "appraisal has for its fundamental object the study of the processes of valuation of those economic goods for which the market does not express a price in explicit form."[6] Medici feels that this definition includes only those goods that do not enter into market transactions or only to a limited extent.[7] He says that this is unrealistic because the appraiser may be asked to determine the money value of goods such as grain, which, although they have a regular market quotation, will not be available until a future date. He states that the main object of an appraisal is to provide a method which the appraiser can use in order to express judgement on the value of any goods.

An appraisal of a property is made for several reasons, the nature of which determines the approach or procedure that will be involved and as a result several types of appraisal have been developed. The principal types are loan, purchase and sale, condemnation and tax assessment. These types of appraisal are basically similar and the differences that do exist are mainly due to the emphasis placed on a particular factor in accordance with the desired end.

The main feature of a loan appraisal is the emphasis on the long-range future prospects. The money lender is much concerned,

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[6] E. Marenghi, Lezioni di Estimo, Milano, Libreria Editrice Politecnica, 1925, p. 21.

[7] Giuseppe Medici, Principles of Appraisal, Ames, Iowa State College Press, 1953, p. 14ff.

before making a loan committal, with the probability of complete repayment. If the lender knows little or nothing about the managerial ability of the borrower, it is necessary for him to guard against this imperfect knowledge by careful consideration of the productivity of the farm, the general outlook of prices for the products produced, and the potential sale value of the farm.

The appraiser's problem of estimating future farm productivity would be considerably simplified if the same farmer was to continue to operate the farm throughout the period of the loan. Since it is possible, especially during long-term loans, that a new owner or manager may take over the operation of the farm, the appraiser must rely on the productivity of the typical operator in any given area. This may provide an overvaluation or undervaluation of any particular farm.

Lending agencies are particularly concerned about the risk from price declines. When farm prices decline they tend to do so more as the distance from the consuming center increases because of the fixed nature of freight and other handling charges. The depression period provided lenders with an extremely clear record of the results of price declines. The number of foreclosures that occurred at that time may be attributed in part to faulty appraisals. This, coupled with adverse natural and economic conditions, placed both the borrower and lender in much difficulty. As a result of this experience more caution has been taken in loan appraisals.

The most prevalent mistake made in loan appraisals has been the overvaluation of poor lands. When periods of low prices occur the owners of these lands are unable to meet the payments to which they have committed themselves. Upon closer observation it is often found that loans should not have been made on these properties or at least to a much lesser extent.

Purchase and sale appraisals are made as an aid to prospective buyers or sellers of farm land. The choice of value indicators and different points of emphasis will usually result in different appraised values depending upon whether the farm is being appraised for purchase or for sale.

An appraisal made for a prospective buyer will emphasize farm productivity because it is in this that the buyer is primarily interested. This entails a study of the crop and livestock income possibilities of the farm as well as a detailed inventory of the land and buildings. The proximity to markets, schools and other non-income features will be of importance.

An appraisal for sale purposes, on the other hand, will emphasize the most favourable of the income and non-income features of the farm and may tend to overlook undesirable characteristics.

Another type of appraisal which is more specialized and restricted in use than the others is that of condemnation. It is used for the valuation of farm lands to be purchased for governmental projects such as roads, airports or military purposes. A condemnation appraisal usually uses market value as its base but in order to do justice to the seller who is often forced to

relinquish the property, a value somewhat above the existing market value may be used.

In the appraisal for tax assessments the assessor is mainly concerned with the achievement of uniformity in property values. This is a necessity if the distribution of the tax load is to be equal among all property owners. The assessor, unlike the valuers for other purposes, is faced with the task of mass appraisals and legal deadlines. These place continual pressure on the assessor and he may not have the time to study economic trends as they may affect his area. It is this method of appraising that is the main concern of this thesis.

CHAPTER III

METHODS OF ASSESSMENT IN OTHER COUNTRIES

The land tax, as it was determined in the western countries before the industrial revolution and as it is still in force in a great part of the primary producing areas of the world, is a general tax on land with the base being both its capital value and its income.

As they system of taxation evolves, the taxation of the capital value of the land is differentiated from the taxation of land income. The former is subject to property taxation and the latter to income taxation.

In theory, the objective of land taxation has been to tax the actual income from the land; in practice, it has been extremely difficult to realize this goal. The difficulties of cost accounting for agricultural enterprises as compared with industrial enterprises are many. Cost, profit or loss estimations are difficult to arrive at with the same precision as for an industrial enterprise. Not withstanding the development of commercial farming it is often carried on as a way of life rather than as a business enterprise. In most parts of the world the farmer's family and the farm are so closely integrated that it is almost impossible to distinguish the household income and expenses of the farmer from those of the farm. Also, where household consumption is high one cannot use the volume of produce available at the marketing stage as a reliable measure of farm output. As a result land income has been assessed presumptively in most countries.

In India and Pakistan, the assessment of land is based upon the value of the produce of the land. This may be either the gross or net produce depending upon the systems used in respective states or provinces. If gross produce is used, an adjustment in the form of percentages of gross output is made in order to arrive at net output. The cost of transporting and handling of the crop is deducted from prevailing prices when the crop value is calculated. The remainder is the taxable net produce.

In some other countries rent is used as the basis of assessment. This method is widely used in the Latin American and Middle Eastern countries. The net rental income accruing to landowners is subject to tax and in the case of owner-cultivators the rent is imputed presumptively through comparison with similar properties. In practice the rent which is taken as the tax base may be either the net annual value of the land after the deduction of the producer's fair share or the actual rent received by the landowner.[1]

The assessment of land in Communist China is made on a progressive scale based on "normal annual yield". This is worked out according to the natural conditions of cultivation such as the quality of the soil, weather, irrigation, manpower, animal power, number of harvests and others, for a normal season for the land in question.[2]

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[1] Papers and proceedings of the Conference on Agricultural Taxation and Economic Development, edited by H.P. Wald, Cambridge, Mass., 1954.

[2] Chao Kuo-Chiin, "Current Agrarian Reform Policies in Communist China", The Annals of the American Academy of Political and Social Sciences, Philadelphia, 1951, p. 114.

The tax rates range from three percent when annual total income per capita of a peasant household is 150 catties(approximately 150 pounds) of grain to 42 percent when the annual total income per capita reaches 3411 pounds of grain or more. The minimum tax base of 150 pounds may be lowered to 120 pounds if in any one year less than ninety percent of the farming populace pay tax. Taxes must not exceed eighty percent of income.

Another feature of the system is that if income in excess of the normal annual yield is obtained through more intensive cultivation or improvements in management no extra tax is levied. If the harves falls short of the normal annual yield due to the tiller's negligence no tax deduction is made; but if yield is decreased by natural phenomena partial or total tax exemption may be granted. Tax exemption is made for three to five years on newly claimed land.

Three alternative methods of calculating taxable income are used. For income from rented land, a hundred pounds of grain are calculated as eighty; from rented-out land, one hundred pounds are calculated as one hundred and twenty and for selfcultivated land one hundred pounds are calculated as one hundred. The tax burdens on the various rural classes are approximately as follows: on landlords fifty percent, rich peasants twenty to twenty-five percent, middle-class fifteen percent and the poor eight percent. Agricultural tax in the form of public grain formed 37.2 percent of the total state revenue of Communist China in 1950.[3]

In Italy the most important method of property valuation is

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[3] Ibid., p. 116.

that of income capitalization. It is stated by Medici that "tradition and theory had long agreed that a rational appraisal judgement could be only expressed through the capitalization of income. Moreover they had agreed in distinguishing a synthetic appraisal method, based upon the synthetic appraisal of the probable market value of the goods to be appraised, from an analytical method, more correctly known as the capitalization of income. . . ."[4] He recognizes the use of market prices as value indicators but states that such prices to be valid require districts within which the farms are uniform in physical characteristics. This condition is rarely found in hilly and mountainous areas which predominate in Italy[5]

Areboe's method of appraisal has been widely used in Germany for many years.[6] His method presupposes the availability of large quantities of data consisting, in part, of the all possible market prices. Uniform districts, each representing one type of farming are used as models to establish basic values.

The farms within a given district for which sale prices are available are analyzed first apart from the buildings, equipment and stock. To do this the value of such improvements are deducted from the market value of the farm. The bare farm is then divided into lots according to the kind of crops produced, and a

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4 S. Medici, Principles of Appraisal, Ames, Iowa State College Press, 1953, p. 69.

5 Ibid., p. 167.

6 Ibid., p. 164.

value is assigned to each. This value is calculated from the sale prices of farms having only one kind of crop in production.

The farms in a given district are classified according to soil characteristics, size of farms and economic conditions such as markest. It is from this classification that average prices are obtained for each class. A farm to be valued will have a class assigned to each crop section into which it has been divided, and since each class has a predetermined value the total value of the farm is calculated. To this value is added the value of buildings, equipment and stock. Any necessary additions or deductions for individual characteristics of the farm are made to the final value.

The American system of property valuation uses three distinct approaches in calculating value and then by correlating the three resultant values a single final value is obtained. The approaches utilize data obtained on sales, income and costs of given properties. This system has been adopted in Canada and for most property valuations at least one of these approaches is used and where adequate data are available all three are used. The details of the system will be expanded in a later section.

This system of the three approaches to value has had little acceptance in European theory or practice. British appraisers rely heavily on the income capitalization method although the other approaches have been used to a lesser extent.

