THE BARGAINING POTENTIAL IN THE MICHIGAN ASPARAGUS INDUSTRY

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
Lowell D. Hill
1963

This is to certify that the

thesis entitled

THE BARGAINING POTENTIAL IN THE

MICHIGAN ASPARAGUS INDUSTRY

presented by

Lowell D. Hill

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Agricultural Economics

Major professor

Date December 9, 1963

O-169

ABSTRACT

THE BARGAINING POTENTIAL IN THE MICHIGAN ASPARAGUS INDUSTRY

by Lowell D. Hill

The Michigan asparagus industry has been involved in a series of organization and bargaining attempts through three decades. With the merging of the state association with Michigan Agricultural Cooperative Marketing Association (an affiliate of Farm Bureau) interest in bargaining has been renewed. The purpose of this study is to evaluate the potential that exists in the industry for a bargaining association in particular, and for an organization of growers in general. The approach is one of a problem solving framework in which the existing environment is related to the problem of forming an organization of growers.

Three aspects of the environment are assessed in terms of their effect upon the potential for group formation: (1) economic environment, (2) institutional environment, and (3) attitudes of growers and processors in the industry. Statistical analysis of secondary data provided substantiation of the theoretical models of supply and demand. The lack of accurate data prevented the desired degree of

refinement in the statistical analysis, but provided estimates of elasticity of supply and demand. Due to the cultural characteristics of asparagus, supply is highly inelastic in the short run. Using the length of harvesting season as an intermediate variable in a recursive system, price elasticity of supply was estimated as .1 at the mean values of price and quantity over the observation period from 1947 to 1962.

Price elasticity of demand was computed as -.15 at the mean values, substantiating a hypothesized inelastic demand curve. Two income elasticities were computed--one for transitory income changes and one for a permanent income trend. The transitory income elasticity was computed as .0098 using income as deviations from a time trend. An elasticity of permanent income of .4 was obtained from the trend in income. Using cross sectional data the elasticities ranged as high as 1.2 at the $3,000 level.

The institutional environment of importance to organization includes the concentration of processing among a few firms, the dispersion of production among many small growers, an oligopsony relationship in purchase of the raw product, and a competitive framework in the sale of the finished product.

The attitudes of growers toward organization was explored first in an historical perspective, tracing organizational development from the early 1900's to the present. With this as a background, present beliefs and values were assessed by means of a mail survey of growers.

One of the pertinent facts revealed was the lack of dissatisfaction with current prices being received. Thirty-seven percent of the respondents indicated that they considered present prices to be fair to both grower and processor. The number of growers specifying 15 cents or below as a fair price was approximately equal to the number of growers specifying a price above 15 cents, for the 1963 crop.

Considering the historical record of unsuccessful bargaining attempts and current attitudes of respondents towards possible success of bargaining, alternative focal points of organization appeared to offer a better basis for group action at the present time. An exploration of processor attitudes and their relationship with their growers, indicated a limited opportunity for joint grower-processor actions to further the welfare of the industry. Grower interest was favorable to having an organization which would provide them with a source of information on markets and production techniques. This interest should be exploited as a means for increasing membership for, given the economic and institutional environment in the industry, there exists only a limited potential for successful bargaining for price at the present time. The potential supply response of Michigan growers, the availability of supply in other areas, the structure of the processing sector, and the general satisfaction of growers with current prices, all indicate the limited support which a bargaining organization could expect.

This does not preclude the possibility of building a base for such an organization in the future through improving grower-processor relationships, and gaining grower support by designing the organization to meet the current needs of growers and enlarging the membership base.

THE BARGAINING POTENTIAL IN THE MICHIGAN ASPARAGUS INDUSTRY

By

Lowell D. Hill

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Agricultural Economics

1963

PREFACE

This study of the Michigan asparagus industry was undertaken with a duality of purpose: (1) to analyze a specific problem whose solution is of immediate concern to members of an industry and may be directly applied by the interested persons, or (2) to extend existing knowledge and theory and/or develop new theoretical concepts. The unique characteristics of the crop require extensions of the existing theory of economics and application of these principles to the problems of pricing, spatial adjustments, and organization in the industry. At the same time the demands by the industry for problem solutions provide an opportunity for a contribution to this segment of agriculture by a problem solving orientation.

While this study is problem oriented, certain theoretical concepts are necessary in defining the problem and in providing a basis for the analysis. These concepts must be developed in sufficient detail to enable their application to the problems whose analysis has been undertaken. The organization of the material is such as to permit deletion of the theoretical portions without losing the flow of ideas for the lay reader. At the same time these deleted sections must form an integral part of the study for those interested in the more theoretical aspects of the problem.

This analysis of the asparagus industry has relied heavily upon the deductive process, for the paucity of recorded data has provided little basis for inductive reasoning from statistical relationships. The statistical analysis has provided supporting evidence for the deductive hypotheses, as has personal observation of various facets of the industry. Utilizing existing theories from several disciplines, low level hypotheses have been deduced and empirically tested insofar as available data would permit.

I wish to acknowledge the contribution made to this study by industry personnel--especially those growers and processors who provided me with data and an understanding of the industry. To Dr. Vernon L. Sorenson I owe a debt of gratitude for his professional guidance throughout the study and his patient critiques of many experimental formats and outlines. Dr. Manderscheid, Dr. Pesek, and Dr. Stapleton also made valuable contributions.

This research was conducted with the financial support of the Department of Agricultural Economics under supervision of Dr. L. L. Boger. To him I extend a special thanks for his personal encouragement and advice throughout my academic career at Michigan State University.

Words cannot encompass the contribution made to this study and my graduate program by Betty Becky and Brent, for without their assistance and support it would not have been possible.

Much of this study has been dependent upon contributions from many sources but responsibility for errors or deficiencies lies entirely with the author.

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CHAPTER I

THE PROBLEM AND ITS SETTING

The potentialities of a producer oriented organization are usually evaluated within the confines of the theoretical framework unique to the discipline undertaking the analysis. These artificial delineations of a problem are necessary techniques for isolating and analyzing the causal factors which determine the complex interactions of an industry. Such disciplinary categories are too restrictive, however, for a problem-solving approach, attempting to provide directly applicable answers for an industry group. Most problems cannot be entirely encompassed by any one discipline and attempts to so structure them result in a ceteris paribus analysis in which some of the relevant and important variables are excluded from consideration.

It is never possible to take into consideration all the variables which are related to a given problem, for any event or situation has an infinite number of characteristics but the effect of many of these characteristics is sufficiently small that no measurable change is evidenced by their exclusion from the analysis. To obtain a workable solution it is only necessary to select a subset which includes those variables whose effects will

alter the conclusions to be reached. The difficulty exists in finding that particular combination of variables which meets the above criterion.

Objectives of the Study

The problems in the Michigan asparagus industry have stimulated discussion and action for a stronger organization of growers as a means for improving the relative position of the growers and also a way to benefit the entire industry. The purpose of this study is to determine the feasibility of organizational activity within the industry and the form which this organization should take. In evaluating the alternatives and the problems to be solved it is necessary to consider the economic environment in which the industry operates, the relationships among growers and between growers and processors, and the characteristics of the institutions involved.

The specific objectives of this study are:

1. To evaluate the feasibility of creating and maintaining a producer organization for the Michigan asparagus industry.
2. To indicate the possible form and purposes of such an organization.
3. To outline some strategies necessary for the success of the organization.
4. To present a methodological technique for evaluating a problem in the context of the entire industry and its internal relationships.

Each of these objectives will be met through a total industry approach in a problem solving framework.

Unique Characteristics of the Asparagus Industry

Although industry studies relating to bargaining and group action have been made for other crops, the asparagus industry possesses certain unique characteristics which preclude direct application of the results from these other studies. Since asparagus is the only commercially produced vegetable which is a perennial, its production characteristics and related economic factors are unique among vegetables. In comparison with perennial fruit crops, such as apples and cherries, the growth and harvest period, the importance in the farm organization, and the regional production pattern of asparagus, all require a different approach. Whereas fruit crops are usually the primary enterprise in the farm organization, only 49% of the asparagus growers in the producer survey[1] conducted as a part of this study, received more than 10% of their income from asparagus. With most producers growing less than four acres, asparagus assumes the role of a crop which provides for a complementary use of labor, land, and management. Its short harvest season practically precludes complete, one crop specialization in Michigan. Labor requirements peak in early spring, prior to demands of most other crops and little labor is needed after July 1. The growth period of asparagus coincides with harvest (all

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[1]Details of the producer survey are discussed in Chapter V and in Appendix B.

within a six weeks period) making advance production estimates extremely difficult.

The unique characteristics of asparagus also influence the processing sector of the industry, for no other major product competes for labor and plant space during the asparagus season, and procurement methods differ from those of other perennial crops. Interregional movements, export trade, and activities of national brand packers would indicate a national perspective for an industry analysis, but the interregional differences in harvesting methods, quality of pack, grade standards, and product form suggest a regional approach to organization.

Approach to the Study

While useful comparisons may be made with studies of other crops, the uniqueness necessitates an individual analysis; interpreting principles and generalizations for group action in the light of the botanical, sociological, institutional, and economic characteristics of this particular industry.

Using a combination of historical and statistical approaches, the important variables associated with each of these factors will be considered as they interrelate in the Michigan asparagus industry. Much of the material will be presented in an historical setting, for out of the past is formed the present and the future.

Chapter II will present a description of the general environment of the industry including the importance of the crop, the trends in production and marketing, and the characteristics of consumers. Chapter III will provide additional descriptive details of production and develop the theory necessary for prediction. Chapter IV will perform a similar function for the marketing sector. It will include a description of the processing firms, an account of the marketing channels commonly used for distribution, and the regional marketing relationships and patterns. The statistical analysis in this study is developed primarily in Chapters III and IV where both structural and predictive equations are specified and discussed.

One of the more important determinants of organizational relationships in this particular industry is discussed in Chapter V. The objectives, beliefs, and attitudes of producers have been very influential in the rise and fall of various organizational attempts over the past forty years and will continue to exert an influence on future organizational development. This chapter is developed in two major parts. The first is an historical description of the growth of organizational activities since asparagus was first introduced into Michigan. The second part of Chapter V uses results from a mail survey of growers to analyze attitudes of growers which have been and will continue to be a significant restrictive influence, placing limitations upon the organizational activities which

will be initiated, accepted and supported by growers.

The final chapter will present the alternative actions and recommendations which have evolved from a simultaneous consideration of the economic, sociological, and institutional factors comprising the industry.

CHAPTER II

THE GENERAL ENVIRONMENT OF THE INDUSTRY

Although the cultivation of asparagus is recorded as far back in history as 200 B.C., large scale commercial production is relatively recent. The rapid expansion of United States acreage from 97,740 acres in 1930 to 160,750 acres in 1959, has precipitated many changes in production and marketing techniques as the industry adjusted to a steadily expanding consumer market. Although this expansion has slowed preceptibly in recent years the industry is still in the process of attaining an equilibrium position within its environment.

Regional Production Patterns and Shifts

Production shifts continue to change the regional pattern of concentration and, as in many phases of agriculture, specialization is altering interfarm relationships. While California continues to dominate the market in terms of total volume of production, its position relative to other states has changed in the past decade. Figure 1 compares the percent of the total crop produced by various states in 1950 with their share of total production in 1963. The decrease in California's share of the market has been

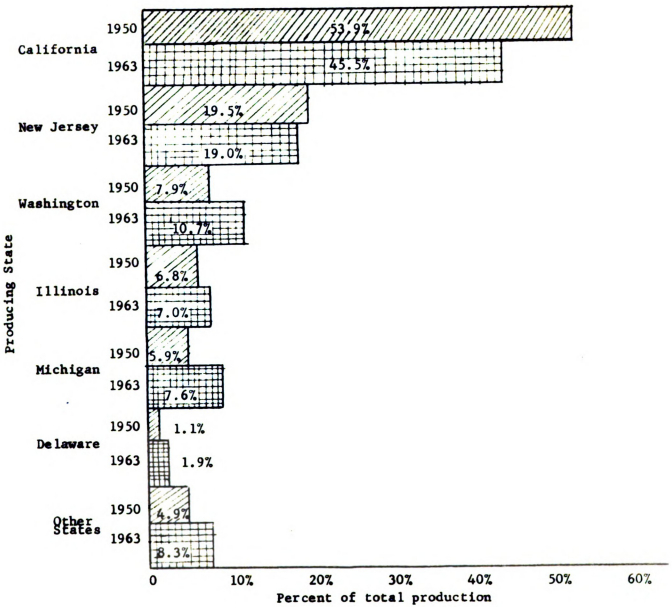

Figure 1. Distribution of asparagus production among states, 1950 and 1963

Basic source of data: The Almanac, National Canners Association, Washington, D. C. (1950 and 1963)

absorbed primarily by Washington and Michigan. Shifts among the other states, while of local significance, have had a negligible influence upon the total industry.

Producing areas in the east and midwest have had greater acreage increases than California, resulting in a redistribution of relative production among states. Figure 2 shows the cumulative percent of production plotted against the number of states. The two lines labeled "line of equal production in major producing states" and "line of equal production in all states" provide a comparative reference for evaluating the extent to which the present regional distribution pattern differs from that of one where production is distributed equally among states. The relative decline of California in the past decade results in a more equal distribution of the total product among the major producing areas. Even with this decreased concentration five states produce nearly 90 percent of all asparagus grown commercially for the fresh and processed markets.

Regional Differences in Production Techniques and Farm Organization

While asparagus culture is quite similar throughout the temperate zone, considerable regional differences exist in specific production techniques and the farm organization in which the crop is included.

The topography of the California region is well suited to production of white, and green tipped asparagus, to large scale operations, and to the use of irrigation.