CHAPTER IV

METHODS OF VALUATION IN CANADA

The valuation methods presently in use in Canada were developed at the same time as those in the United States. As a result the principles behind the methods and their applications are similar in both countries. The process that has been established in the use of these methods is carried out in a systematic order. It commences with an identification of the problem. This includes a description of the property and the purpose of the appraisal. The next step is a preliminary survey to determine the relative importance of each of the valuation approaches and the availability of data for each. The data to be collected for the final analysis will be governed by the results of the preliminary survey.

When the data have been collected the next step is the analysis. This can generally be done by three methods: the sales method, the cost method and the income method. In farm valuation, the sales and income methods are used because land does not lend itself to a cost valuation. The place of the cost approach is in farm building appraisal. One of the methods that can be used in the analysis, then, is the sales method, sometimes called the comparative or market data methods. It is based on the proper selection of a representative sample of property sale values which, when they are analyzed, will reflect the existing market value of similar properties that are not in the market.

The merit of the sales method depends upon its compliance

with four main assumptions.[1] The first is that a market exists for property at all times. The second is that persons entering the market do so voluntarily. The third is that all persons in the market are fully informed as to the prevailing market conditions. The fourth assumption is that market bids are based on estimates of the future use of the property. It is very rare in practice, however, that these conditions will be found together in the same real estate market.

In areas where the land use and soil types are relatively uniform, the sales method provides an inexpensive and effective means of establishing land values. The method is easily understood and accepted by the public and the courts and it is one for which the basic data are easily collected if they are available.

The sales method is accurate in reflecting market value, however, only to the extent that the above assumptions are fulfilled. The most important of these is that the market is relatively active. This is necessary in order to provide the method with sufficiently comprehensive statistical data to make the distinctions in value that are required in farm valuation between the various soil types as well as between the land use characteristics. In order to have such distinctions reflected by an analysis of sales, there must be enough sales available having these various conditions of soil and land use in order to show the relative importance of each in the property market.

The proper interpretation and selection of representative

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[1] G.C. Elliot, "Theoretical Considerations on Rural Appraisal", Journal of the Appraisal Institute of Canada, December 1948, p. 106.

market sales is important. Individual land sales differ widely in the nature of the properties, in the circumstances and terms of the sale and in the nature of the buyers and sellers themselves. Few sales are entirely free from specific circumstances that may be unknown to the assessor. The variations in physical and economic factors among properties are complex and there is danger of error in trying to relate a limited sale sample to a wide area of dissimilarly productive acreages.

The second method of analysis involves the use of the net income of the farm. It is based on the theory that the net income when capitalized at an acceptable rate of interest results in an amount of capitalized earnings representative of the level of value which can be supported by the income from that farm.

Theoretically, the value of a property results from the capitalization of its entire money stream both tangible and intangible. It is only the stream of tangible and measurable income, however, which lends itself to the capitalization process. The intangible satisfactions of a location, home site and others are included here and escape capitalization. It has been suggested, in view of this, that this method arrives at only part of the value namely that which is measured in money terms. It has been contended, however, that over a period of time a given level of values can be supported only by the money earning power of the property. The long time average level of values must, therefore, closely approximate the amount of the capitalized long-run money earning power.

There are two procedures in use for determining the probable

net earnings. One procedure measures the total net income of the property by estimating the gross income and subtracting all the cash and non-cash expenses. The other procedure considers net income from the standpoint of a landlord's share. The landlord is assumed to have a certain capital investment in the farm that he leases and his share of the returns, then, represents the return on his investment. From this share of returns is subtracted the landlord's expenses such as taxes, insurance, depreciation, repairs, et cetera, and the resultant figure is the estimated net income to the landlord. This is comparable to the net income figure obtained by the first procedure.

The two procedures have advantages and disadvantages. The first which seeks to capitalize the entire net income has the disadvantage of requiring a much greater number of estimates. All the specific items of income and expense for the property must be estimated as accurately as possible. One way to avoid misleading calculations is to have access to data on farm income and expenses for a large sample of farms in the area under consideration. Another way is to obtain reliable estimates of normally expected expenses for typical farm operations within the area. In spite of the disadvantage mentioned this procedure does arrive at an estimated figure for the total income and the level of value from its capitalization is based on all income rather than only a selected part of that income.

The procedure utilizing the landlord's share of the income has the advantage of having a market rate which represents net income. It is easier to estimate the landlord's net income, but

there is doubt as to whether the capitalization of this figure results in a correct level of value.

The assumption in the use of the landlord's share as the net income of land is that the rate of return to the landlord from his investment in land and buildings is equal to the rate of return to the whole investment in farming. The competitive bidding of tenants for farms is presumed to result in a landlord's share return comparable to the rate of return which all farmers get. Also, it is presumed that, since the landlord can either rent the farm or farm it himself, farmers would not rent farms when the rate of return from farming is greater than the rate of return from renting. Conversely, it is assumed that farmers would cease farming and rent their farms when the return from renting becomes greater.

These assumptions do not accurately reflect the landlord-tenant situation in practice. In Western Canada, at least, most renting is done on a crop share basis. The share rental assumes that it is possible to obtain the fair share of the crop to the landlord and tenant by taking the usual share of the district. The share of the crop going to the landlord should vary closely with the productivity of the land but, in practice, such share is determined largely by custom. It is doubtful if adequate recognition of the differences in grades of land is accounted for in the usual crop share leases. The predominance of one-third share in some areas continuing year after year would appear to suggest that there is no close relationship between the landlord's rate of return and the return to the whole farming

investment.

The capitalization of the total net earnings despite its disadvantages of requiring a larger number of estimates and more difficult procedure would seem to give a closer approximation. It is more representative of farming as a whole especially in areas where tenancy is of minor importance; it is based upon an estimate of the entire income and it is more sensitive to local conditions of soil, climate, et cetera, all of which have a direct bearing on farming returns.

CHAPTER V

A BASIS FOR ASSESSMENT OF ORCHARD LAND

Property assessment is a major problem in every country which uses land as a basis for taxation. The objective of assessment is to provide an equitable base to which tax rate levies may be applied. Assessment is a special form of value appraising which is an attempt to approximate market value at a given time or over a period of time. Assessment for taxation purposes however, is less concerned with absolute value than with a relative scale of property values which will best serve as a base for taxation.

A method of assessment often used is the market value or sales method. The reason that this method has been widely used is probably because the assessors in the various districts do not have the time necessary to study and prepare schedules of values based on the productivity of the land. Also, the basic data for the required analysis are not usually readily available. It is often necessary for someone other than the local assessor to collect and analyze the necessary data and provide it to him in a usable form whenever changes in assessment are necessary. As a result, the method used will usually be the one for which the basic data are most easily obtained.

In the Okanagan valley of British Columbia the sales method has dominated the assessment of orchard lands. The method has not been used, however, without its inherent weaknesses being evident. The growth and development of an orchard is a long-term undertaking as it takes at least fifteen years from the time of planting to bring the trees well into production and another

fifteen to twenty years will elapse before the productive life is ended. In view of this characteristic of orchard production, sales information tends to be somewhat unreliable because buyers and sellers lack the necessary information about the market. Furthermore, the sales tend to be clustered among the farms of small acreages. While the values derived from an analysis of these sales would probably approximate the market value with respect to the small farms, it could be quite misleading to apply such values to larger farms, since there is considerable evidence that many of the small farms are being purchased for purposes other than to provide a source of income

The sales method, although it has been the main one used in orchard assessment, has not been used in past assessments in the sense that the method implies. The average sale value for an acre of orchard was determined by an analysis of the available sales in a given district. This value was the arbitrarily divided into the parts which were thought to make up this value. One-third of this value was thought to be contributed by trees and the other two-thirds by the other factors such as soil and topography. The one-third portion of the sale value figure contributed by trees was deducted from the total figure to arrive at the indicated sale value for bare land only. This, then, removed the influence of trees from the orchard valuation. The reason for doing this was that the Taxation Act states that trees are not taxable and therefore it was felt that they should not enter into the valuation. Yet, it is conceded by the above calculations that they do have an influence on value.

The point in question is not whether the trees can be taxed

but whether they can be assessed along with the land on which they are standing. The assessor does not determine what shall be taxed nor the rate of taxation, his sole function is to establish a value to be used as a basis for taxation. The position of fruit trees is similar to that of farm buildings which are assessed but not taxed under the Taxation Act.

The orchards in the Okanagan are not homogeneous within themselves with respect to age, variety and kind of fruit produced. Each orchard usually has several kinds of fruit (e. g. apples, pears, cherries etc.) as well as different varieties of each kind of fruit. Also, there is usually a wide range of tree ages within the orchard. Since this heterogeneity exists, the value of an orchard cannot be accurately determined by the quality of the land alone but must also include the composition of the orchard in respect to the age, variety and kind of trees grown.

The assessment of land and trees together on orchard properties should lead to a more accurate reflection of value. One might strongly question the use of an arbitrary percentage to represent the contribution of trees to total land value. This contribution would be most difficult to estimate accurately, but even more important, the contribution would not be uniform on each acre of any given farm let alone for a complete district due to the heterogeneity of an orchard acre. To try to draw a distinction between land and trees in the composition of orchard value would assume a degree of precision not found in assessment procedures.