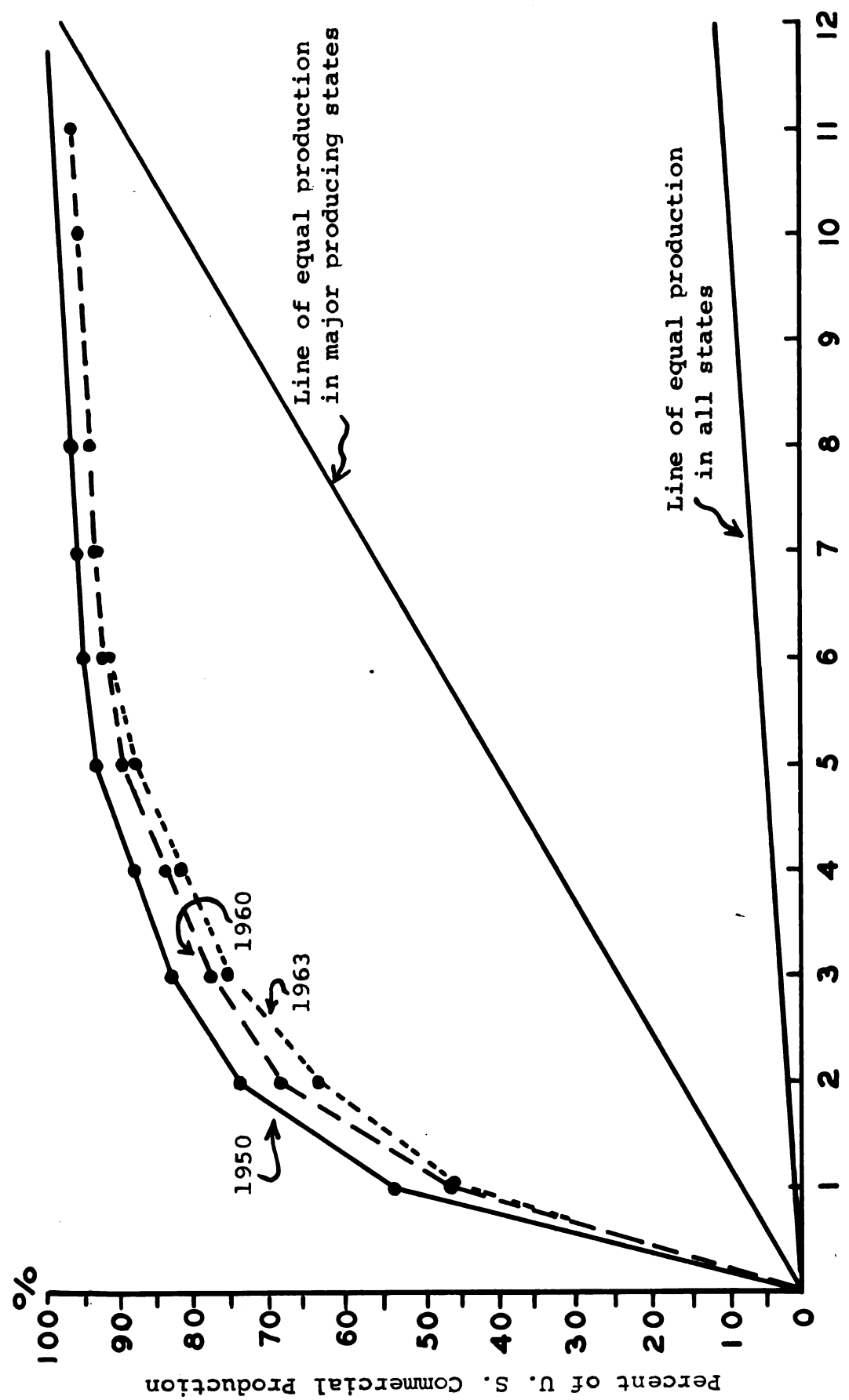

Figure 2. Concentration of Asparagus Production, Cumulative Percentages of Total United States Commercial Production by Number of States Producing.

Source of basic data: The Almanac, National Canners Association, Washington, D. C. (Annual Issues)

Michigan growers produce only the all green product, in general operate small acreages, and are further differentiated by their method of harvest. Nearly all of the Michigan production is snapped above the ground resulting in less gross weight but eliminating the necessity of trimming off the fibrous butts prior to processing. Michigan is the only State where this technique is used extensively. In most regions the spears are cut one or two inches below the ground, although in some localized areas they are cut at the surface--a compromise between the snapping and cutting techniques.

New Jersey producers in general are specialized in vegetable crops with fairly large acreages. In contrast, the majority of Michigan growers are diversified into grain and livestock as well as fruits and other vegetables, and tend toward small plots of asparagus where it will complement their land and labor utilization in other enterprises. Much of the Illinois crop is produced under contract or on processor leased land, resulting in highly localized production areas around the processing plants and fairly large acreages.

Other regional differences exist in the marketing patterns, the allocation of product between fresh, frozen, and canned markets, and the producer organizational activities.

Marketing Patterns

The contractual arrangement between grower and processor which exists in Illinois, results in a large proportion of the Illinois production being channeled into processing outlets. The processor is also the major outlet for Michigan--in contrast to New Jersey and Maryland where nearly half of the product is sold fresh, or to Massachusetts where essentially all the crop goes to the fresh market. Table 1 indicates the distribution by state between the fresh and processed markets for the ten year period 1950 through 1959. While state by state detail is not available on frozen pack, the regional analysis in Table 2 shows that the West Coast region accounts for about three fourths of the total frozen asparagus; the midwest only about two percent. The combined pack of Washington and Oregon has averaged about the same total quantity of frozen product as California's, although the total production is only a fraction of the California volume. This indicates that the Washington-Oregon market outlet is primarily in frozen asparagus. The fresh market for the entire United States is divided between California and New Jersey primarily on a time differential--California shipping even to East Coast cities until the New Jersey crop comes on the market. Washington is the only other state shipping carload lots to points outside their immediate locality, although every producing state supplies fresh product to local markets. The auction system in New Jersey

provides even small growers good access to the large chain store buyers. This enables New Jersey growers to compete effectively with the larger farm units of California, for midwestern fresh markets.

Table 1. Distribution of asparagus production between fresh and processed markets. Total tonnage and percent in each market by state. 1950-1959 average.

	Fresh %	Pro-cess %	Total tons
Michigan	13.9	86.1	7,530
Illinois	18.4	81.6	7,890
Washington	31.2	68.8	17,810
California	33.8	66.2	86,290
Oregon	33.9	66.1	590
Maryland	40.2	59.8	2,390
New Jersey	42.5	57.5	36,220
Massachusetts	100.0	0	1,600

Source of basic data: Agricultural Statistics, United States Department of Agriculture, Washington, D.C. (Annual issue 1952-1962.)

The United States export market is primarily for white asparagus. Consequently, although exports run as high as one-fifth of the total United States' pack, this demand is filled almost exclusively by California. In 1960 for example, total United States' exports were reported as 2,195,000 standard cases of 24 - #2 cans. California

Table 2. Asparagus--frozen pack, United States and by region, 1950-61.[a]

Year	Total	Region			California	Washington and Oregon
		East and South[b]	Midwest[c]	West[d]		
	1	2	3	4	5	6
	thousand pounds, frozen weight					
1950	22,309	8,634	784	12,890	5,615	6,904
1951	23,562	10,823	720	12,019	5,028	6,923
1952	25,460	11,284	667	13,509	6,046	7,463
1953	32,945	15,327	478	17,140	8,987	8,153
1954	25,780	11,986	414	13,380	6,472	6,908
1955	28,669	13,492	724	14,453	7,786	6,666
1956	37,674	12,816	2,687	22,171	14,397	7,774
1957[e]	31,201	10,703	1,312	19,185	10,023	9,162
1958[e]	24,365	10,080	963	13,323	6,966	6,356
1959	32,739	12,720	861	19,158	10,942	8,216
1960	40,026	14,555	811	24,660	12,660	12,000
1961[f]	34,028	9,886	650	23,492	13,741	9,750
1962	30,810	8,304	564	21,942		

[a]Commercial pack only.

[b]Includes Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Mississippi, Missouri, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, Tennessee, Texas, and Virginia.

[c]Includes Illinois, Indiana, Michigan, Minnesota, Nebraska, North Dakota, Ohio, and Wisconsin.

[d]Includes California, Colorado, Idaho, Montana, Oregon, Utah, Washington, and Wyoming.

[e]Revised.

[f]National Association of Frozen Food Packers, Frozen Food Pack Statistics, 1961 (Washington, 1961).

Source: Bain, Beatrice, and Sidney Hoos, Asparagus--Processed and Fresh Markets, Economic Statistics for the 1962 Season, California Agricultural Experiment Station, April, 1962, p. 25.

exports from Los Angeles and San Francisco ports only were reported as 1,370,000 actual cases. This would not include California's share of the Canadian market nor California shipments from the East Coast ports. European markets have traditionally been for white asparagus and California is the only region reporting commercial acreage of this variety.

Grower Organizations

Growers' organizations exist in each of the four major producing regions but their objectives, activities, and strength differ widely and many individual states lack any type of formal organization of their own. Until recent years California has operated under a State marketing order which facilitated grower-processor negotiations. This legislation also provided for advertising and promotion contributions, sponsored research, and regulated quantity of production. While a growers' organization still exists, the marketing order has been voted out and the activities of the growers do not include bargaining negotiations. Washington established an organization in 1957 which negotiates with processors, prepares grower contracts, and provides market information and other grower services. Processor negotiations in New Jersey are handled by the New Jersey Vegetable Growers Cooperative Association, Inc., which has now merged with the New Jersey Agricultural Marketing Association Cooperative. In addition there is

a New Jersey Asparagus Industry Council established by legislation in which promotion, marketing, and research programs are financed by a tax imposed upon growers and processors. The Michigan Asparagus Growers Cooperative Association has merged with the Michigan Agricultural Cooperative Association (an affiliate of Farm Bureau) and present activities consist chiefly of providing marketing information and a liaison between growers and processors for improved grading, and purchasing practices. Each of these four state organizations include some growers from adjacent states, but in general these other areas operate on an individual grower-processor basis without group representation. While part of the differences between organization is a result of basic regional differences in environment and grower needs, much of it must be attributed to the exploratory stage of the industry organizations in which the asparagus industry is searching for answers to its complex of problems through trial and error techniques.

Consumption Characteristics

The preceding description of the industry environment has centered around the production of asparagus. Equally important to an understanding of the industry is the relationship of the finished product to the consumer. Grown originally for its medicinal value, asparagus has always held a unique position among vegetables and many

of the industry problems evolve from this uniqueness. Its unusual flavor, an image of a "company dish," and a high retail price, combine to restrict consumption to a specialized market. A pilot study of consumer motivations toward asparagus emphasized this uniqueness in its findings.[1] Three conclusions specified in the study help to illustrate this point. (1) "Asparagus is 'different' and 'unique' -- and therefore 'controversial.'" (2) "Asparagus is elegant to the sophisticated, alien to the many." (3) "Asparagus tends to invite extreme reactions."

As a result of these characteristics, asparagus is purchased by a small number of consumers who form a relatively stable group in terms of composition and characteristics. Consequently per capita consumption has remained fairly constant since 1940. On a fresh weight equivalent, 1939 per capita consumption was 2.13 pounds per person. In 1960 it was 2.15.[2] Fluctuations in the intervening years were from a low of 1.86 to a high of 2.66. There has, however, been a definite downward trend in consumption of fresh asparagus and an upward trend of frozen. Consumption of canned asparagus has fluctuated according to total supplies available to processors.[3]

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[1] R. Gatty and E. Angel, Consumer Motivations Toward Asparagus; A Pilot Study, Department of Agricultural Economics, Rutgers, New Brunswick, New Jersey, 1961.

[2] United States Agricultural Marketing Service, The Vegetable Situation, October, 1961, p. 21.

[3] A detailed table of per capita consumption may be found on page 87, Chapter IV.

The General Environment in Bargaining Perspective

The environment of the asparagus industry thus consists of the geographical distribution of producing regions, regional differences in production techniques, marketing channels, current grower organizations, and the characteristics of the consumers of the finished product. Asparagus is a specialty crop grown in localized areas and having limited market outlets for final consumption, domestically as well as abroad.

Although the spatial concentration of production in four states facilitates interregional organization of the growers and regulation of supplies for short periods of time, there are other environmental factors which deter such organization. While spatial separation is a rather negligible handicap in itself, it results in other differences which are more significant. The climatic, topographical, and soil conditions are important differences arising from this spatial separation. The resultant variation in production techniques, cultural practices, and product, make a non-comparable basis for regional comparisons of costs and prices. The importance of asparagus in the farm organization results in widely different aspirations for the asparagus grower; each region tending to have different objectives and expectations for the crop as well as different value systems concerning organizations. The variation in market outlets also accentuates these differences.

The existence of organizations in the other producing areas provides a wider range of experiences from which to evaluate organizational opportunities for the Michigan growers. The failures as well as the successes in other areas can be used in combination with Michigan experience, to develop that form of organization which will best meet the needs of the Michigan industry. The composition of the consuming sector of the industry also contains implications for the organizational potential. The stability of the consuming group, resulting primarily from the uniqueness of asparagus, implies difficulty in increasing consumption over a short period. Little response to price in the short run would be expected due to the necessity for developing a taste among consumers not familiar with the product. The product image of uniqueness limits the acceptability of asparagus as a vegetable to be served other than for special occasions. These relationships will be further elaborated in the ensuing chapters, and substantiated with economic and statistical analyses.

CHAPTER III

ASPARAGUS PRODUCTION IN MICHIGAN

Organization of the Michigan Industry

Within the frame of reference provided by the general environment of the industry, the Michigan producers of asparagus have a history, a structure, and an environment which interact with other regions to develop the potential for group formation. The history of Michigan production and the growth potential of the industry is a key factor in explaining the need and opportunity for an industry organization. While the Michigan industry has been growing as indicated in Figure 1, page 8, a further analysis is needed to evaluate the importance of this growth and its effect upon the agricultural economy of the state.

Intercrop Relationships

One technique for comparing asparagus with other crops is utilized in Figure 3 where asparagus appears as one of the most promising horticultural crops. The vertical axis of Figure 3 records the average Michigan production in the 1957 to 1960 period as a percent of average production in the 1941 to 1960 period. The horizontal axis shows similar percentages for the total United States. The diagonal line connects points of equal percentage changes in both United States production and

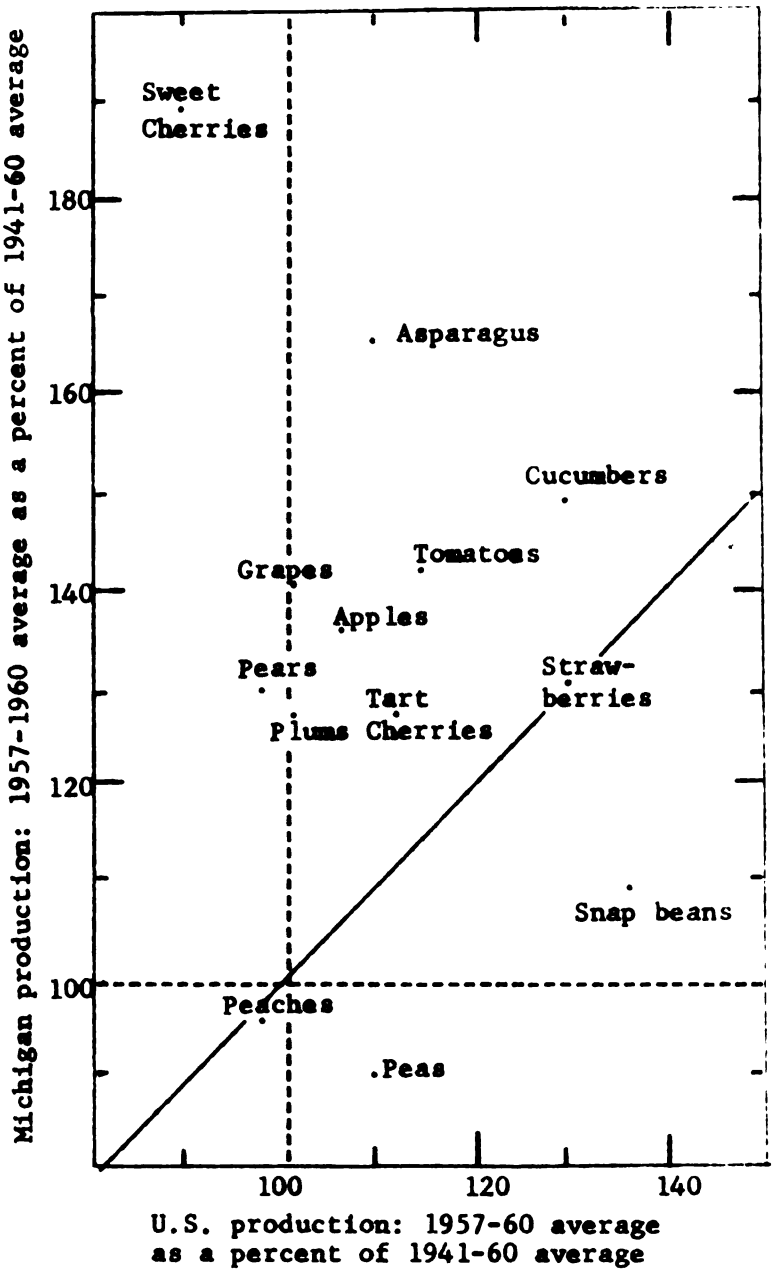

Figure 3. Comparison of United States and Michigan changes in production of horticultural crops.

Basic source of data: Michigan Agricultural Statistics, Michigan Department of Agriculture, Lansing, Michigan (annual issues)

Michigan production. Thus, an observation on this line would indicate that Michigan is producing the same share of the total production in both periods and Michigan and United States production changes have been in equal proportion for the two periods under consideration. An observation above the line indicates Michigan production has been increasing more rapidly than the total United States, and is producing a larger share of the total. For observations below the line, the converse is true: Michigan's share in total production has decreased. The line parallel with the vertical axis represents 100 percent for the United States production. It separates the area on the left in which total industry production is declining (i.e., average production is less for the 1957-1960 period than for the 1947-1960 period) from the area on the right in which total United States' production has increased.

Green peas and snap beans are the only two crops shown in Figure 3 in which Michigan has appreciably lessened its share of total production. Michigan production of peas declined absolutely as well as relatively while a 15 percent increase in production of snap beans in Michigan was insufficient to keep pace with the growth in the total industry. Sweet cherry production in Michigan during recent years has been 190 percent of the 20-year average, indicating rapid relative growth and suggesting a potential for future development. However, the point representing sweet cherries lies to the left of the 100

percent line in Figure 3, indicating that Michigan's greater share is of a nationally declining total.

Another factor to consider is the importance of the crop in terms of total acreage--an indication of the influence growth could have upon the state's agricultural economy. State and national production have increased rapidly and Michigan acreage is sufficiently large to be an important contributor in the horticultural crop sector of Michigan agriculture. While Michigan ranks fourth in the production of processed asparagus, it still produces less than 8 percent of the U. S. total. Michigan thus possesses a good potential for expansion without unduly influencing the national markets.

Historical Development of the Michigan Industry

Structurally, the Michigan producing sector is composed of approximately 2,000 farms (2,314 in the 1959 Census of Agriculture) involved in the production of asparagus on an area exceeding 11,000 acres. This represents a large increase in number of farms, number of acres, and average acreage per farm over the 1920 figures. As indicated in Table 3, the number of farms reached a peak around 1954 and has been declining as total acreage continues to increase.

The pattern of production distribution is shown in Figure 4 and 5 where it is evident that the major counties are concentrated along Lake Michigan. The acreage increases

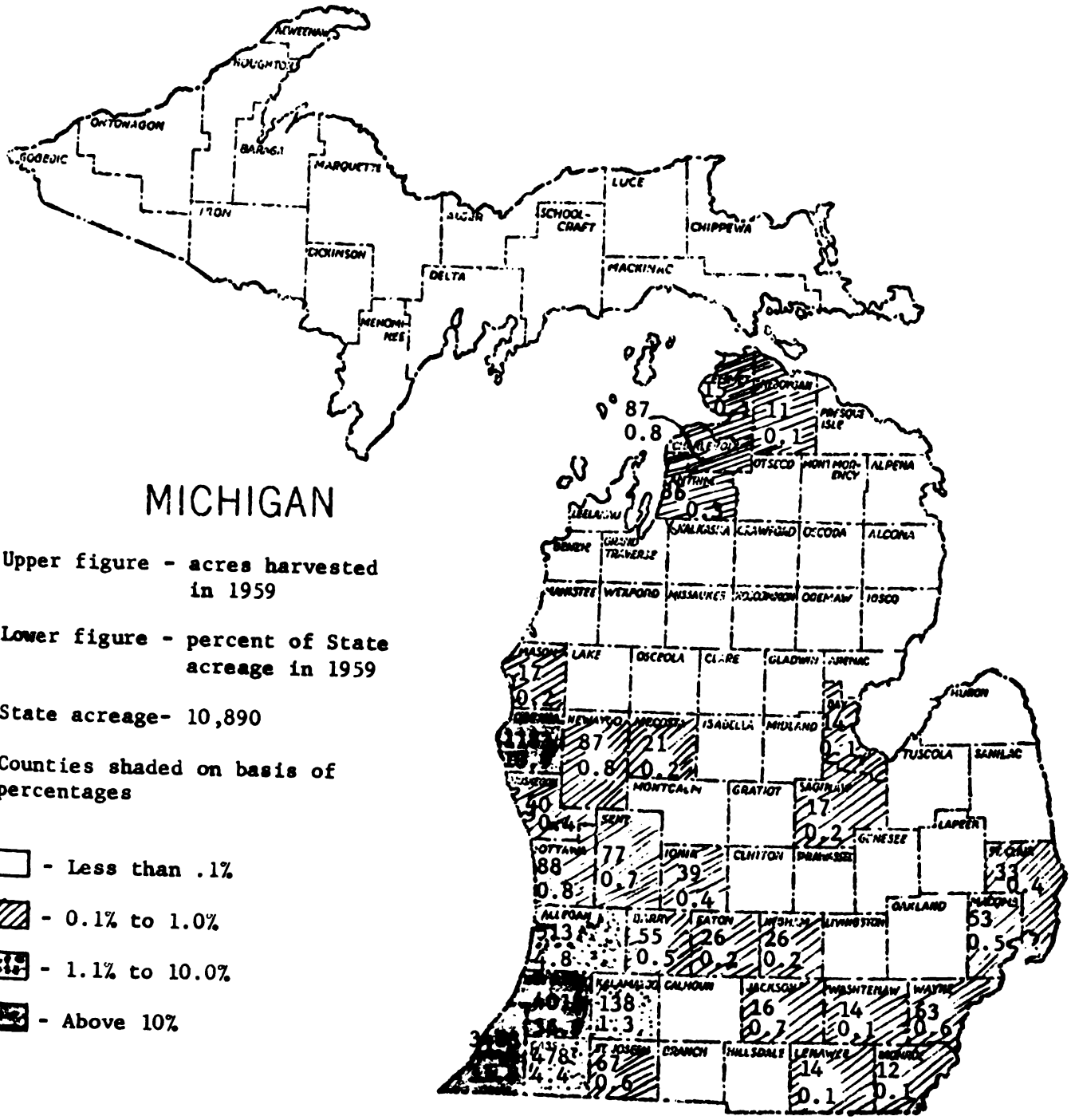

Figure 4. Acreage of asparagus and percent of state total, Michigan by counties, 1959

Source of basic data: United States Census of Agriculture, Department of Commerce (1959)

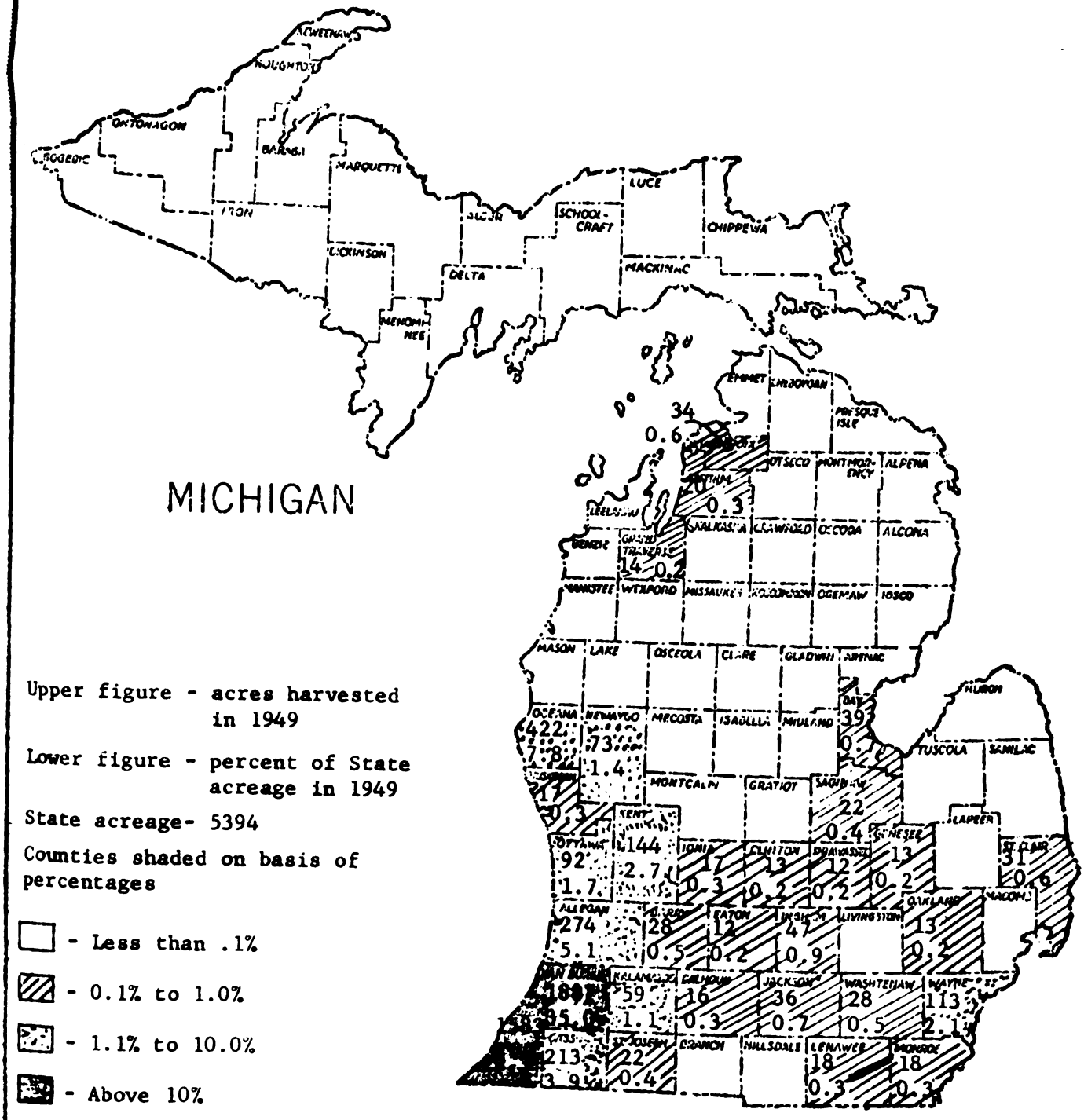

Figure 5. Acreage of asparagus and percent of State total, Michigan, by counties, 1949
Basic source of data: United States Census of Agriculture, Department of Commerce (1949)

as shown in Table 3 have altered the geographic concentration of production in Michigan. A comparison of Figures 4 and 5 show that production has shifted toward western Michigan between 1949 and 1959 with an accompanying increase in concentration. The extent of this increase is better illustrated in Figure 6, where the four lines indicate the proportion of production from a given number of states, for the years 1929, 1939, 1949 and 1959, respectively. Unlike the national situation depicted in Figure 2, page 10, concentration in the major areas in Michigan has continued to increase during the last decade within the top five counties.

Table 3. Farms reporting asparagus production and number of acres by census years.

Year	No. of Farms	No. of Acres	Average Acres per Farm
1920	237	256	1.08
1930	1401	1467	1.05
1940	1677	2531	1.51
1950	2180	5394	2.47
1954	2589	8724	3.37
1959	2314	10890	4.71

Source: Census of Agriculture.