The inclusion of trees in the orchard land values would immediately raise the property assessments. This should not cause concern, however, because as long as the assessments are uniform the tax burden will be no greater than before. The mill rate of taxation will be correspondingly lower under these circumstances.

An assessment method for orchards including both land and trees would provide more equitable valuations than those obtained by the sales method. The small number of orchard sales available is not sufficient to reflect the price differences paid for orchards that have bearing or non-bearing trees. Obvious value differences do exist because of the difference in earning power of each. Also, there are differences in earning power between different kinds of fruit trees and different varieties as well as between different ages of trees. If the available sales were sufficient in number they would undoubtedly show sensitivity to these factors. Since this is not the case, however, it is proposed that a method of orchard assessment be established which is related to the earning power of the orchard.

Since it appears that the problems facing assessors arise from the procedures used in the determination of the assessed value of land, any improvement must be directed at those procedures. This is the main consideration here. The role of farm buildings is omitted and attention is paid solely to the determination of the value of orchards alone.

An effective improvement in the method of assessment must possess certain characteristics:

1. In accordance with the Taxation Act all taxable property in British Columbia must be valued and assessed at its actual value.[1] This means that where two parcels of land differ in quality there must be a corresponding difference in the assessed or actual value.

It is undoubtedly the sincere desire of the assessment officials to fulfillthis characteristic but even though an assessor might succeed in establishing the proper relationship between the individual farms within his district, he has difficulty in assigning values to the properties that will be in line with the values assigned in other districts. The designers of the property tax system apparently were aware of these difficulties and established tax equalization boards whose duties were, among other things, to review assessed values within and between districts in the Province. The results that such a board can obtain are necessarily limited, however, in that it cannot determine the difference in value of two neighboring farms without taking over the duties of the local assessor.

Any improved method must possess an administratively feasible means of making adjustments in assessed values to account for material changes in economic conditions. The time and expense involved in determining the appropriate actual value for all properties within a district will not permit complete revision of assessments very frequently. It must be possible, therefore, to use the values determined under an assessment method

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[1] Revised Statutes of British Columbia, 1950, Chapter 72, Section 4.

long enough to justify the necessary revision expenditures without a decline in the validity of the assessments. Since the actual values, if they have been properly determined, may also be considered to be the proper relative values, it appears that a general change in economic conditions or an equalization adjustment may be accounted for by making a necessary percentage adjustment.

2. An improvement in one phase of property tax administration must not be made at the expense of another. The cost of making an improvement in the method of determining the assessed value must not be so great that it offsets any advantage derived from the improvement. Any plan proposed should be of such a nature that it is administratively feasible.

3. Any improved method of assessment should not be so complicated that it cannot be readily understood by the landowner. It is quite likely that the adoption of a new method of real estate assessment would lead to the taxes on some land being lowered, on some they will remain the same, and on the rest the taxes will be increased. This would be essentially the reason for the change in method. The farmers in the first two categories will say little but the ones who have experienced the tax increase will immediately want to know why. If the method used meets the characteristics mentioned before and has been accurately administered, and if the logic behind the change can be understood by the landowner there should be few serious objections to such increases.

The Determination of Actual Value

The first requirement prescribed that, in accordance with the Taxation Act, all property in British Columbia subject to taxation must be assessed at its actual value. The question that arises is what is actual value. The Act states that "in determining the actual value, the Assessor may give consideration to present use, location, original cost, cost of replacement, revenue or rental value, and the price that such land and improvements might reasonably be expected to bring if offered for sale in the open market by a solvent owner and any other circumstances affecting value." The way that the actual value of farm property may be determined by the assessor is not well defined.

The sense in which actual value is used in the present work may also be termed productivity value. The principle under which the term is used here is that if a man wishes to invest a sum of money wisely in property, he is willing to be satisfied with an average or normal annual net return equivalent to a reasonable rate of interest on this sum of money. Normal annual net return is determined by taking into consideration normally expected costs and receipts over a specified period of years. On this basis, the actual value of a parcel of land is the sum equivalent to the normal annual net return from that land, capitalized at the prevailing rate of interest on investments of similar risks.

In general, actual value is dependent upon two factors:

(1) normal annual net return, (2) prevailing interest rate on investments of similar risks. The determination of normal

annual net return is, in turn, dependent upon three factors: (1) yield or production. (2) prices received for fruit.(3)cost of production.

In the analysis done in this work all factors are considered on a "per tree" basis. It was felt that this was the most accurate way to describe the actual financial structure of orchards. The absence of basic data necessitated the establishment of a schedule of expected normal costs of production. This schedule was constructed for a twenty-acre orchard which, while it does not represent a large or small orchard, is considered by people in the industry to be an economic unit. The costs that are contained in the schedule represent those that would be normally expected under typical namagement practices for the area. Also, because of limited yield data only two varieties of one kind of fruit are considered. These are the McIntosh and Red Delicious apple varieties. As the yield data becomes available the analysis can easily be extended to include other varieties.

In order to consider other types of fruit it will be necessary to construct cost of production schedules for each type separately and obtain the necessary yield data. There is also a significant variation in yields and costs of production between different districts in the Okanagan Valley. These, too, will have to be given attention in the extension of the analysis. The level of investment will vary between farms of different size. In small farms factors such as custom work become a more important item of expense whereas large farms are more self sufficient

with respect to machinery. These things would have to be studied to find out if there is a significant difference in overall costs of production between farms of various sizes.

The assessment of orchards presents problems that are considerably different than those encountered in other types of farming. In the case of a new orchard or newly planted tree, its value is small because it has no income. As it increases in age it receives increasing amounts of inputs in the form of labour and materials but it still yields no income. In this phase it experiences a negative net income. As the tree reaches a certain age, it starts to bear fruit and during this period net income will change from negative to positive at an increasing rate. During the final stage net income increases at a decreasing rate until eventually it becomes zero again at which time the tree is replaced. The problem in the assessment of an orchard is to determine its value at any point in its life cycle. The value of the orchard will be based upon the anticipated net income over the remaining life of the orchard. Since an orchard is composed of trees of varying ages it is necessary to discount the anticipated net incomes of all the trees back to the date of assessment. This is the method that is used in the present analysis to establish a basis for orchard assessment. The data used corresponds to that of owner-operator orchards.

Determination of Yields

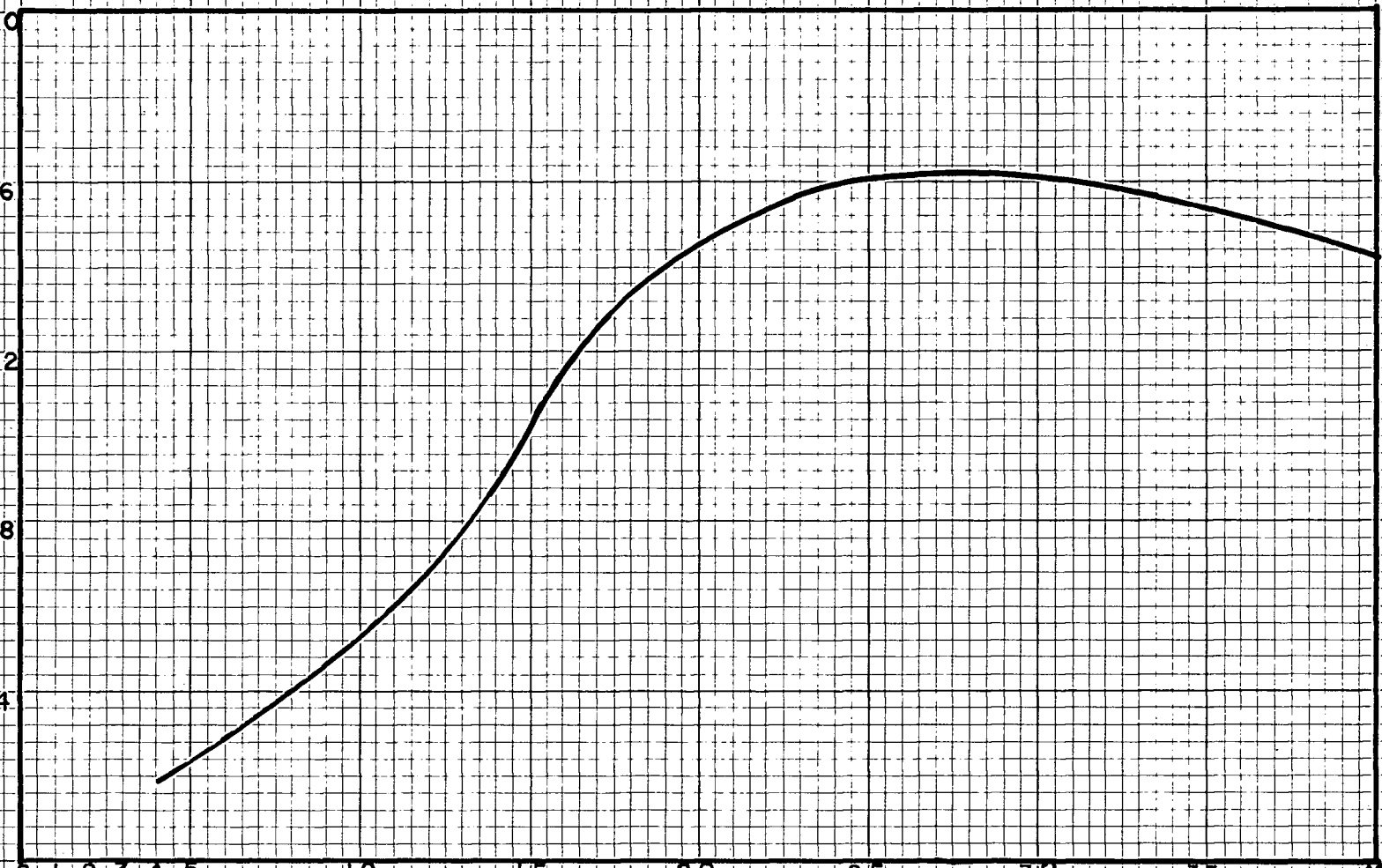
The first determinant of net income to be considered is the yield of apples per tree. The yield not only influences the level of net return but also causes much of the difference in

net returns between orchards. One of the important factors affecting apple yields is the variety that is grown. Different varities have different patterns, hence, it is necessary to make a distinction between varieties in order to measure the income of an orchard.