The steady increase in average acres grown per farm is an indication of increased specialization in production and a decrease in the number of "garden size" beds whose output was formerly delivered to local, fresh market outlets. The decrease in absolute acreage as well as percentage of the total crop around metropolitan areas

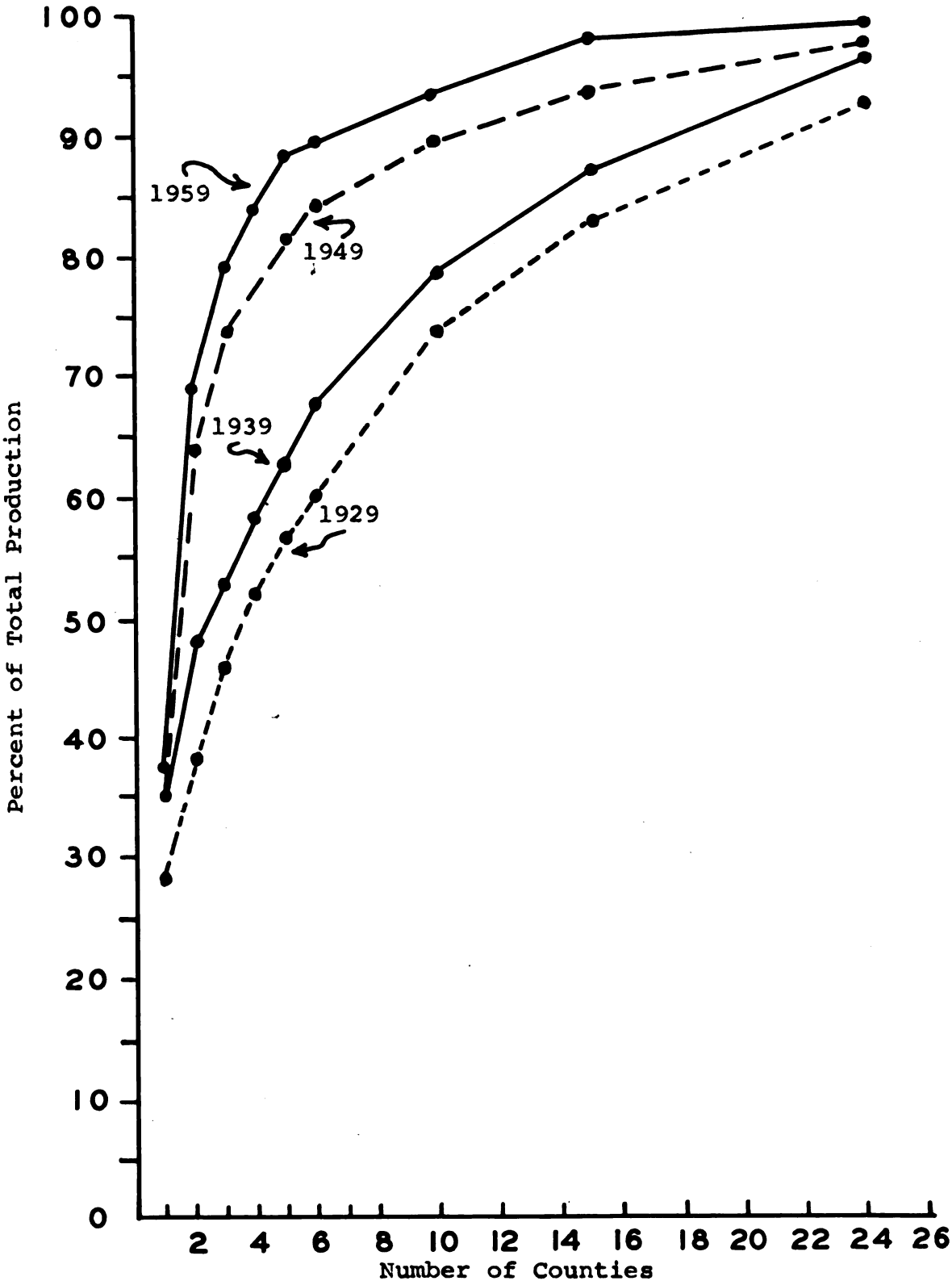

Figure 6. Percent of Production by Number of Producing Counties in Michigan; 1929, 1939, 1949, and 1959.

Source of basic data: United States Census of Agriculture, Department of Commerce, 1929, 1939,

also suggests decreased importance of Michigan asparagus in the fresh markets. The wide range of acreage per farm between counties indicates that there are still many small producers over the State. For example, in 1959, the average acreage in Cass County was 10.6 acres for the 45 producers, while the 49 growers in Kalamazoo County averaged 2.8 acres. A tabling of acreage per farm from the survey data shows a frequency distribution heavily skewed to the left as in Figure 7--a factor of importance in the formation of a grower organization. The feasibility of coordinated action among the growers is diminished due to the large number of growers with small acreages. Their sheer numbers present an obstacle to organization. Also the minor importance of asparagus in the cropping system, as evidenced by the survey results, is not conducive to strong support for organizational activity.

Cultural Characteristics of Asparagus

A prerequisite for developing an economic and institutional analysis of the asparagus industry is a knowledge of the crop and its characteristics of growth and culture. The genus Asparagus, a member of the Lily family, has at least 150 species found throughout the temperate and tropical regions of the world. Only one of these is cultivated as a food plant. It is a perennial, dioecious herb, 4 to 10 feet tall, with male and female flowers borne on separate plants. The plant develops two kinds of roots--fleshy and fibrous--which serve as storage

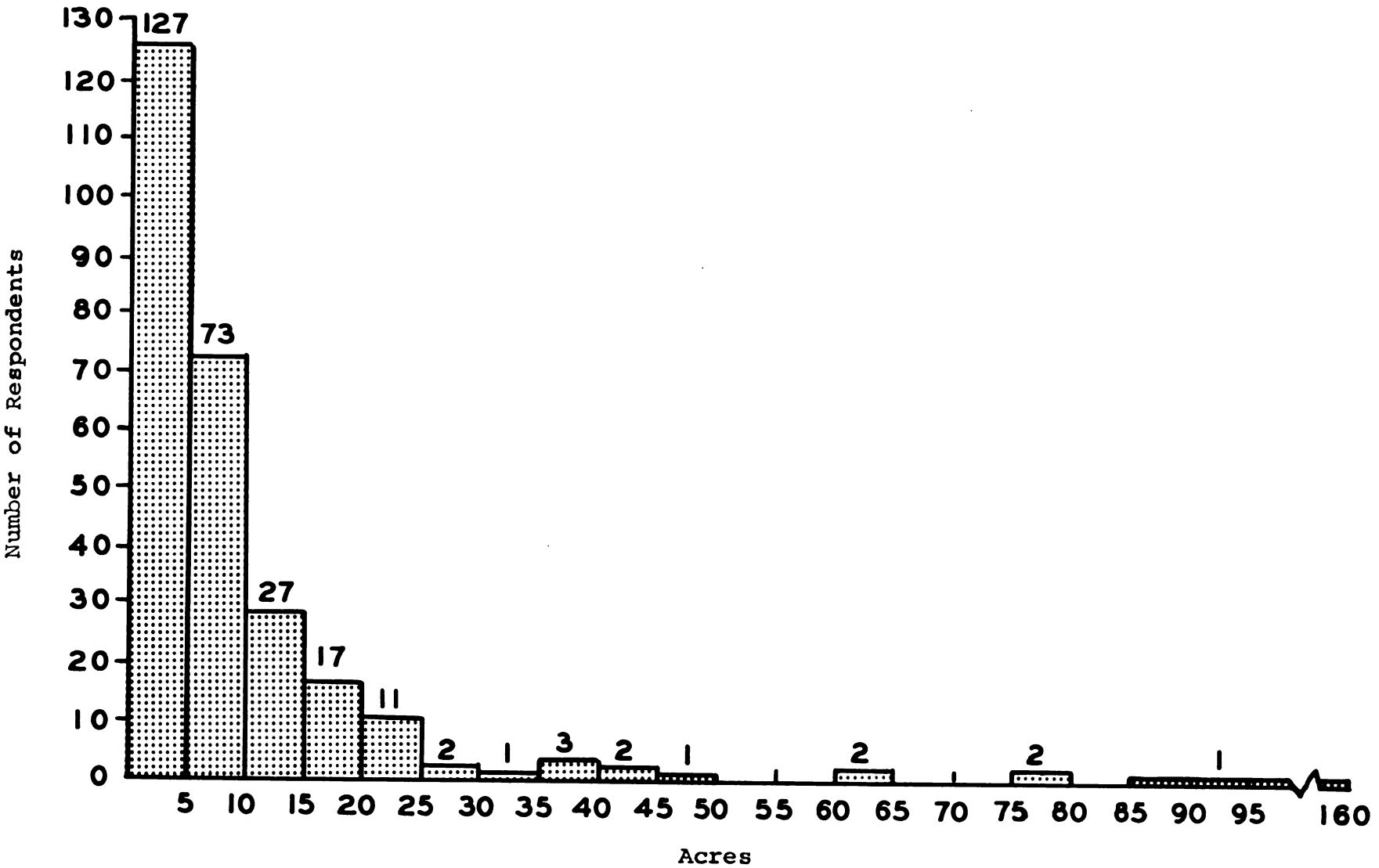

Figure 7. **Frequency Distribution of 1963 Asparagus Acreage Reported by Survey Respondents.**

Source of basic data: Survey Questionnaire Results.

roots and adsorptive roots respectively. As this root system develops, a rootstock or crown is formed containing numerous buds. These buds produce the top growth which emerges as a shoot or spear; developing branches, leaves, and flowers if permitted to grow. When the spear is harvested (usually at a length of 4 to 9 inches) additional buds become active with spears emerging frequently during the growing season and requiring daily or twice daily harvesting during favorable weather.

While asparagus may be reproduced asexually, the common method is to transplant one year old crowns which have been grown from seed under nursery conditions. The crowns are planted in the spring in trenches 6 to 14 inches deep with soil being gradually filled in by cultivation as the new shoots appear. In the following spring, top growth is disced into the soil or removed before spring growth begins and weeds are controlled during the growing season by cultivation or chemicals. It is generally recommended that harvesting begin in the third year, with a short season to permit late summer storage of food reserves in the crown. Full term harvesting (usually consisting of 6 to 8 weeks) begins in the fourth season after planting. The food reserves accumulated after harvest ends are quite important to the growth the following year. Tiedjens[1]

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[1]A. Tiedjens, "Some Physiological Aspects of Asparagus Officinalis," Proceedings of American Society of Horticultural Science, 1924, 21:129-140.

suggests that for a single year's growth, asparagus needs only water and oxygen from the soil. This provides a partial explanation of the controversial results from fertilizer experiments with asparagus. Brown, conducting both laboratory and field experiments stated, "In conclusion, there appears to be some disagreement among investigators as to the fertilizer requirements of asparagus but the evidence indicates a reduced response to applied fertilizer as the plants grow older."[1] Fertilizer recommendations have been adjusted downward during the past ten years in contrast to increased applications for most other crops. Present recommendations[2] suggest heavier applications of complete fertilizers (500 to 100#) during the first three years in order to establish a good root and storage system. After the plants are well established this is decreased to 40 to 60 pounds of actual nitrogen following the harvest season, with some side dressing in the spring and a complete fertilizer applied as soil tests indicate. Irrigation trials have also produced conflicting results in Michigan and further research is needed prior to recommendations. Other cultural practices consist of weed and insect

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[1] L. D. Brown, "Some Influences of Mineral Nutrition on the Growth and Chemical Composition of Asparagus Officinalis," (unpublished Ph.D. dissertation, Dept. of Soil Science, Michigan State Univ., 1962).

[2] J. D. Downes and John Carew, Asparagus Production, Fact Sheet for Michigan Agriculture, Cooperative Extension Service, Michigan State University, East Lansing, Michigan.

control, neither of which present a serious problem for most Michigan growers.

Development of new varietal strains of asparagus has been very slow for two reasons. (1) The number of years necessary to adequately test a new variety requires long term testing programs. Since a planting may be expected to continue in production for fifteen to twenty years, a new variety must have longevity as well as high productivity. (2) The lack of purity in existing strains combined with the necessity of cross pollination makes genetic improvement difficult and costly. Since self-pollination is ordinarily impossible with asparagus, development of pure strains has been slow and new varietal crosses are scarce. The original Mary Washington and Martha Washington varieties developed in 1910 are still widely planted and have been the recommended varieties for many years. A new variety has been developed which is showing considerable promise but has not been in production long enough to be widely accepted.

Technology in the sense of varieties, fertilizer use, and mechanization, has changed very little in the last fifty years. The use of chemicals has improved the control of weeds and insects but modern science has added little else to the production techniques of 2,000 years ago.

The Place of Asparagus in the Farm Organization

The place of asparagus in the farm organization is also an influence in the Michigan asparagus industry. Although adapted to deep fertile soils, much of the processing asparagus is grown on the sandy loams along Lake Michigan, where the tempering effects of the lake create a particularly desirable environment of early springs and moderate temperatures.

With respect to the location of the asparagus acreage within a given farm, the alternative land use is probably the most important consideration. Fruit crops in this area of Michigan are usually given first priority in allocating the available acreage. On many farms there exist small areas which, for reasons of air drainage, slope, and exposure, are not well suited for fruit trees. It is upon these areas that asparagus is most often found on the diversified farms. This is not true on the larger acreages (over 15 or 20 acres) but it accounts for a large number of the 2,314 farms reported in the 1959 census as growing asparagus for commercial markets. This relationship, combined with the early but short harvest season, gives asparagus a position of high complementarity in many farm organizations. It permits use of land, labor, management, and capital reserves, in a way which detracts little from the application of these factors to other enterprises.

The Harvesting Process in Michigan

As mentioned previously, the harvesting technique used in Michigan differs from that of most other regions. From 95 to 100 percent of all commercial production in Michigan is harvested by "snapping." This consists of bending the stalk until it breaks rather than cutting below the ground. The break will occur just above the fibrous portion, producing a spear of high quality over its entire length and elminiating the need for further trimming at the processing plant. Harvesting is done by hand, utilizing family labor on the small acreages and hired labor on the larger acreages--usually migrant labor available from late season vegetable crops. The only successful mechanization has been the use of "rigs" on which the worker rides across the field. These may be self-propelled or pulled by a tractor, and carry from three to eleven workers depending primarily upon the size of the field. The spears are placed in boxes which are then deposited at the end of the field and collected by truck for delivery to the processing plant. Although several mechanical harvesters have been designed none have been successful. The problems of selectivity and spear damage have been difficult obstacles to overcome.

Production Trends and Prediction

Although acreage has increased quite slowly during the past five years, an historical analysis of asparagus production in Michigan indicates a rapid acreage expansion occurring between 1946 and 1956. Figure 8 shows this pattern in harvested acreage along with total production of processed asparagus. The declining average yield reflected by the relationship of production and acreage is shown more clearly as the solid line in Figure 9. Explanation of this diminished yield lies in an analysis of the rate of acceptance of the snapping technique for harvesting. It was first introduced in the early forties and annually gained wider acceptance. By 1957, nearly all the Michigan crop was being snapped. Since the yield and production data has been reported on a combined cut and snapped basis the tonnage from all acreage has gradually decreased as more of the growers adopted the snapping technique each year. This diminished yield thus reflects a technological change rather than the biological productivity of the Michigan crop.

To provide a more comparable series of yield and production data, the percent of the crop harvested by snapping in each year was used to convert production to a snapped equivalent basis. Using experimental test results[1] which indicate a ratio of cut to snapped asparagus

[1]Unpublished research conducted by the Michigan State University experimental farm at Sodus, Michigan, in 1957 and supported by grants from the Michigan Asparagus Growers Association and Millburg Growers Exchange.

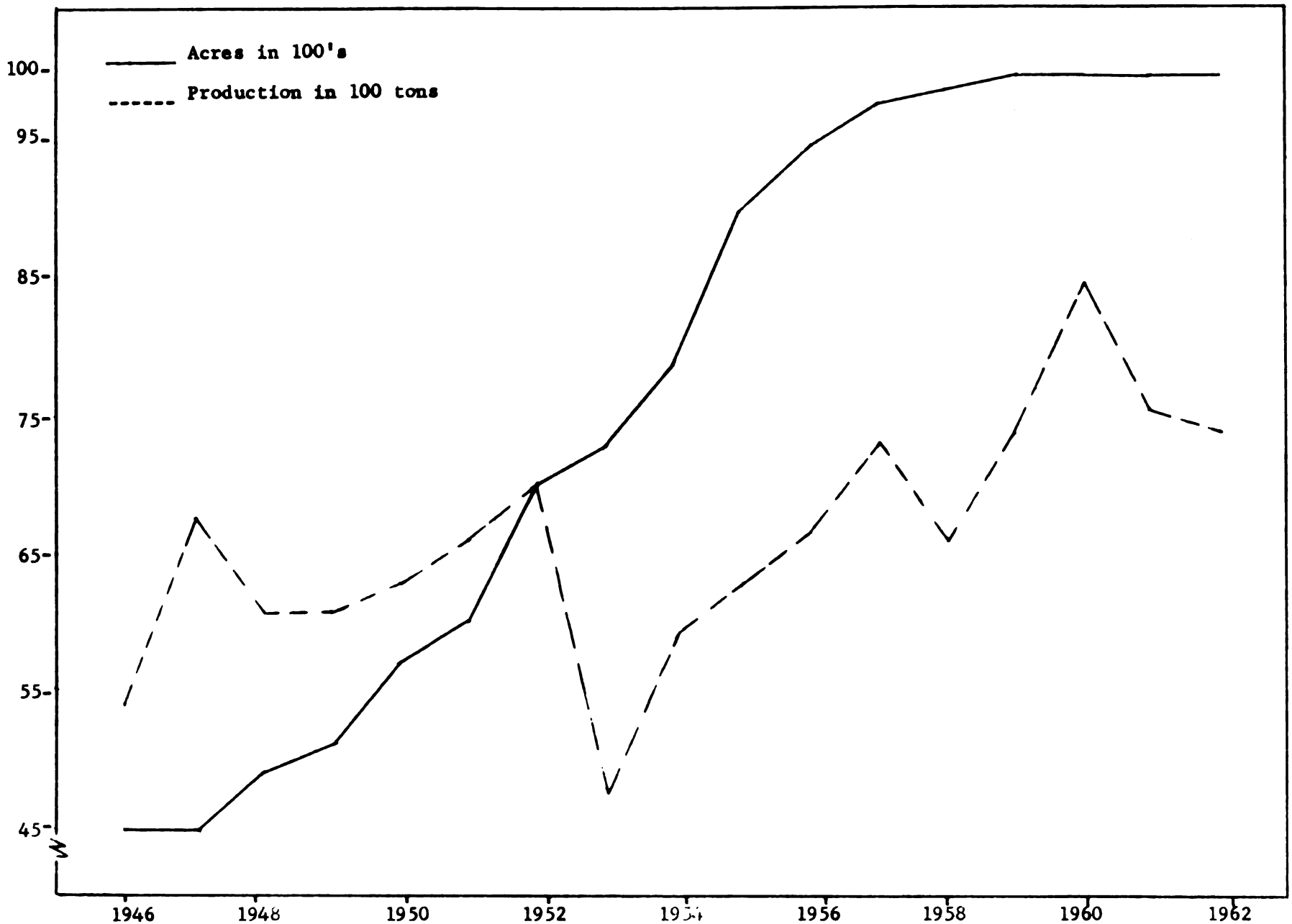

Figure 8. Acreage and production of processing asparagus in Michigan
Source of basic data: Michigan Agricultural Statistics, Michigan Department of Agriculture, annual issues

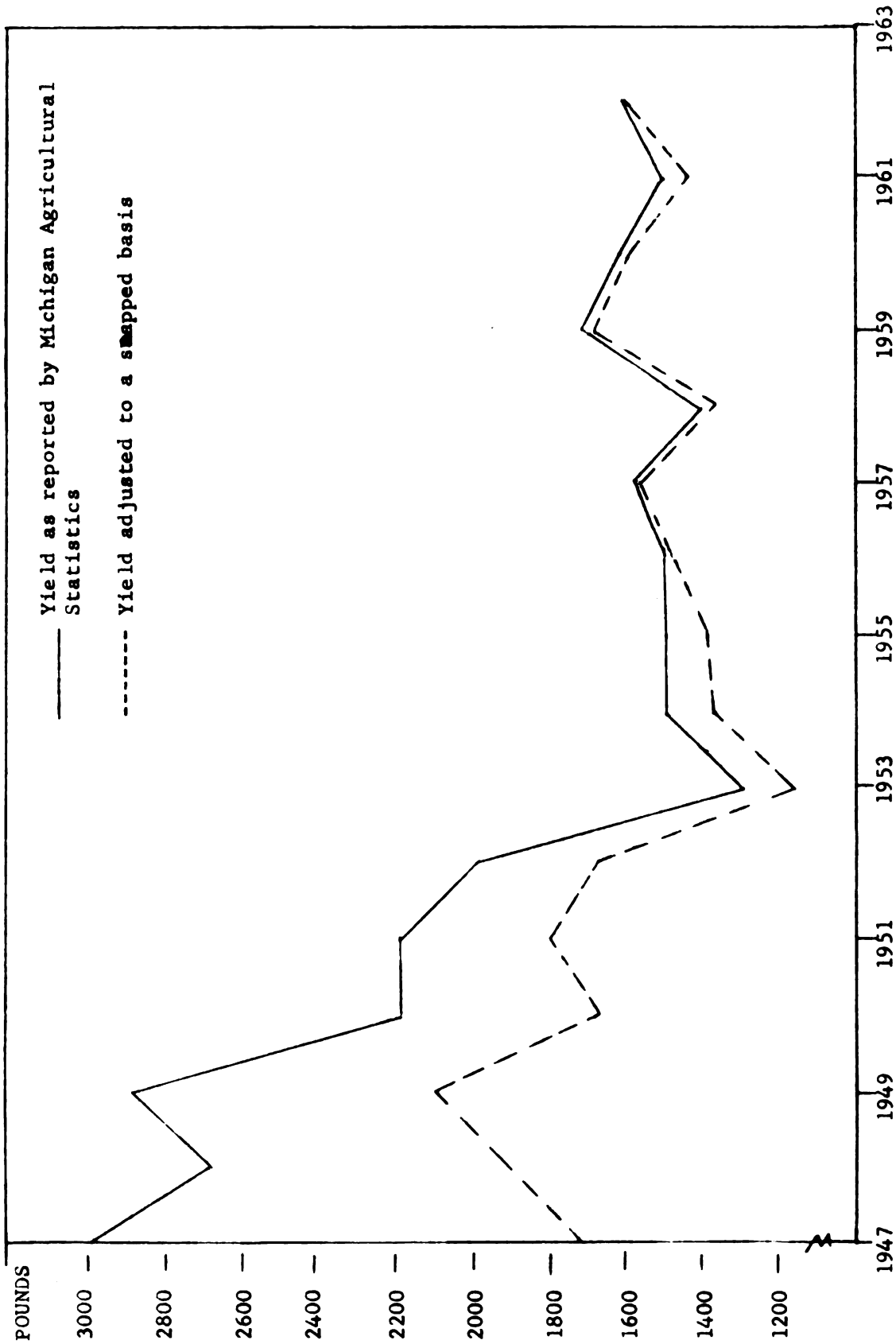

Figure 9. Yield of Processing Asparagus in Michigan, in pounds per Acre 1947-1962
Source of basic data: Michigan Agricultural Statistics,
Michigan Department of Agriculture, Lansing, Michigan,
(annual issues)

of 1.56:1, from equally productive plots, the yield data was converted to a standard base and plotted as the dotted line in Figure 9. The resultant graph indicates the relative stability of yield which has characterized the asparagus industry in Michigan as well as in other states since 1953. The fluctuations which have occurred are primarily due to variation in weather conditions.

One of the important uses of historical data, such as these trends in production and yield, is the estimation of production prior to the harvest period. Growers often make these estimates individually based upon their plans and their evaluation of the season. Processors also utilize their judgment and experience in determining in advance of the season the anticipated production from their supply area. These factors may be further aggregated to include the entire state, and statistical techniques used to quantify the relevant variables in determination of production. In equation 1, 90 percent of the annual variation in production is explained by[1] changes in acreage and lagged farm price.

The values obtained by statistically fitting this equation to the data from 1947-1963 indicate that an increase of one acre in the state will result in an increase of .788 tons in total production, on a snapped equivalent

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[1]The use of the term "explained by" is not intended to imply causation.

basis. For a 1964 prediction (since nearly 100 percent of the crop is snapped) the estimated tonnage may be obtained by inserting the 1964 acreage for X_1 and 1962 price for X_3 and performing the indicated multiplication and addition.

Equation 1:

$$X_5 = 2644.87 + .788\ X_1 - 12.847\ X_3$$

$$(5.15)^* \quad (9.44)^* \quad (3.59)^*$$

*Numbers in parentheses are t-values

Where:[1]

X_5 = Annual production of processing asparagus in Michigan adjusted to a snapped equivalent basis.

X_1 = Annual acreage of processing asparagus in Michigan.

X_3 = Michigan farm price in dollars per ton lagged three years.

$R^2 = .90$ = The percent of total variation in production explained by the equation.

Degrees of Freedom = 14

Standard error of the estimate = 734.6.

The high correlation in this equation using only the two variables, acreage and lagged price, indicates the relative stability of yield when averaged over the entire state. Prediction for an individual grower or even for all growers in a local area, would be less accurate due

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[1] A description of the data and their sources is given in Appendix C.

to climatic variations and other variables excluded in this simplified model.

Although estimates of harvested acreage are available just prior to the beginning of the season, it would be useful to predict production prior to release of these estimates. Equation 2 uses lagged price and time as the independent variable for estimating acreage.

Equation 2:

$$X_1 = 1964.36 + 12.793\ X_3 + 339.936\ X_{16}$$
$$(2.89)^* \quad (2.47)^* \quad (8.69)^*$$

*Numbers in parentheses are t-values

Where:[1]

X_1 = Annual acreage of processing asparagus in Michigan.

X_3 = Michigan farm price in dollars per ton lagged three years.

X_{16} = Time in years; 1947 = 1

$R^2 = .94$ = The percent of total variation in acreage explained by the equation.

Degrees of Freedom = 14

Standard error of the estimate = 596.6.

The statistical values obtained by fitting this equation indicate that an increase of $1 per ton in the farm price of asparagus increases harvested acreage by 12.8 acres three years later, the approximate time necessary

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[1] A description of the data and their sources is given in Appendix C.

to bring new acreage into production. The time trend variable shows an annual increase of 340 acres. Despite the fact that 94 percent of the total variation in acreage has been explained, it is important to point out that the time variable is a substitute for one or more unspecified variables which either cannot be identified or, if identified, cannot be measured. If the values of some of these variables should change relative to time, the same structural relationship need not continue between time and acreage, and predictive accuracy would be decreased.[1]

Using these two equations together for predicting total production would have resulted in fairly accurate estimates during the past ten years. Figure 10 shows actual production, on a snapped equivalent basis, as the solid line and estimated production as the broken line. While an error exists in every estimate, the predicted value falls relatively close in all but three of the past ten years.

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[1] Analysis of residuals from equation 2 indicated that a quadratic function might fit the data better, since expansion during recent years was very slight. The equation used was $Y = 1783.7 + 4.2\ X_1 + 902.1\ X_2 - 27.9\ X_2^2$

Where: Y = acreage of asparagus, X_1 = lagged price of asparagus in dollars per ton, X_2 = time in years where 1947 = 1; the fitting of this equation resulted in an R^2 of .99 and a standard error of 255.4. Although the reliability and accuracy of this equation was greater than equation 2 it was not used because large values of X_2 would result in a diminishing value for Y, i.e., a long range projection would indicate a decreasing acreage.

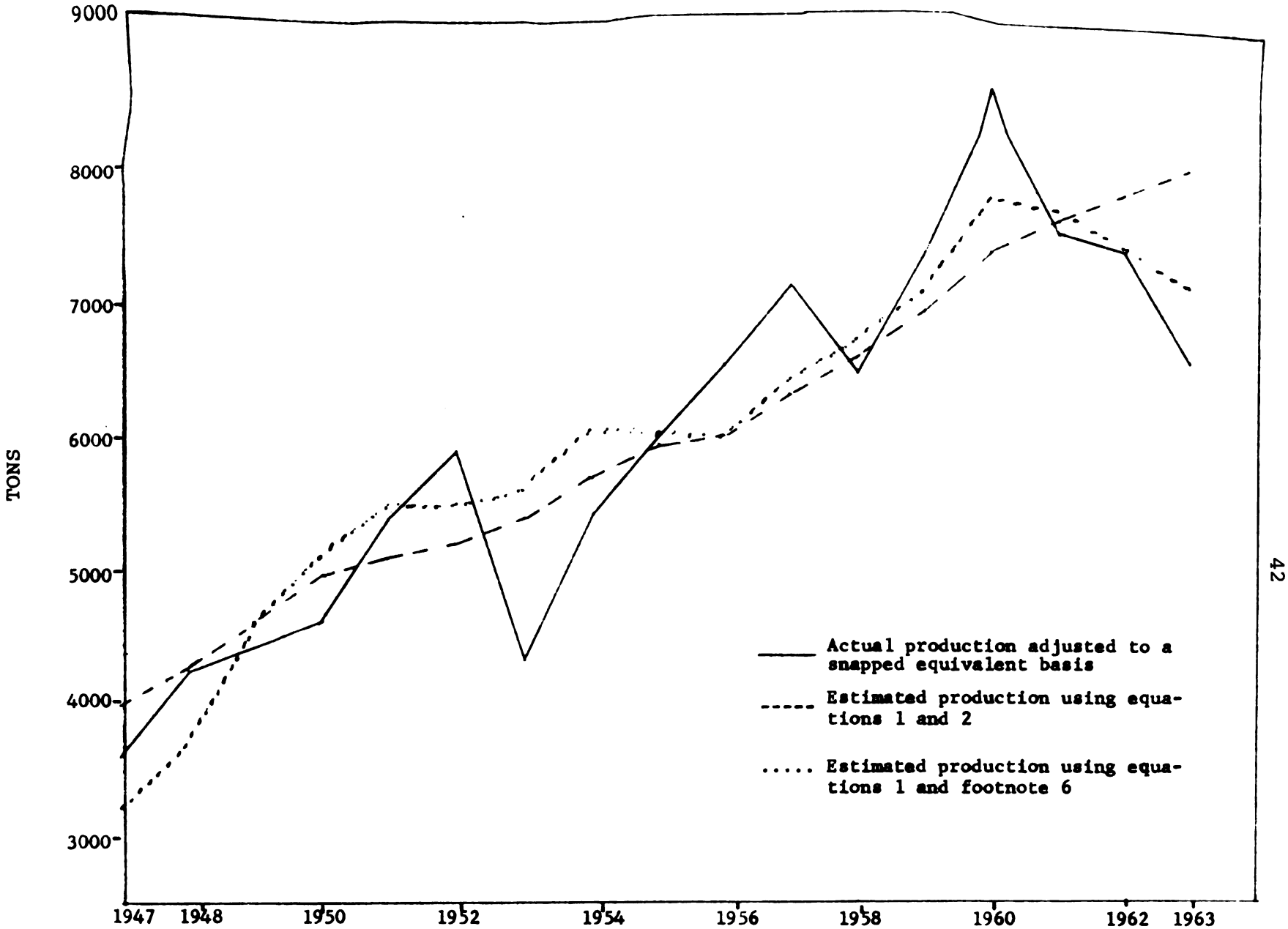

Figure 10. Actual and estimated Michigan asparagus production in tons; 1947-1963
Source of basic data: Michigan Agricultural Statistics, Michigan Department of Agriculture, Lansing, Michigan, (annual issues)

Additional observations are needed to improve on the estimates as well as to take into account any changes which occur in the relationships in succeeding years.