Another important determinant of yield is the age of the tree. In order to determine the yield pattern throughout the life of a tree it is necessary to establish a yield curve, that is, a schedule of normally expected annual yields. This curve shows the expected yields for each age of the tree and is required to estimate the expected income at any given time. Ideally, age intervals of one year would provide the most complete estimate of a tree's productivity. It is difficult, however, to obtain tree ages more accurately than at five year intervals because of the lack of records kept by the orchardist and the lack of any rapid field measurement of age. As a result tree ages have been divided into eight groups containing five years each. (Figures 1 and 2).

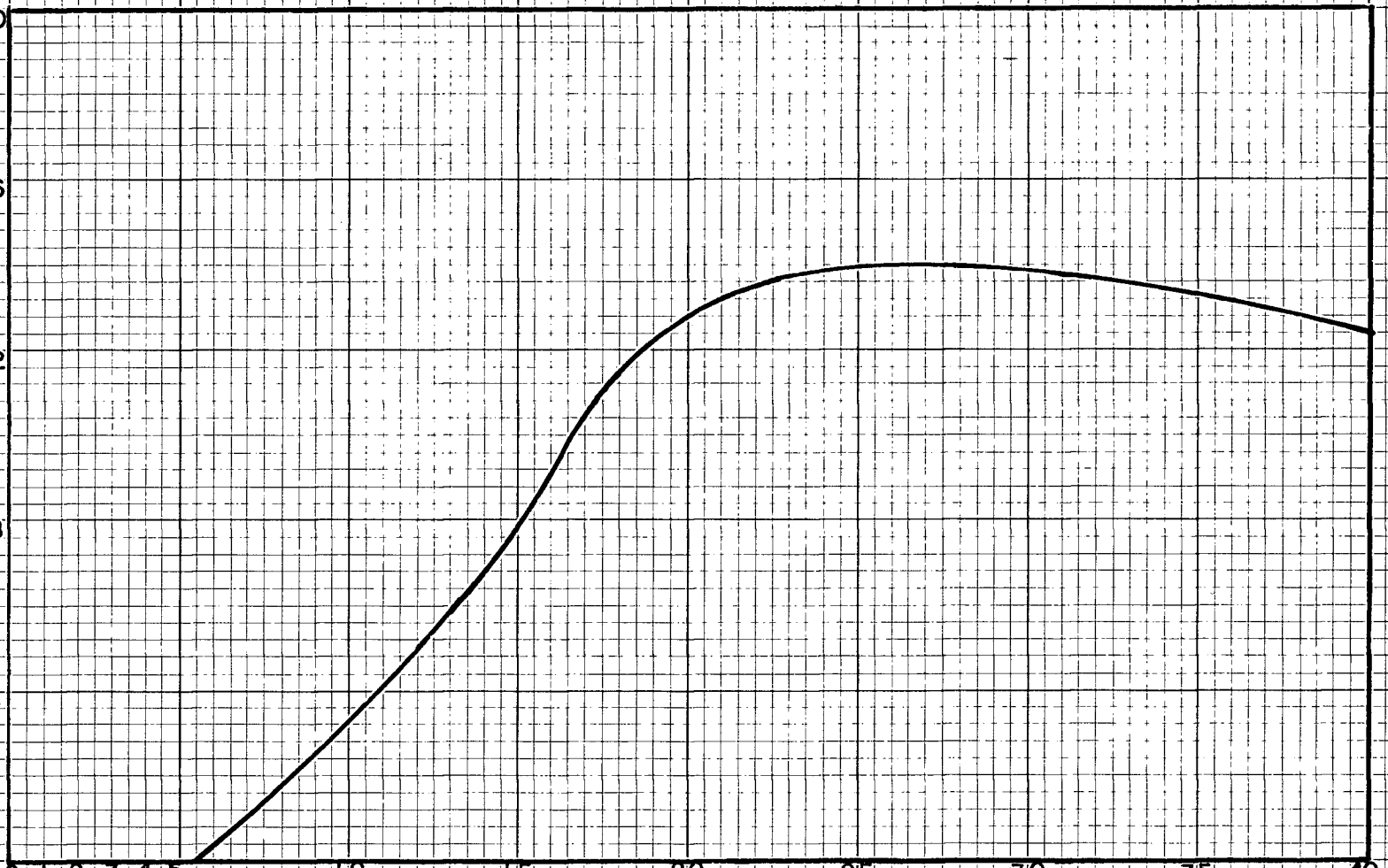
Physical characteristics such as the type of soil, the percent of slope, the degree of erosion and the incidence of winter injury from frost also influence yield. Tree fruits are less dependent upon distinctions between soil types and more dependent upon a favourable climate than most other crops. They are able to produce satisfactorily on shallow, gravelly soils which might be regarded as poor or non-arable for crops which have a more limited root system. This feature to some extent reduces the importance of the soil-crop relationship which would be more

FIGURE I: NORMAL YIELD FOR MCINTOSH APPLES



Source: Summerland Experimental Station, Economics Division, Canada Department of Agriculture, Commercial Orchards, Okanagan Valley, B.C.

FIGURE 2: NORMAL YIELD FOR RED DELICIOUS APPLES



SOURCE: Summerland Experimental Station, Economics Division, Canada Department of Agriculture, Commercial Orchards, Okanagan Valley, B.C.

clearly defined if the same soils were used in the production of field crops and vegetables. Certain soil types do, however, produce one tree fruit crop better than they do another. Each soil type in the Okanagan Valley has been rated according to its suitability for the production of all tree fruits. Over forty soil types of the four major soil zones have been assigned individual productivity ratings on this basis. The most productive soil types have received a rating of 100 and less productive soil types are rated as a percentage of this maximum figure. The productivity ratings for the soils of the Summerland area are given in Table 1.

The effect of the percent of slope upon the productivity of the soil is well known. The difference in moisture absorption on slopes is due mainly to the more rapid run-off. The Okanagan Valley is typical of the rough mountainous topography generally found in British Columbia. Changes in elevation are often rapid and this leads to the frequent occurence of slopes approaching or exceeding the maximum for agricultural use. Slope is a factor in the cost of farm operation and since soil types may cover a variety of slopes a reduction in the productivity ratings of soils according to the precent of slope is necessary. (Table 2).

The degree of erosion also influences soil productivity and, hence, yields especially in areas of adverse topography. Extensive erosion may cause patches of unproductive land to appear in some orchards where the trees are smaller or are not able to grow at all. The type of soil influences the rate of erosion and in the Okanagan Valley where irrigation is required throughout most of of the growing season it has been recommended that cover crops

TABLE 1

SOIL PRODUCTIVITY RATINGS FOR THE SUMMERLAND AREA
OF THE OKANAGAN VALLEY OF BRITISH COLUMBIA

Soil Type	Apples	Pears	Plums	Prunes	Cherries	Peaches	Apricots
Penticton Silt Loam	100	100	100	100	90	90	90
Skaha Gravelly Sandy Loam (kettle phase)	55	50	45	45	40	65	45
Osoyoos Sandy Loam (terrace phase)	80	80	80	80	85	95	80
Osoyoos Loamy Sand (kettle phase)	50	30	30	30	65	65	50
Rutland Gravelly Sandy Loam (terrace phase)	65	40	40	40	65	45	45
Nisconolith Silt Loam	60	70	60	60	50	70	70
Nisconolith Sandy Loam	60	70	60	60	50	70	70
Rubble	75	70	75	75	85	75	65

SOURCE: British Columbia Department of Agriculture, Proceedings of the Reclamation Committee, Kelowna, 1952, Brief no. 15.

TABLE 2

ADJUSTMENTS TO SOIL PRODUCTIVITY RATINGS FOR TOPOGRAPHY

Per Cent Slope	Per Cent Deduction
0 - 10	Nil
11 - 15	5
16 - 20	15
21 - 25	30
26 - 30	50
over 31	80

Source: British Columbia Department of Agriculture, Proceedings of the Reclamation Committee, Kelowna, 1952, Brief no. 16.

be planted on certain soil types to retard both erosion and run-off. In orchards where soil erosion is present it has been recommended that adjustments be made to the productivity rating of the soils in accordance with the degree of erosion. (Table 3).

Another physical characteristic that can greatly influence fruit tree yields is winter injury. The occurrence of this type of injury, generally, is not frequent, however, when it does occur it can have a marked effect on yield and in severe cases many trees may be killed. Injury is usually a result of extremely low temperatures or other abnormal temperature effects and is confined for the most part to certain localities. A micro-climatic factor which reduces the severity of winter injury is the moderating effect of lakes near tree fruit growing areas. In such areas the frost-free period is extended thus benefiting the fruit varieties which experience late dormancy or early blossoming.