Michigan Farm Prices

Production trends and estimation are important factors in determining management decisions which affect farm income in the asparagus industry. Equally important is the price which the production will bring in the processing market. United States Department of Agriculture price data shown in Figure 11 involves the same complication as production data, for the introduction of the snapping technique changed the basis on which the price was quoted.[1] Assuming a constant price ratio between cut and snapped asparagus, the quoted prices have been converted to a snapped equivalent basis and plotted as the broken line in Figure 11. While the assumption is not entirely valid, the uniform basis provides comparability among the various years. Additional price fluctuations have been introduced due to the technological change requiring a series of adjustments in seeking the new equilibrium level of prices.

A problem frequently discussed in the asparagus industry is the inability of processors to establish a raw product price until after harvest has started. One of the

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[1] A detailed analysis of the effects of this change in the price basis on returns to Michigan growers, is given in Appendix A.

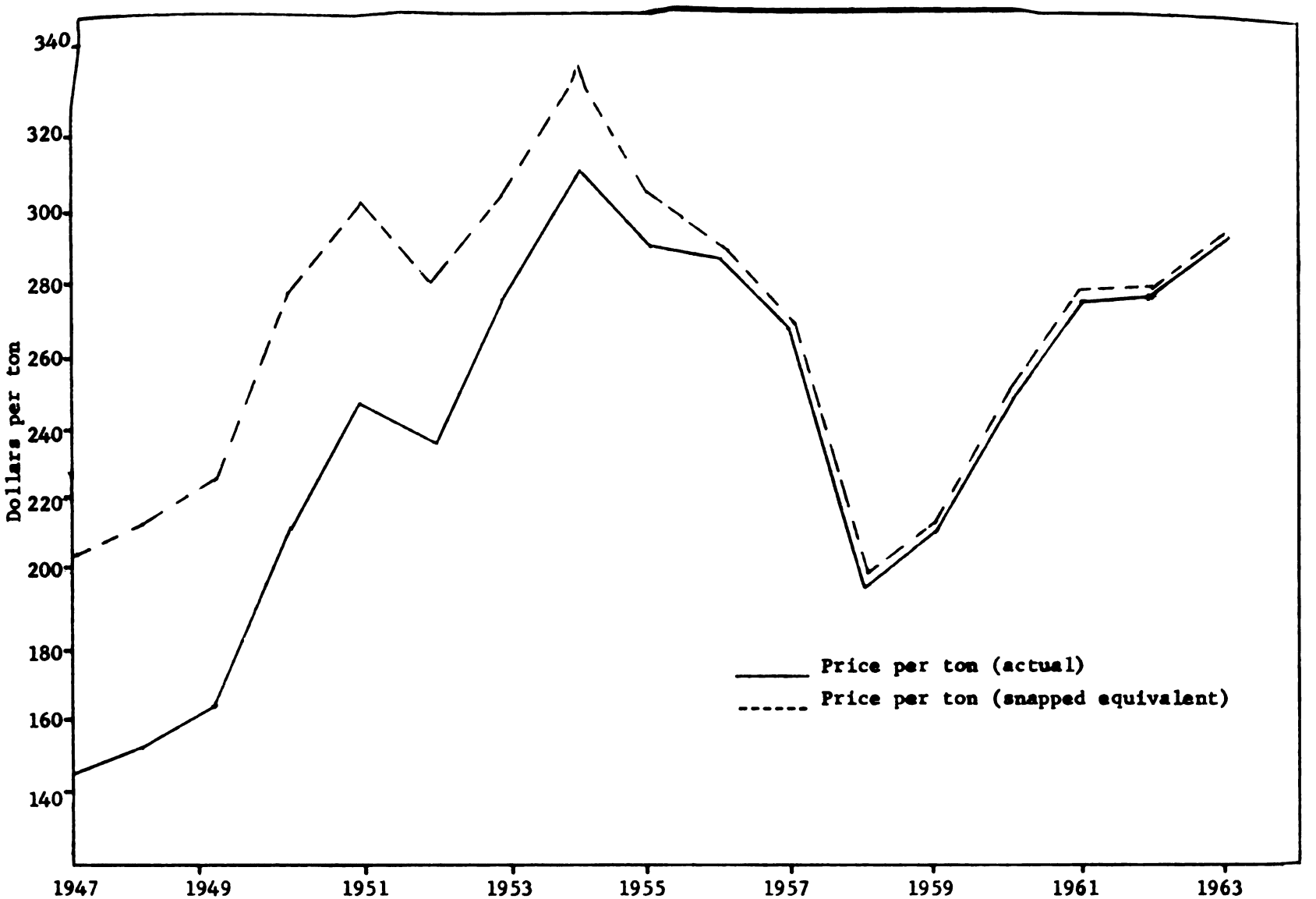

Figure 11. Farm prices for processed asparagus in Michigan, 1947-1962; actual and adjusted to snapped equivalent basis.
Source of basic data: Michigan Agricultural Statistics, Michigan Department of Agriculture, Lansing, Michigan, (annual issues)

prerequisites for price negotiations between grower and processor is a basis for establishing the range of prices for the coming season. In order to statistically quantify the relevant variables, a statistical model was fitted to the data resulting in equation 3.

Equation 3:

$$X_1 = -133.0312 - .0034\ X_2 + 194.6652\ X_4 + .00026\ X_5$$

$$(0.68)^* \quad (1.34)^* \quad (4.57)^* \quad (0.28)^*$$

*Number in parentheses are t-values

Where:[1]

X_1 = Michigan farm price of asparagus in dollars per ton on a snapped equivalent basis.

X_2 = Michigan production of processing asparagus in tons, adjusted to a snapped equivalent basis.

X_4 = Michigan wholesale price, May 1, in dollars per dozen #303 cans.

X_5 = United States acreage of processing asparagus.

$R^2 = .85$

Degrees of freedom = 8

Standard error of estimate = 11.4

Eighty-five percent of total variation in farm price is explained by this model and there exists a strong correspondence (r = .90) between Michigan Whilesale prices on May 1, and the average annual farm price. Processors appear to rely quite heavily on the current wholesale

[1]A description of the data and their sources is given in Appendix C.

prices as a basis for establishing raw product prices, giving the equation economic as well as statistical validity.

If it is desired to estimate farm price of raw product prior to May 1, or if the wholesale price is not available at that time, some estimates could be made of wholesale prices. The month-to-month stability of these prices would suggest using the price quotation from the preceding months as a guide. A second alternative would be to use the predicting equation for May 1 wholesale prices which is discussed on page 95.

The release data for USDA estimates of production for Michigan would necessitate use of equations 1 and 2 to obtain a preseason value for production. The use of this system provides at least a guide for predicting production and prices for Michigan growers. The accuracy is illustrated in Figure 12 where both actual and estimated values are shown for farm prices. A third line based on equation 3 only is included in Figure 12 to demonstrate the degree of accuracy obtainable if both acreage and May 1 wholesale prices are known prior to estimation.

The Theoretical Analysis of Supply

While the preceding discussion provides a method of estimation based upon a static framework, additional analysis is necessary for an understanding of the relationships and the effect of changes in the structural parameters. In addition, the implications of the supply relationships

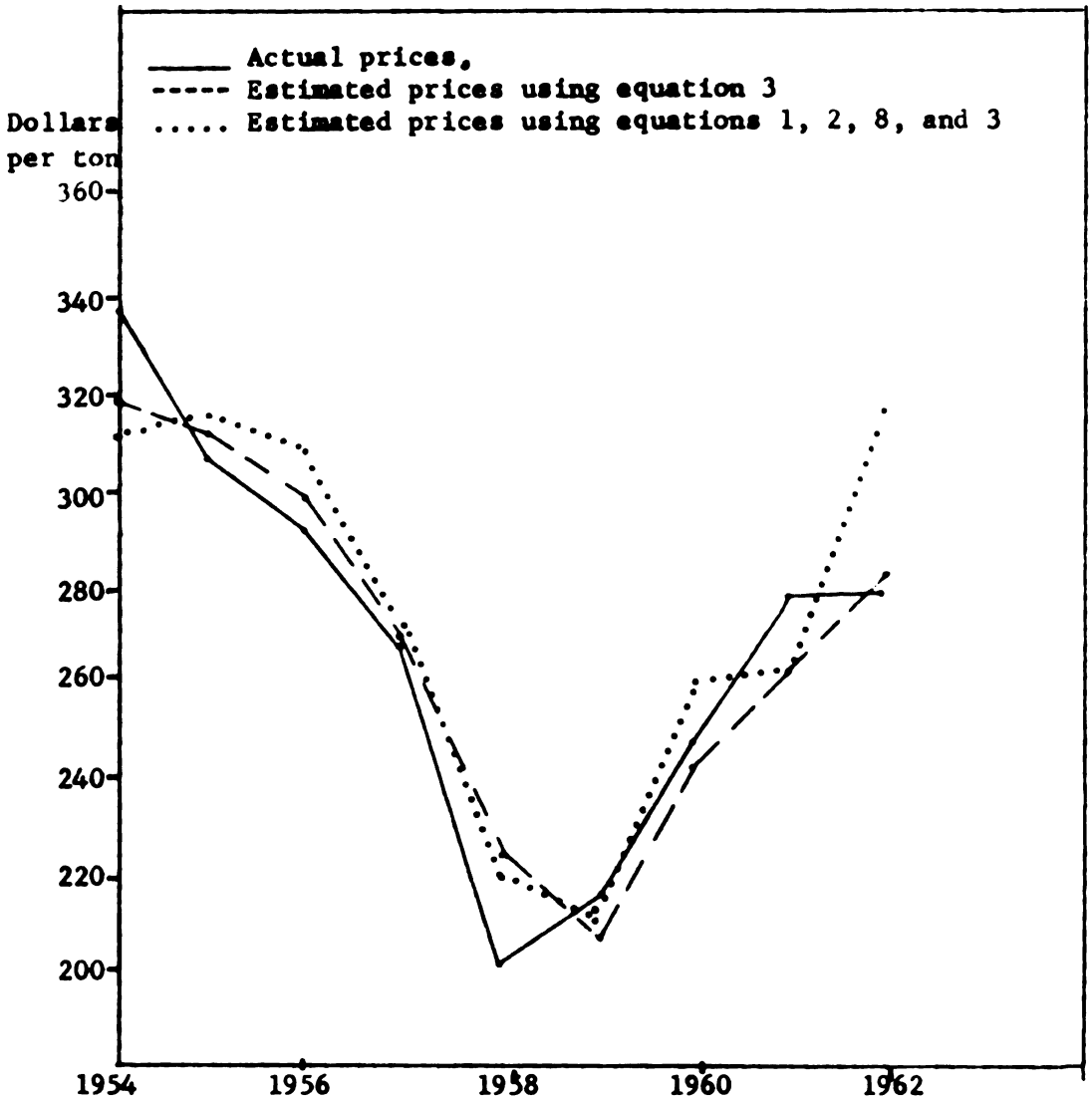

Figure 12. Actual and estimated farm prices of Michigan asparagus, 1954-1962, snapped basis

Source of basic data: Michigan Agricultural Statistics, Michigan Department of Agriculture, Lansing, Michigan (annual issues)

are not apparent from the cursory explanation sufficient for statistical prediction. Application of more refined tools of economic theory and statistics will enable much better utilization of the available information and data.

Short Run Supply

Defining the short run as extending over one season (i.e., March to October) the short run supply response by asparagus growers is controlled primarily by the cultural characteristics of the crop. The productive acreage of any given year must have been established at least three years previous, resulting in a perfectly inelastic response of producing acreage to price increases. Given the acreage, production can be varied within only a limited range by adjusting the cultural practices. Supply response downward in the short run is also limited since substitute crops cannot be introduced on the same ground within a given season and failure to harvest may increase disease problems (especially rust), in following years.

Grower Cost Curves

Assuming the short run to extend over a single production season (i.e., March to October), and also assuming a perfect knowledge situation, with uncertainty excluded, the cost curves may be constructed as they exist for an individual grower on March 1. The first assumption essentially fixes the planted acreage. The second implies

that the grower can determine in advance his yield per acre and his costs of production for all possible combinations of factors which are under his control. Figures 13 and 14 define the cost curves for an individual producer under these assumptions. Fixed costs (OL Figure 13) are quite high in proportion to variable costs, for they involve the three or four years required to bring a new bed into production. Table 4 indicates the relative magnitude of fixed costs compared to approximately $50 per acre of operating expenses. These are 1952 data but provide a basis for comparison of relative magnitudes.

Table 4. Investment necessary to bring one acre of asparagus to bearing age.

	Cost to Establish		
	1st year	2nd year	3rd year
Plants	$ 75.00	$	$
Prepare field and plant	25.00		
Cultivation	15.00	15.00	15.00
Lime to pH 6.5	7.00		
Manure 12 Ton	75.00	75.00	75.00
Complete Fertilizer	15.00	25.00	30.00
Nitrogen	5.00	10.00	10.00
Apply fertilizer	3.00	3.00	3.00
Spring field work		7.00	7.00
	220.00	135.00	140.00

Total to income period $495.00 per acre.

Source: Newsletter to growers from the County Extension Office, Paw Paw, Michigan, 1952.

Production may be increased over the range OS to OP in Figure 14, by increased fertilizer use, improved weed

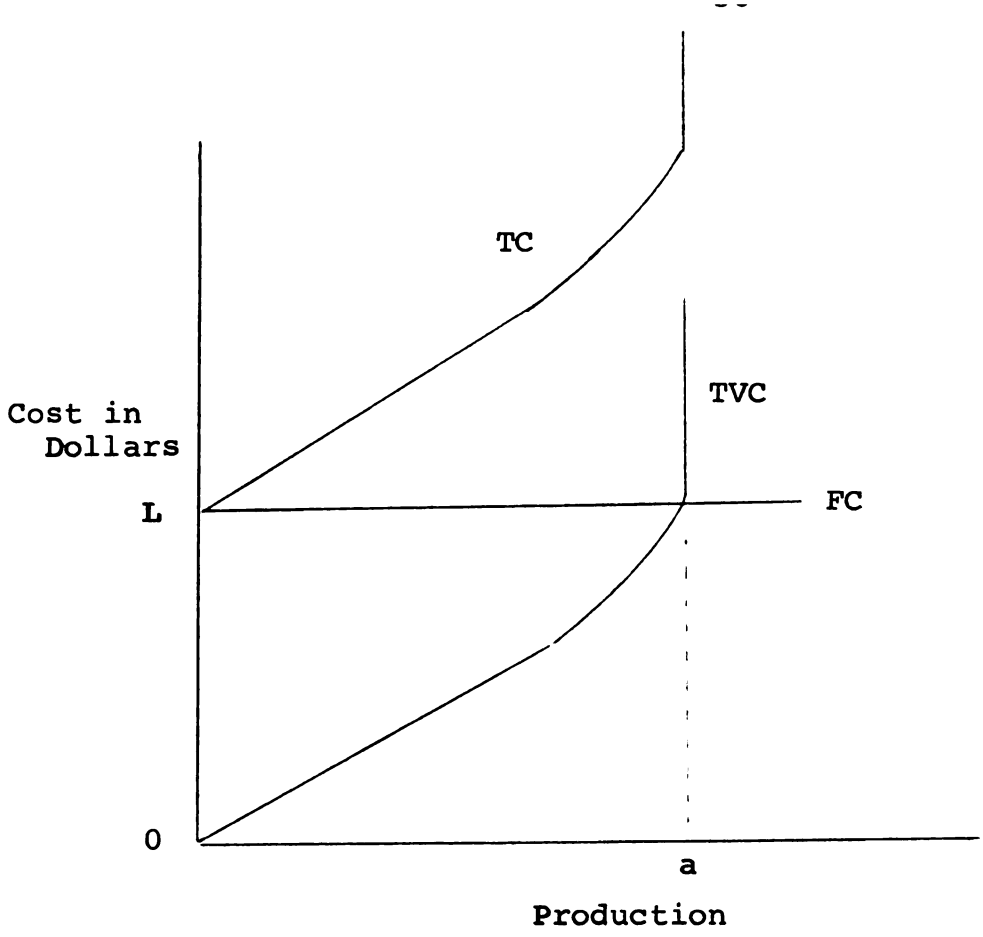

Figure 13. Total cost curves.

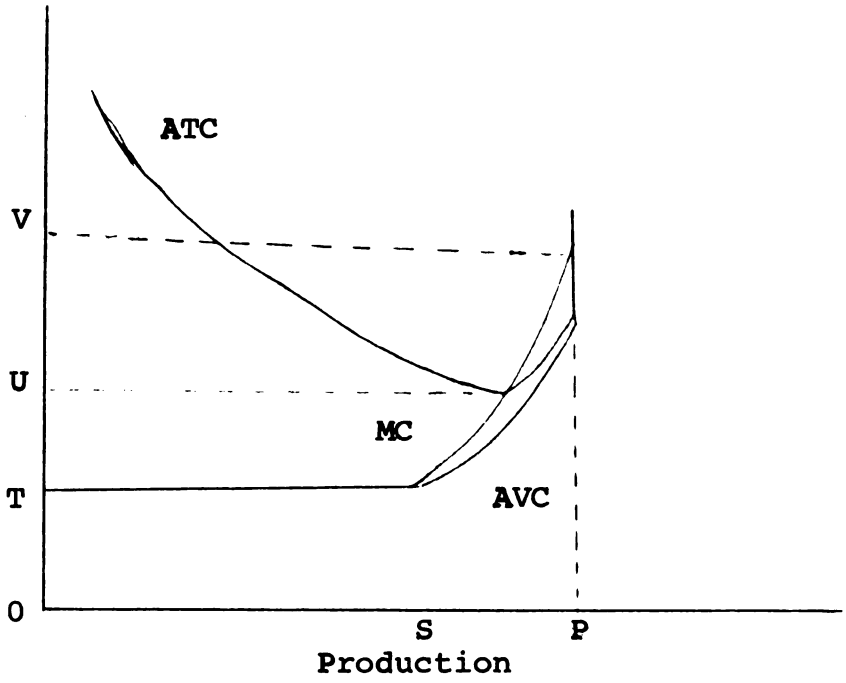

Figure 14. Average and marginal cost curves.

control, and more careful harvesting. The length of the harvest period also may be extended and is probably the most effective method of increasing production in a given season. The horizontal portion of the cost curve in Figure 14, indicates a constant cost of harvesting where labor receives a uniform price per pound during the major portion of the season. The price OT is the harvest cost per pound from a bed receiving a minimum amount of care. At any price below OT, production will be zero. At OT, production will be OS. In terms of grower decisions this means that if price will cover the cost of labor, it will pay to harvest the entire acreage. Past the point OS in Figure 14, the cost curves begin to rise for two reasons. First additional expense is involved in raising the yield (e.g., fertilizer and spray expenses) on the producing acreage. The second reason involves the fact that in order to increase production above OS, harvest must continue later in the season and labor costs per pound will increase when yield diminishes to the point where higher wages must be paid. As production approaches OP, the marginal cost, average variable cost, and average total cost rapidly approach infinity, indicating the difficulty of increasing production above a certain level with a given acreage. The vertical portion of the marginal cost curve occurs at only a slightly larger quantity than minimum average and marginal costs.

Supply Curves

The short run supply curve for the individual grower is that portion of the marginal cost curve above the average cost curve in Figure 14. Supply will be zero for any price below OT, and constant for any price above OV. Any price above OU will result in a rent to the fixed factors of production. Quasi rents exist for prices between OT and OU in that price is greater than necessary to keep the firm in production in the short run even though they are insufficient to attain long run equilibrium.

Under the restrictive assumptions that the factors of production have a constant supply price regardless of the quantity of asparagus produced, or that all firms have identical cost and production functions, the supply curve for the industry is the summation of the marginal cost curves of the firms.[1] Since asparagus production has a minor role in most farm organizations and in the agricultural sector generally, the first assumption is generally valid. Production probably has no effect of a measurable magnitude upon the prices paid by growers for labor, fertilizer, land, etc. The second assumption is not empirically valid since operating costs probably vary widely between firms. This difference is most apparent in harvesting costs where small farms may utilize family labor but larger operations

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[1]Milton Friedman, Price Theory, A Provisional Text (Chicago, Illinois: Aldin Publishing Company, 1962), p. 85.

must bring in migrant labor. If the assumption of identical cost and production functions is relaxed then the short run supply curve for the industry would appear as in Figure 15.

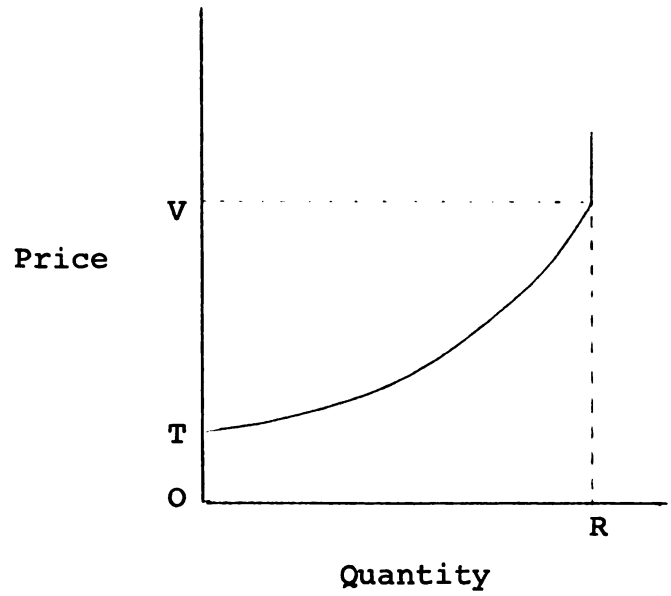

Figure 15. Industry supply curve.

Assuming a given planted acreage, there will exist a price, say OT, below which production will be zero. There will be more slope to the lower portion of the curve than there was under the identical firm assumption due to differences in production costs between firms, but there will exist some price below which no producers would harvest their acreage. At prices above OT those producers whose average variable cost was equal to the price, would harvest their most productive acreage during the peak of the season. As price increased further these growers would include their less productive acreage, other less efficient growers would enter the market, the harvest period would be extended, and operating expenses would

be increased in an attempt to increase output. When all producers are operating on the vertical portion of their marginal cost curve (Figure 14) no further increases in production would be possible from the given acreage.

The Statistical Model

The previous analysis has been based upon a static model in which the elements of temperature, rainfall, insects, disease, etc. were assumed constant or known. In practical estimation of production, most of these factors are not known prior to the production period and must be excluded from the estimating equation or based upon estimates themselves. The additional variance in the model resulting from these excluded variables is reflected in the error term, and the production estimate will differ from actual production by the amount of this residual.

Relaxing the assumption that production is known prior to harvest introduces a limitation on the model which precludes determination of a specific *a priori* cost curve for the firm. A given combination of operating costs may result in a different quantity produced in different years due to conditions outside the control of the firm. If the included variables account for most of the variation, the error in the estimate will be small and have little effect upon the cost curves. This is not the case in asparagus production for the variables which cannot be determined prior to the harvest season are quite important

and (given the acreage) account for over 85 percent of the total variation in yield.[1] Statistical data and grower interviews both indicate that there is very little yield response to any of the production factors within the control of the grower. This means that marginal cost must be computed under some assumed level and combination of the variables whose values are not known prior to completion of the harvest--i.e., upon a given set of weather and disease factors for the specific year. This set of variables can be assumed to be: (1) the average, (2) the maximum, or (3) the most probable. A different supply (marginal cost)

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[1]The percent of variance explained by the variables whose values can be determined prior to harvest varies with the specific equation being used. The example discussed above is based upon the R^2 deletes from the following equation:

$$X_{25} = \underset{}{1.828} - \underset{(6.431)}{.0078\ X_5} - \underset{(1.106)}{.0157\ X_6} + \underset{(1.948)}{.0181\ X_7} - \underset{(0.772)}{.0012\ X_{23}} - \underset{(1.680)}{.0061\ X_{22}}$$
$$(3.810)$$

Where:

X_{25} = yield of Michigan processing asparagus in tons per acre

X_5 = date of maximum volume of strawberries on the Benton Harbor market

X_6 = Number of days in June during which temperatures were 85° or above

X_7 = rainfall during August and September of preceding year

X_{23} = a three year moving average of farm price prior to current year

X_{22} = percent of crop harvested by the snapping method

$R^2 = .90$ with X_{23} deleted $R^2 = .87$.

curve would be applicable for each. If the marginal cost is computed ex post the values are already given. However, a useful supply curve must indicate the ex ante conditions of response to price and therefore one of the above three alternatives must be chosen as the basis for the cost and supply curves. If seasonal conditions are such as to reduce yield from the pre-season estimates from which the cost curves were constructed, the result will be to shift the average variable cost and marginal cost curves to the left for the individual firm. This in turn will shift the industry curve to the left although the intersection with the vertical axis will still remain at the same price level. Since harvesting is a continuous process over the season, the processors may offer a higher price to induce increased production (higher yield) as the growers move along their supply curve in response to this new price. The extent to which price increases can stimulate diminished production toward the level upon which pre-season plans were based, depends upon the severity of the production depressing phenomena and the stage of the seasonal production cycle at which it occurs. More specifically, if a series of late spring frosts should severely curtail production, price increases can have little effect upon cultural practices which could alter current season production. In contrast, if inferior fall growing conditions prompt an outlook for higher prices the following spring, growers could increase fertilizer applications in fall and spring

and adjust other cultural practices to increase yields.

In estimating production for the current season the processor may use the average, the maximum, or the most probable combination of environmental factors in an attempt to informally construct the supply function which he faces. The combination selected will depend upon the relative loss from unused plant capacity compared to the danger of overpayment at the beginning of the season, and also upon the individual's affinity for risk. In practice, processors have minimized this problem by refusing to establish prices until after harvest has progressed past the first week or two.

Statistical Analysis of Supply

The previous sections have outlined an economic framework for the analysis of the short run supply response. Empirical substantiation requires first a logical interpretation of the results in terms of observed actions by growers, and second the aggregation of these actions as shown by the statistical relationships. The inelastic portion of the marginal cost curve in Figure 14 illustrates the inability of the individual grower to alter yield in response to price changes. This would indicate, in the aggregate, a highly inelastic supply curve. However, the relationship is not easily established by statistical analysis. As demonstrated by Working,[1] a statistical

[1]Elmer Working, "What do Statistical 'Demand Curves' Show?," Quarterly Journal of Economics, 4(1927), pp. 212-235.

analysis using observations through time cannot differentiate between points on a supply curve and intersections of a demand curve with shifting supply curves. Equation 1 of the form Q = f(P), indicates a negative relationship between price and production in which a $1 decrease in price per ton is associated with a 12.8 tons increase in total state production. Assuming the demand curve has remained relatively stable during the period under observation, then the autonomous shifts in the supply curve due to weather have traced out points along a demand curve as illustrated in Figure 16. The statistical observations of price and quantity are the points a, b, c, d, resulting from the intersection of the respective supply curves with the processor's derived demand curve for raw asparagus.

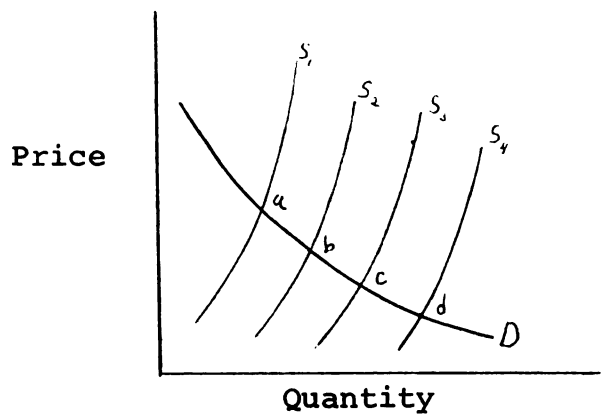

Figure 16. Statistical supply curves.

The inelasticity of the supply curve can be substantiated by firm level observations combined with statistical techniques. Due to the cultural requirements

and limitations of asparagus the primary short run adjustment to price changes is a shortening or lengthening of the harvest season. Statistically, the effect of this variable on production is difficult to separate from the random effects of temperature, rainfall, and disease, except by indirect means. Equation 4 relates production to the last day of harvest with a partial correlation coefficient of .64. Equation 5 then shows the last day of harvest to be a function of current price, with a partial correlation coefficient of .52.