TABLE 3

ADJUSTMENTS TO SOIL PRODUCTIVITY

RATINGS FOR EROSION

	Condition	Percent Deduction
(a)	No erosion	Nil
(b)	Slight Erosion: more than 10% and up to 25% of horizon A, has been removed.	10
(c)	Moderate Erosion: more than 25% and up to 50% of horizon A, has been removed.	25
(d)	Severe Erosion: more than 50% and up to 75% of horizon A, has been removed. In places horizon B, or horizon B-D are exposed.	50
(e)	Excessive Erosion: more than 75% of horizon A, has been removed. Horizon B, and patches of horizon B_2 are exposed and horizon B-D has been partly removed.	80-100

Source: British Columbia Department of Agriculture, Proceedings of the Reclamation Committee, Kelowna, 1952, Brief no. 16.

In some cases the lakes may freeze over thereby mullifying any protective influence. It is also significant that tributary stream valleys entering the main valley pour cold air into the valley bottom. This adversely affects orchards that are located in the main valley at the mouths of these tributaries and winter injury is of higher incidence in these areas. In general, most tree fruit varieties have "hardened off" sufficiently to withstand these conditions in moderation during the winter months. The most susceptible period is in the early spring when the blossoms have started to appear. Blossom frosts while not usually injurious to the trees themselves can cause the loss of all or part of the crop for the coming year. In view of this situation it

has been recommended that there be a reduction in the productivity ratings for orchards located in areas which are subject to blossom frost. The amount of the reduction is based upon the expected frequency of such frosts during the blossom period. (Table 4).

These soil productivity ratings and the various adjustments that can be made to them for the conditions mentioned could be extremely useful in the application of basic land values to individual orchards. It would be through the use of these ratings that inter-farm differences in production conditions would be reflected in the assessed values.

TABLE 4

ADJUSTMENTS TO SOIL PRODUCTIVITY

RATINGS FOR BLOSSOM FROST

Occurrence	Per Cent Deduction
Every year	10
Every second year	8
Every third year	6
Every fourth year	4
Every fifth year	2

Source: British Columbia Department of Agriculture, Proceedings of the Reclamation Committee, Kelowna, 1952, Brief no.16.

Wilcox[2] states that there also can be a marked reduction in in tree yields due to biennial bearing. This is of more

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[2] J.C. Wilcox, "Some factors Affecting Apple Yields in the Okanagan Valley", Scientific Agriculture, Ottawa, December, 1944, p205.

importance among some varieties than others. He points out that to some extent this feature has been reduced in importance in recent years by the practice of spray thinning.

Determination of Prices

Each variety of apples obtains its own price in the market. This price may be determined by the time of the season that the variety reaches the market but usually it is influenced more by the consumer's preference for a certain variety. The difference in prices between varieties received by the orchardist remains fairly constant in the short-run, however, the gradual change in consumer's tastes as new varieties are developed tends to shift the relative prices over a longer period. For many years the McIntosh variety had received one of the highest prices in the apple market, but during the past ten years it has been displaced by several other varieties of which Red Delicious is one. A major factor contributing to this, however, has been the extremly large volume of McIntosh being produced. This is presently causing low returns for this variety.

In order to obtain a normal or average price per box for each variety it is necessary to study the historical price patterns. Considerable variability was observed between individual years due to fluctuations in the size of the crop. In general, however, it was not difficult to establish a trend in prices. To calculate an average overall price for each variety it was necessary to weight the prices paid to the grower from all sources. Since each variety receives several grade prices

as well as a manufactured price the weights for these prices were determined by the respective volumes of each produced by the whole industry. The collection of the prices received by the growers is greatly facilitated by the fact that all fruit is sold through a central selling agency. This means that all growers throughout the Okanagan Valley receive the same price for each grade of apples that they produce.

The weighted overall average price for each variety was calculated for each year from 1942 to 1957. In order to reflect the recent changes in relative prices of different varieties a ten-year moving average price was chosen instead of an average price for the whole period. (Appendix, Table 6). The tree yields as indicated by the yield curve for each variety were converted from a loose box to a packed box basis by multiplying the former figures by 0.70 since it is on this basis that the price was determined. The expected gross income was then calculated by applying the average price to the yield in packed boxes for each of the age groups. (Appendix, Table 7).

Determination of Cost of Production

Although production costs are seldom the same for any two orchardists the influence of the individual operator upon costs must not be considered if differences in net income are to be based essentially upon differences attributable to the trees and soil. Instead, typical production practices which are followed by the average operator must be used so that the outstanding operator will not be penalized for his managerial abilities

and so that the inefficient operator who lacks initiative and foresight will not be subsidized.

The cost of production figures used in this analysis are based upon the estimates of people in the industry and checked against data obtained by the Economics Division, Canada Department of Agriculture (Appendix, Table 8). They represent the normally expected costs of operating a twenty acre all-apple orchard under average management. The fact that many orchards contain several kinds of fruit does not significantly affect the cost of apple production. In general, other kinds of fruit would merely shift a portion of the total production costs to a different part of the growing season.

The main factor causing differences in the costs of production of apples is the age of the trees. The difference in costs between varieties of apples is mainly associated with yield differences. This can be readily determined by the shape of the respective yield curves. In order to examine the age increment in the cost of production of a tree as it moves from one age group to another it was necessary to obtain data on each expense item for each of these groups throughout the lifetime of the tree. In the first age group, (1-5 years), data were obtained for each year in order to show certain changes that take place during that period with respect to costs and income.

The costs are higher during the first year because the young trees have to be set out and require extra attention at this time. These costs decline as the tree grows older but are

replaced by the increase in other costs such as pruning and spraying. When the trees start to yield the income rises and for the Red Delicious apple variety the annual income equals the costs when the trees reach fourteen years of age at the given level of prices and costs. Above this break-even point, a positive net income is realized which continues to increase until the trees reach maximum production at about twenty-seven years of age. After this point, a decline in yield and net income takes place. (Figure 3).

For the McIntosh variety the cost curve is slightly higher than for the Red Delicious. The reason for this is that the higher yield of McIntosh trees increases the cost per tree of handling the fruit. The present level of prices for McIntosh apples is not sufficient to cover the costs of production at any age of the tree. (Figure 4). The low prices for this variety is undoubtedly a result of over-production in the face of increasingly restricted markets. At the time when the presently producing trees were planted the price-cost relationship was quite favorable. Since World War II, however, the demand has slackened but the supply has remained high because of the long-term productivity of trees. Nothing can be done to curb production short of pulling the trees out, once they have started to produce. The result, then, is extremely low prices which does not allow the orchardist to break-even when all costs are considered.

FIGURE 3: EXPECTED NORMAL INCOME AND COSTS FOR RED DELICIOUS APPLE TREES

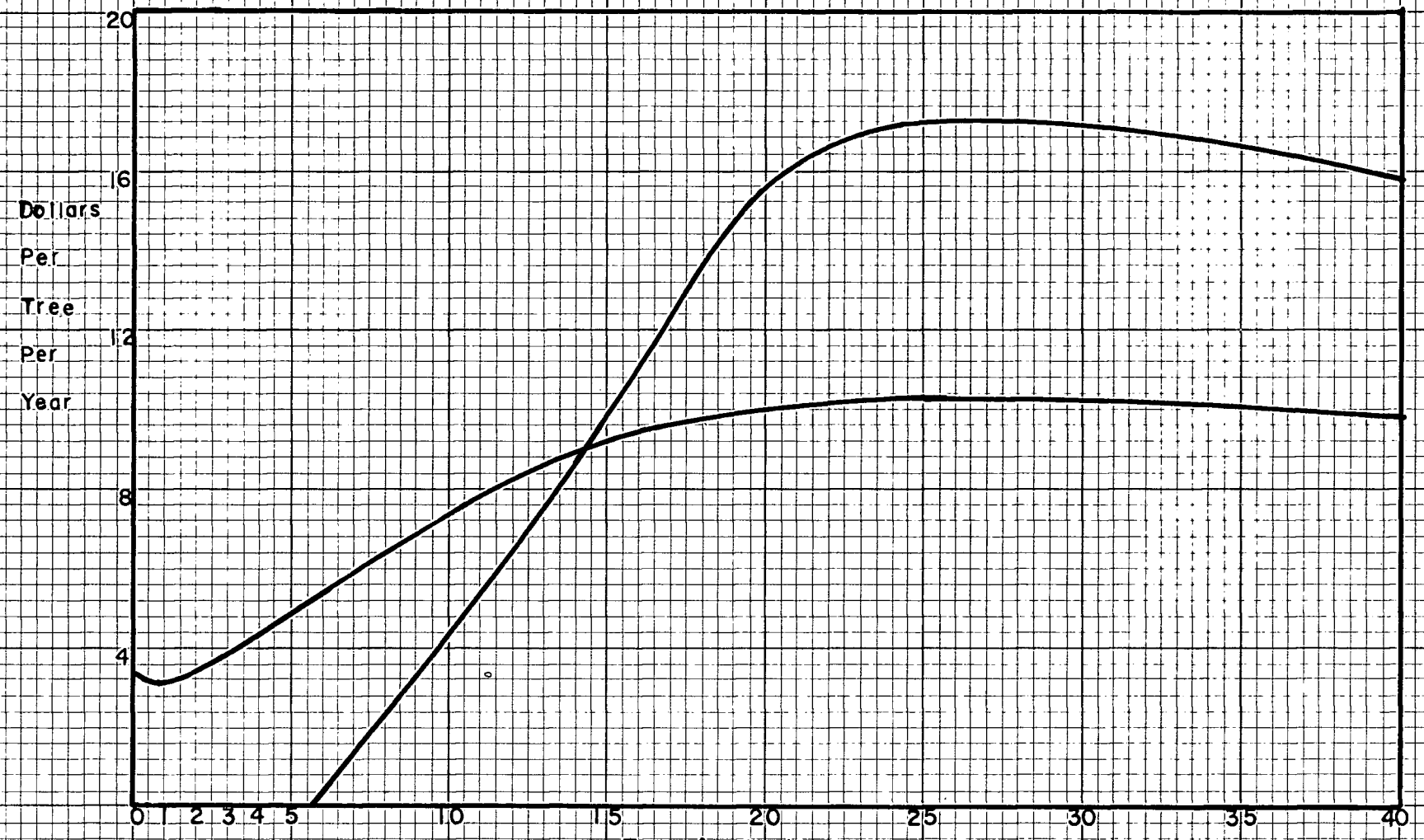
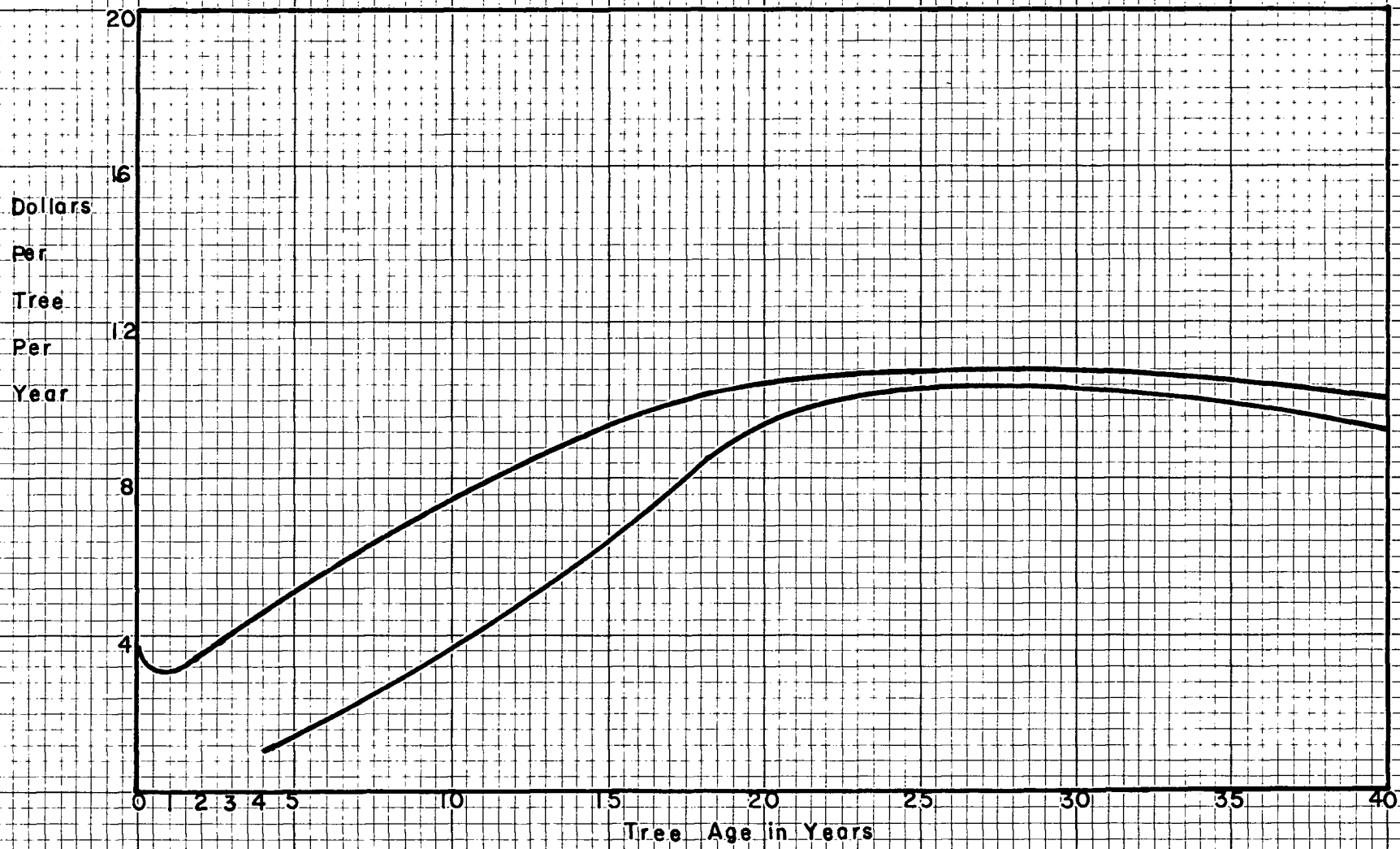


FIGURE 4: EXPECTED NORMAL INCOME AND COSTS FOR MCINTOSH APPLE TREES



Capitalization of Net Income

The expected net income is calculated by subtracting the total cost per tree from the gross revenue per tree (Appendix Table 9). The maximum net income is reached in the age group 26-30 years for Red Delicious. For McIntosh this age group provides the lowest negative net revenue.

Since the value of an orchard is to be based on the anticipated net income over the life of the tree, it is this figure for each age that is discounted back to the present date. However, before this can be done the rate of capitalization to be used for this purpose must be established.

Some objections have been raised concerning the use of the capitalization method because of the difficulties involved in establishing the rate. While this is true, it is not an argument against the use of the capitalization method which is sound in principle, being based upon the productivity of the asset.

There are several methods by which the capitalization rate may be determined. One of the most common ways is analogous to the sales analysis method of calculating value. It involves determining the net income from properties that have been sold and dividing the net income by the selling price or offering price. This method is subject to the limitations of the sales analysis method of valuation, the most important of which is the difficulty of obtaining a sufficient volume of sales.

Another method of establishing the capitalization rate is to use the market rate for competitive investments. The principle on which this method rests is that real estate can be expected

to attract capital at a similar rate of return to that which can be obtained by capital in other investments of similar risks.

A third method involves the summation of different rates which have been weighted according to their relative importance to the property in question. This could be the combination of first and second mortgage rates and a rate of return on the remaining equity weighted by the percentage of the total investment that each constitutes. The sum of the products thereby calculated would provide an overall rate for the property.

In the valuation of farm property, assessors have often adopted a capitalization rate equal to the first mortgage interest rate on this type of property. The main criticism of accepting the mortgage interest rate is that it represents a return to an investment with less risk than that represented by the equity capital invested in the farm property. It would be reasonable to think that if the first mortgage rate was 5 per cent and the second mortgage rate was 6 per cent then the return on the equity of the owner would be at least 7 or 8 per cent. On this basis it might be thought that the capitalization rate should always be higher than the mortgage interest rate because of the difference in risks involved between owning the mortgage and owning the whole farm. It has been shown, however, that the rate of return on land has often been below the mortgage interest rate.[3] This relationship probably stems from a generally held belief that

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[3] M.M. Regan, F.A. Clarenbach, and A.R. Johnson, "The Farm Real Estate Situation", U.S.D.A. Circular no. 721, 1943-44, p. 20.

land will become relatively scarce as population grows and that land ownership is a useful hedge against inflation as well as a source of security in depression.

The capitalization rate tends to be lower when the conveniences offered by the farm are important. These include the availability of business centres, markets and communications and the desirability of the property as a homesite. Another factor that would tend to lower the rate is the moderate size of the farms which makes them accessible to a fairly large number of purchasers who are interested in places to live. There seems to be as much, if not more, in favour of using a capitalization rate which is lower than the existing mortgage rate as there is in favour of using one which is higher.

Murray[3] states that there is a tendency toward equilibrium between the mortgage interest rate and the return from land investment. If the interest rate goes up in any area, investors and potential land owners prefer to invest in mortgages rather than in farms. This causes a decline in the demand for land which in turn causes the price to fall and the rate of return to rise. If the interest rate goes down in any area, certain investors take their money out of mortgages and buy land. This tends to raise the price of land and lower the rate of return.

Calculation of Present Values

In order to obtain the present value of an asset it is necessary to discount the anticipated net income back to date.

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[3] William G. Murray, Farm Appraisal, Ames, Iowa State College Press, 3rd ed., 1954, p. 408.

The principle behind this procedure is that the present value of an asset is dependent upon the future earning power which, because it extends into the future, is worth less than it would be if it were presently available. Therefore, it is necessary to discount the future annual earnings of all the trees to arrive at the value of the orchard at the present time.

The basic equation used in calculating present value is (1) $V=\frac{R}{r}$ where "R" refers to the annual net income and "r" refers to the market interest rate. This equation assumes a constant rate of income over an indefinite period of time and must be modified to take into account shorter time periods or changing levels of net income. For example the basic equation may be expanded to give (2) $V=\frac{R}{r}\left(1-\frac{1}{(1+r)^n}\right)$: This equation provides for the termination of incomes but assumes that the annual net incomes are the same for each year. In order to provide for variations in costs and revenues for each year as well as the termination of these factors it is necessary to expand the equation further into

$$(3)\quad V=\left[\frac{R_1'}{1+r}+\frac{R_2'}{(1+r)^2}+\frac{R_3'}{(1+r)^3}+\cdots\frac{R_n'}{(1+r)^n}\right]-\left[C_1+\frac{C_2}{1+r}+\frac{C_3}{(1+r)^2}+\cdots\frac{C_n}{(1+r)^{n-1}}\right]$$

where "R^1" refers to the gross revenues at the end of each year and "C" refers to the cost of production at the beginning of the year.

The present values which were obtained as a result of the application of this equation are shown in Table 5 and Figure 5. These values are based on the average life of a tree being forty years. The present values reach a maximum during the 16-20 years

age group. This is earlier than the age at which the maximum net income is realized; this illustrates the fact that a tree is most valuable not at the age when its net income is the highest but rather at the age when its most productive years are just ahead of it. The present values assume the continuation of typical management practices throughout the productive life of the tree and, as a result, these values will not equal market value if general economic conditions cause buyers and sellers to foresee inflationary or deflationary tendencies in the years ahead.

The present value per tree at one year of age is shown on Table 5 to be a negative figure. This has resulted from the high level of costs incurred during the non-bearing period of the tree's life. This is not to say, however, that the orchard is of no value when the trees are at this age. The value of a tree at this age is more dependent upon the cost of producing it than it is at an age when it becomes productive because then its income producing ability is the main determinant of value. The value of a young tree should be at least equal to, if not greater than, the cost of producing it because the orchardist expects to recover the production costs during some future period. The trees which are already growing may be worth something more than their cost of replacement.

The value of orchard land before the trees are planted or when the trees are ready to be replaced must be based upon the anticipated income from the land when it is used for orchard or some other competing use. This would involve calculating the

TABLE 5

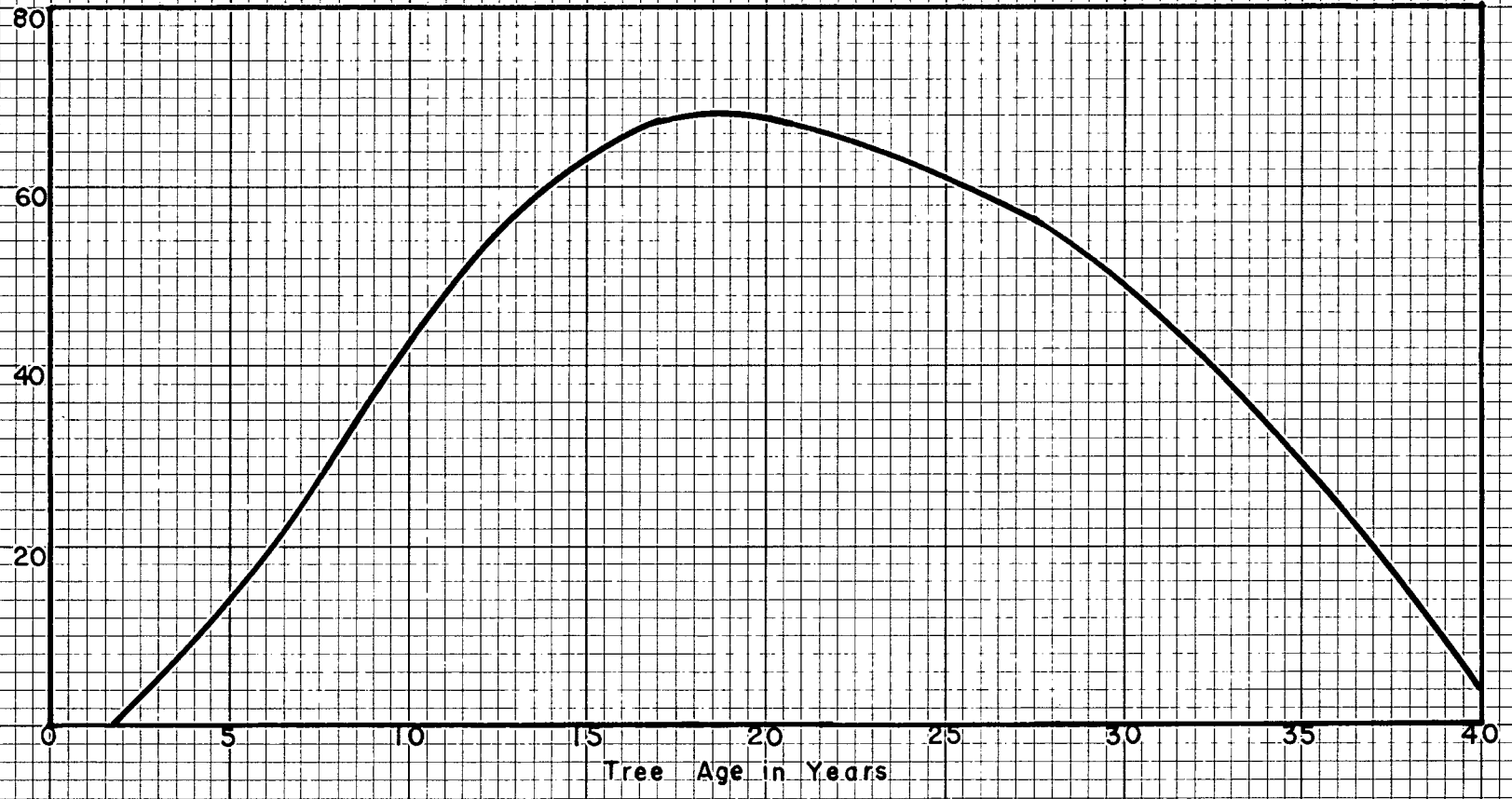
CALCULATION OF PRESENT VALUES FOR

RED DELICIOUS APPLE TREES BY AGES

Age of Trees Years	Net Income Per Tree $	Present Value Per Tree $	Present Value Per Acre[1] $
1	-3.50	-2.10	
2	-3.20	1.50	70
3	-3.50	4.90	240
4	-3.90	9.00	430
5	-4.40	13.70	660
6-10	-3.50	34.50	1660
11-15	-0.40	55.80	2680
16-20	4.40	68.80	3300
21-25	6.70	65.50	3140
26-30	7.00	55.30	2650
31-35	6.60	40.10	1920
36-40	6.20	14.30	690

[1] 48 trees per acre.

FIGURE 5: PRESENT VALUE OF FUTURE INCOME PER RED DELICIOUS APPLE TREE



average annual net income that would be expected from alternative uses and assuming that this average income approximates the expected future income, the value of the site can be obtained by the use of Equation (2). This would perhaps represent a ceiling of value if the future trends of incomes and costs appear to be uncertain.

In the case of McIntosh trees which received a negative net income throughout their life span in the above analysis, it is not possible to calculate their present values. This means that at the existing price for McIntosh apples the trees themselves have no value and that the only value of such an orchard lies in the basic site value of the land as determined by the average annual net income from alternative uses discounted to date.

The orchard conditions under which the basic data were established apply part of the Summerland district of the Okanagan Valley. The predominant soil type was Penticton silt loam with slightly undulating topography (less than 10 per cent slope) and there was no significant erosion. This area was not considered to be subject to blossom frost with any regularity. These conditions are perhaps the best for orchard production and the values obtained from the analysis would represent the maximum for the area. This area was selected only because it provided the necessary basic data for the analysis. The application of these values to other areas in the district would lead to lower values as a result of the existence of less favourable production conditions. The conditions under which the basic data are obtained need not be ideal however; as long as they are uniform

the necessary control can be obtained.

In order to obtain the actual values of individual orchards it will be necessary to obtain a complete inventory of the trees in each orchard with respect to the kind of fruit, variety and age. The present values as calculated by Equation (3) would be applied to the number of trees in each age group in the orchard. The sum of the values thereby obtained would give the total inventory value of the orchard. This inventory value would then be adjusted for the physical characteristics of soil, slope, erosion and blossom frost. It is quite probable, especially in the larger orchards, that the inventory value would have to be divided into parts to accommodate more than one soil type, different degrees of slope and erosion and the presence of frost pockets. Another factor which might require consideration in the physical adjustments to value is the problem of air drainage over an orchard. This is closely associated with frost damage and a further allowance for it could be given in the frost adjustment.

The influence of non-income factors on the basic value of the orchard is not easily determined. Certain factors such as the convenience of markets, schools and the type of roads and other services are generally not important in the Okanagan Valley because they are usually adequately available in all areas. In the case of markets, the farmer's responsibilities end when his fruit is delivered to the nearest packing house which is usually within a few miles of his farm.

The orchard values calculated by this method should not

require revision more often than once every five years. The movement of prices and costs should be relatively slow in making significant changes and should not be a source of disparity in values. The most important factor requiring re-adjustment will be the inventory of the trees because of the changes in value which accompany changes in tree ages. Since the age groups are at five year intervals, however, a revision of the inventory once in five years would be adequate to keep the values up to date.

The task of inventory revision would be greatly assisted by the fact that the Horticulture Branch of the Department of Agriculture undertakes a complete tree census in all districts in the Okanagan every five years. Instead of duplicating the efforts of this Department by undertaking its own tree census for assessment purposes, it would seem feasible that this information could be made available to the Department of Finance and the assessors for the purposes of inventory revision. In the case of individual orchards which experienced marked changes in inventory due to severe frost damage or complete re-planting, a second inspection could be made by the assessor. In most cases, however, the overall changes would merely involve those associated with an increase in the ages of the trees as well as a few additions and deductions for replacements.

The physical factor adjustments to the orchard values would not have to be reassessed for each subsequent inventory revision because they are fairly premanent in nature. The only one that might need revision is the allowance for erosion, otherwise, the soil types, topography, and frost zones would remain constant once they had been established for each orchard.

A P P E N D I X

TABLE 6

SUMMARY OF WEIGHTED AVERAGE PRICES PAID TO GROWERS BY YEARS FOR APPLES PER PACKED BOX, OKANAGAN VALLEY, B.C.[1]

Variety	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1957[2]
Golden Delicious	------- Included in "Common Delicious" ----------								0.700	1.343	1.668	1.664	1.606	1.369	2.124	1.762	1.4045
Sparton	------- Included in "All Others" ----------								0.671	1.234	1.362	1.124	1.065	1.431	1.958	1.473	1.2898
Red Delicious	------- Included in "Common Delicious" ----------								1.301	1.654	1.911	2.024	1.936	1.603	2.704	1.415	1.7848
Winesap	1.026	1.746	1.442	1.737	1.710	1.686	1.583	1.187	1.026	1.549	1.865	1.697	1.498	1.054	2.012	1.225	1.4696
Newtown	1.088	1.708	1.381	1.774	1.697	1.639	1.537	1.113	0.921	1.411	1.479	1.261	1.192	1.094	1.640	0.878	1.2526
Common Delicious	0.916	1.533	1.272	1.616	1.518	1.511	1.652	0.988	0.833	1.281	1.452	1.458	1.309	1.108	1.956	0.811	1.2760
Red Romes	------- Included in "All Others" ----------								0.532	0.987	1.245	1.208	1.241	0.881	1.557	0.802	1.0566
McIntosh	0.735	1.296	0.973	1.314	1.160	1.222	1.260	0.667	0.497	1.058	1.233	1.031	0.906	0.578	1.270	0.674	0.9175
Stayman	0.830	1.470	1.130	1.414	1.360	1.282	1.419	0.831	0.716	1.143	1.320	1.187	1.057	0.581	1.442	0.510	1.0206
Jonathan	0.735	1.434	1.110	1.441	1.295	1.269	1.165	0.549	0.544	0.859	0.801	0.718	0.556	0.350	0.954	0.379	0.6875
Cookers[3]	0.513	1.001	0.833	1.135	0.875	0.813	0.858	0.262	0.446	1.145	0.838	0.841	1.200	1.132	0.928	1.166	0.8816
All Others	0.564	1.158	0.864	1.165	0.984	0.928	0.972	0.380	0.284	0.682	0.748	0.525	0.479	0.198	0.767	0.271	0.4940
All Apples	0.846	1.502	1.187	1.546	1.792	1.427	1.433	0.922	0.825	1.236	1.363	1.294	1.144	0.874	1.626	0.885	1.1602

SOURCE: British Columbia Tree Fruits Limited, Kelowna.

[1]Weighted by volume of sales
[2]Ten year moving average
[3]Includes Wealthy, Duchess, Yellow Transparent, and Rob Roy varieties

TABLE 7

EXPECTED NORMAL REVENUE PER TREE
FOR APPLES BY AGE GROUPS AND VARIETY

Age of Tree in Years	McIntosh Yield in Loose Boxes Per Tree	McIntosh Yield in Packed Boxes Per Tree	McIntosh Revenue Per Tree in Dollars at $0.9175 Per Box	Red Delicious Yield in Loose Boxes Per Tree	Red Delicious Yield in Packed Boxes Per Tree	Red Delicious Revenue Per Tree in Dollars at $1.7848 Per Box
1	-	-	-	-	-	-
2	-	-	-	-	-	-
3	-	-	-	-	-	-
4	1.7	1.2	1.10	-	-	-
5	2.2	1.5	1.40	-	-	-
6-10	4.0	2.8	2.60	1.9	1.3	2.30
11-15	8.0	5.6	5.10	6.0	4.2	7.50
16-20	13.0	9.1	8.30	11.0	7.7	13.70
21-25	15.6	10.9	10.00	13.6	9.5	17.00
26-30	16.0	11.2	10.30	13.9	9.7	17.30
31-35	15.6	10.9	10.00	13.5	9.4	16.80
36-40	14.9	10.4	9.50	13.0	9.1	16.20

TABLE 8

COST OF APPLE PRODUCTION[1] PER ACRE IN DOLLARS BY AGE OF TREES FOR THE SUMMERLAND TREE FRUIT AREA OF THE OKANAGAN VALLEY

TRee Age in Years	Pruning	Spraying	Thinning M.	Thinning R.D.	Picking M.	Picking R.D.	Cultivating and Mowing	Irrigating	Fertilizing	Propping M.	Propping R.D.	Hauling M.	Hauling R.D.	Repairs to Machinery and Equipment
1	-	10	-	-	-	-	15	30	4	-	-	-	-	15
2	2	15	-	-	-	-	15	30	4	-	-	-	-	15
3	4	20	-	-	-	-	15	35	4	-	-	-	-	15
4	6	30	-		11	-	15	35	4	-		3	-	15
5	8	40	-		14	-	15	40	6	-		4	-	15
6-10	12	50	25		25	12	15	40	8	4		7	3	20
11-15	20	78	50		50	37	15	40	10	6		13	10	25
16-20	25	78	70		81	69	15	40	10	8		21	18	25
21-25	30	78	90		96	85	15	40	12	8		26	23	25
26-30	30	78	90		100	87	15	40	12	8		27	23	25
31-35	30	78	90		95	84	15	40	12	8		26	23	25
36-40	25	78	90		93	81	15	40	12	8		25	22	25

[1]All operations include labour, materials, and machine operating costs; labour cost is set at $1.00 per hour.

TABLE 8 (CONTINUED)

Tree Age in Years	Land Taxes	Depreciation on Machinery and Equipment @ 10%	Interest[1] on Machinery and Equipment @6%	Miscellaneous[2]	Total Expenses Per Acre McIntosh	Total Expenses Per Acre Red Delicious	Total Expenses Per Tree McIntosh	Total Expenses Per Tree Red Delicious
1	10	30	27	28	169	169	3.50	3.50
2	10	30	27	4	152	152	3.20	3.20
3	10	35	27	4	169	169	3.50	3.50
4	10	40	27	4	200	186	4.20	3.90
5	10	45	27	5	229	211	4.80	4.40
6-10	10	45	27	5	283	276	5.90	5.80
11-15	10	45	27	5	394	378	8.20	7.90
16-20	10	45	27	5	460	445	9.60	9.30
21-25	10	45	27	5	507	493	10.60	10.30
26-30	10	45	27	5	512	495	10.70	10.30
31-35	10	45	27	5	506	492	10.50	10.20
36-40	10	45	27	5	498	482	10.40	10.00

[1]Investment in machinery and equipment for a twenty acre orchard is set at $9,000.

[2]Includes the cost of planting and extra care for young trees; the cost of clearing the land (or the removal of old orchard) for planting at $14 per acre spread over the life of the trees; and small purchases.

In reference to Table 8, the following spraying program was set up.

1. DDT. Four sprays @ 12 lbs per spray @$0.33per lb.	$16
2. Mites. One spray	4
3. Aphis. Two sprays of malathion	16
4. Kelthane. One spray	12
5. Dormant. One spray lime-sulfur	8
6. Fungicides for scab and mildew, one spray	10
7. Labour. Ten sprays at 45 minutes per spray @ $1.25 an hour	9
8. Machinery operating costs	3
Total Cost per Acre	78

The rate of application of a high-nitrogen fertilizer is as follows:

Age of Tree	Pounds Per Acre
1-5	100
6-10	200
11-15	250
16-20	250
21-40	300

The cost of apple picking used was $0.13 per box.

The cost of hauling used was $0.035 per box. These rates were obtained from growers in the Okanagan.

TABLE 9

CALCULATION OF NET REVENUE
PER TREE BY AGE GROUPS

Age of Tree	McIntosh Gross Revenue Per Tree	McIntosh Total Cost Per Tree	McIntosh Net Revenue Per Tree	Red Delicious Gross Revenue Per Tree	Red Delicious Total Cost Per Tree	Red Delicious Net Revenue Per Tree
1	-	3.50	-3.50	-	3.50	-3.50
2	-	3.20	-3.20	-	3.20	-3.20
3	-	3.50	-3.50	-	3.50	-3.50
4	1.10	4.20	-3.10	-	3.90	-3.90
5	1.40	4.80	-3.40	-	4.40	-4.40
6-10	2.60	5.90	-3.30	2.30	5.80	-3.50
11-15	5.10	8.20	-3.10	7.50	7.90	-0.40
16-20	8.30	9.60	-1.30	13.70	9.30	4.40
21-25	10.00	10.60	-0.60	17.00	10.30	6.70
26-30	10.30	10.70	-0.40	17.30	10.30	7.00
31-35	10.00	10.50	-0.50	16.80	10.20	6.60
36-40	9.50	10.40	-0.90	16.20	10.00	6.20

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