Equation 4:

$$X_1 = 1619.95 + 68.67\ X_3 + 0.51\ X_2$$
$$(1.28)^* \quad (2.07)^* \quad (4.27)^*$$

*Numbers in parentheses are t-values

Where:[1]

X_1 = total production in tons of Michigan asparagus

X_2 = acres harvested in Michigan by the snapping process

X_3 = last day of raw product delivery to the processor

$R^2 = .76$

Degrees of Freedom = 6

Using the chain rule of derivatives and the b values in equations 4 and 5 the elasticity of supply at the mean value of production is .148. This substantiates the relatively inelastic supply curve which was hypothesized.

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[1]A description of the data and their sources is given in Appendix C.

Equation 5:

$$X_{28} = -24.2605 + .0544\ X_8 + .5964\ X_5 + .2626\ X_6$$
$$(2.709)^* \quad (1.214)^* \quad (2.135)^* \quad (.703)^*$$

Where:[1]

X_{28} = last day of delivery of raw product to the processor

X_8 = Michigan farm price in dollars per ton for processed asparagus

X_5 = date of maximum volume of strawberries on the Benton Harbor market[2]

X_6 = number of days in June during which temperature were 85 degrees or above

R^2 = .79

Degrees of Freedom = 4

While some evidence about the shape of the supply curve at the mean values of the variables has been obtained, the entire curve cannot be directly obtained from price-quantity data. It is not statistically possible to separate the positive price-quantity correlation in the supply curve from the negative correlation in the demand curve in an equation of the form Q = f(P). Statistical determination of the supply curve would be possible only

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[1] A description of the data and their sources is given in Appendix C.

[2] The economic explanation of this variable in the equation is the competition between asparagus and strawberries for harvest labor. Since strawberries result in higher labor returns to workers than asparagus, the beginning of the strawberry season draws labor from asparagus harvest where yields have declined with the advance of the hot weather.

if these two effects could be separated. The statistical curve merely connects equilibrium pairs of prices and quantities where the growers are receiving at least their supply price and processors are paying at most their demand price.

The lower portion of the curve as shown in Figure 14, page 50, must be obtained from cost and accounting records since price observations in this range are not available. Lacking statistical data, the major supporting evidence for the horizontal section of the supply curve consists of logical deduction from the assumption of rationality, that these growers will cease production at a price below the minimum variable cost. The specific numerical value for the point must be obtained from cost studies of the firms. Since the minimum variable cost consists chiefly of labor for harvesting, the curve becomes horizontal (or discontinuous) at a price near the average cost of harvesting. While this price is approximately the same for all growers, the better yielding beds and use of family labor will enable some growers to continue harvesting at a lower price than others. This will then produce a slope to the aggregate supply function for the industry as shown in Figure 15, page 53.

Long Run Supply Analysis

Under the short run conditions previously analyzed the variable inputs were limited to labor and cultural

techniques of production such as fertilizer use, spraying, etc., of which only labor was very effective in altering production. As the length of run is increased acreage becomes variable. This is the most significant input in determining total production at the firm level as well as for the industry. (See equation 1, page 39 and accompanying explanation.) The biological characteristics of asparagus require a minimum of three years to increase harvested acreage and one year to decrease acreage. Given the time period necessary for developing a new bed or diverting acreage to other crops, producers become more responsive to price changes than under the short run assumptions. While the response is probably quite definite at the firm level much of it is concealed by aggregation. Due to large differences in ages, productivity, and organizational efficiencies between beds it is apparent that a price sufficiently low to induce one grower to reduce acreage may still be high enough to induce another grower to plant new acreage. This provides a range in the supply response for the total industry, where new beds are coming into production at the same time that old acreage is being removed by other growers. The yield differences between the old and the new beds tends to further this compensation effect on production, for the poorest acreage is removed first. Generally speaking, price variations have been within this range making statistical validation of the total supply curve difficult. However, equation 2

indicates a simple correlation of .79 between total acreage and lagged price (much of this may be due to the time variable).

Table 5 based upon the survey data, indicates a relationship between price and the rate of new acreage planted to asparagus. The observation period is too short to warrant any conclusions based upon statistical validation, but it does indicate that the largest net increases in acreage occur following years of late price increases. This price-acreage relationship is shown conceptually in Figure 17.

Table 5. Acreage changes, 1959-63, as reported by survey respondents.

Years	Acreage Planted	Acreage Plowed Out	Net Change in Acreage	Price Change from Previous Years ($/Ton)
1959	42	35	7	8
1960	131	39	92	34
1961	205	56	149	27
1962	176	55	121	3
1963	165	59	106	15

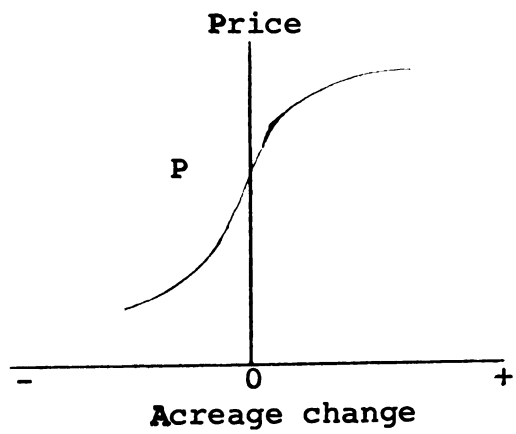

Figure 17. Aggregate acreage response to price changes.

At some price (P) the aggregate annual planting rate would be just balanced by the removal of the less productive acres. Below this price there would be a net decrease in acreage; above this price a net addition to total acreage. Until satisfactory data can be obtained on new plantings and abandoned acreage this formulation can only be hypothesized from micro level observations.

At the lower price levels the aggregate long run supply curve would be quite elastic as shown in Figure 18. Production could be increased both by an increase in the factors variable in the short run and by increasing acreage. If the supply curve in Figure 18 were constructed under the assumption of other prices constant, then the curve would become quite elastic at higher prices. If this assumption is relaxed, then prices for other crops would be expected to rise with asparagus prices and opportunity costs for production of asparagus would make the curve less elastic.

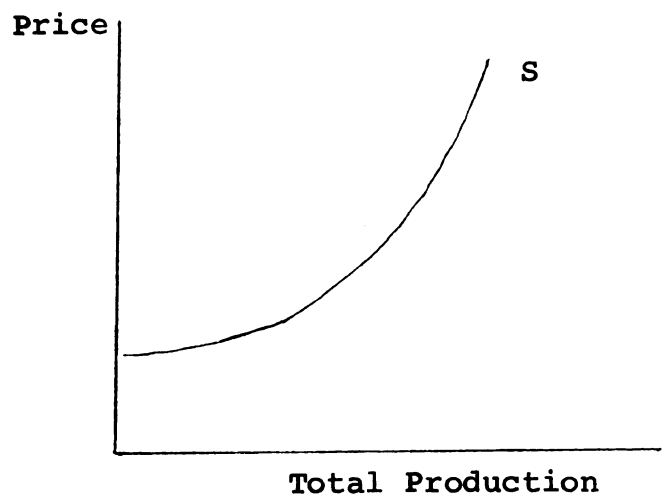

Figure 18. Long run industry supply curve.

There is also the further limitation on the supply response that total acreage for all crops is essentially fixed and any large increase in asparagus acreage would put asparagus into competition with higher return crops such as apples. As the upper limitation of substitutable acreage is approached, less well adapted soils must be used with an accompanying decrease in yield and increase in average cost.

One other factor contributing to an inelastic supply curve is the complementary relationship between asparagus and fruit crops. The pattern of land use within the farm organization, and the distribution of labor and equipment costs over a longer season, are two of these factors which have already been discussed. These can be incorporated into the cost curves of the firm with no change in the theoretical structure of the analysis. Another aspect of the complementarity between asparagus and fruit crops is the timing of cash returns. One of the major reasons given for growing asparagus is the early cash money. This enables the grower to purchase supplies, such as spray and fertilizer, for the fruit crops without the cost of interest. The interest charges which would accrue without the early cash from asparagus could be treated as a negative cost which would lower the cost curves of each grower according to the amount of capital required and supplied. Less easily incorporated into the model is the psychological, as contrasted with the economic cost of borrowing money. Those growers who place a high

value on cash self-sufficiency, find that the asparagus enterprise fulfills their criteria of early delivery, cash payments, and low cash expense.

Summary and Implications

This description and analysis of asparagus production in Michigan has provided information and relationships useful in evaluating the potential for group formation. The limitations placed by cultural characteristics have been delineated and the historical trends provide a record of past adjustments in the industry and an indication of future changes. The economic analysis has provided necessary tools for predicting and explaining part of the supply response phenomena--a necessity for advance negotiations and evaluation of alternatives.

In terms of the bargaining potential, this analysis of production relationships has established the following relevant facts:

1. Interregional relationships and historical trends indicate that Michigan has a good potential for future growth and development of its industry.

2. The Michigan asparagus industry is composed of a few large growers and many small growers for whom the asparagus enterprise is a supplementary source of income providing a complementary utilization of land, labor and equipment.

3. The biological characteristics of the crop result in a highly inelastic short run supply function.

4. The production pattern and complementarity of the enterprise make the aggregate long run response to price only slightly more elastic than the short run over the observed range of observation.

5. Any price changes within a fairly narrow range will not significantly alter the quantity produced.

6. Production is sufficiently stable to permit fairly accurate estimates of total production prior to the beginning of harvest.

CHAPTER IV

DEMAND AND MARKET RELATIONSHIPS

A discussion of the demand and market relationships in the asparagus industry requires the development of three general areas. The first consists of a description of the organization and operating practices of the processing sector, starting with the processor at the "farm gate," through the marketing channel of product transformation and distribution, and ending with the ultimate consumer. The second general area is a development of the analytical framework within which the market operates. This will be needed in understanding the relationships which exist among the market characteristics, price, and consumption. The third area needed for an analysis of the market and demand facets of the industry will combine the descriptive and analytical sections of the market to produce an estimating model for predictive purposes.

Description of the Market

Organization and Operating Practices in the Michigan Processing Industry

The processing sector constitutes an important link in the marketing chain between the Michigan asparagus growers and the ultimate consumer. These firms are in a position

to exert considerable effect upon production and consumption as well as processing. Since less than 10 per cent of Michigan asparagus is sold through fresh market channels the processors' importance in the industry is evident.

Structure of the Processing Sector

Structurally the processing sector is composed of fifteen plants located in five counties in western Michigan. While each of these plants is important within its own geographic area, output for the state is highly concentrated with over 80 per cent of total processed asparagus handled by five firms. None of these fifteen firms process asparagus exclusively. Various combinations of fruit and vegetable crops as well as some specialty products move through the plant during the remainder of the year. While it is a minor product based upon its relative volume through most plants, asparagus is a fairly important product to the processors, primarily because of its timing. Processing precedes most other crops and often the alternative to processing asparagus is to leave the plant idle during these weeks. Consequently, adding asparagus to the product line increases fixed costs for the plant only slightly, and even a small margin above procurement and operating costs would be sufficient to keep the product in the operations of theplant. Despite price fluctuations occurring in both raw product and wholesale markets, curtailment by the processor of the quantity of raw product

purchased has not occurred. "At no time has the raw product price been so high or wholesale price so low as to make processors refuse to purchase all the asparagus growers would deliver" was a common interview response from processors, reflecting Michigan's expansion potential. Raw product prices may, however, be sufficiently low to shorten the harvest period for the grower and thus the quantity which the processor receives.

Procurement Practices

The time and labor complementarity between asparagus and other processed products, stimulates active rivalry between firms for their share of the available raw product during the canning season. Since more than one receiving station is geographically available to most growers, the allocation of raw product among the processors is largely determined by their procurement practices. These practices consist of method of payment, delivery or pickup requirements, contract arrangements, grower services and occasionally price differentials.[1] Although the survey of growers indicated that they would respond readily to any price differential in raw product prices, the similarity of price quotations by processors (Table 6) indicates that this basis for choice is seldom available to the individual grower. In addition, prices are not established until after

[1]See Table 16, page 130, showing factors influencing the choice of processor as reported on the survey questionnaires.

Table 6. Raw product price quotations by nine Michigan processors, 1963, in cents per pound.

% Grade	Processors								
	1	2	3	4	5	6[a]	7	8	9
100	15.00	15.30	15.50	15.50	15.00	16.50	15.00	15.00	15.00
99	"	15.15		15.35	14.85	16.35	14.85	14.85	14.85
98	"	15.00		15.20	14.70	16.20	14.70	14.70	14.70
97	14.80	14.85		15.05	14.55	16.05	14.55	14.55	14.55
96	14.60	14.70		14.90	14.40	15.90	14.40	14.40	14.40
95	14.40	14.55		14.75	14.25	15.75	14.25	14.25	14.25
94	14.20	14.40		14.60	14.10	15.60	14.10	14.10	14.10
93	14.00	14.25		14.45	13.95	15.45	13.95	13.95	13.95
92	13.80	14.10		14.30	13.80	15.30	13.80	13.80	13.80
91	13.00	13.95		14.15	13.65	15.15	13.65	13.65	13.65
90	13.40	13.50		14.00	13.50	15.00	13.50	13.50	13.50
89	13.00	13.35		13.85	13.35	14.85	13.35	13.35	13.35
88	"	13.20		13.70	13.20	14.70	13.20	13.20	13.20
87	"	13.05		13.55	13.05	14.55	13.05	13.05	13.05
86	12.50	12.90		13.40	12.90	14.40	12.00	12.90	12.90
85	"	12.75		13.25	12.75	14.25	12.75	12.75	12.75
84	"	12.60		13.10	12.60	14.10	12.60	12.60	12.60
83	12.00	12.45		12.95	12.45	13.95	12.45	12.45	12.45
82	"	12.30		12.80	12.30	13.80	12.30	12.30	12.30
81	"	12.15		12.65	12.15	13.64	12.15	12.15	12.15
80	"	12.00		12.50	12.00	13.50	12.00	12.00	12.00

[a]Processor No. 6 buys asparagus for freezing and the quoted prices are for asparagus carefully laid in crates by hand for 1/4 to 5/8 inch spears. They offer a bonus of up to 3/4¢ per pound for a high percentage of jumbo spears (over 41% jumbo spears gives the full 3/4¢ premium in each grade.)

Source: Asparagus News, Asparagus Division of Michigan Agricultural Cooperative Marketing Association, May 15, 1963, Volume 2, No. 3.

harvest has started and the first few deliveries have been made. This permits a better evaluation of the market supply by the processor but forces the grower to use criteria other than price in selecting the processor to whom he will deliver his crop.

After approximately one week of harvest an opening price is announced by one or more processors and made retroactive for previous deliveries. Other processors follow with their quotations and prices are essentially established at identical levels at all receiving stations. Occasionally a processor will raise the opening price to increase his supply but other processors must quickly follow. Any significant differential would reallocate supplies between processors and force a price readjustment. Some freezers of asparagus consistently offer a premium but they include more restrictive quality standards and limit the delivered quantity by selection of growers. Table 6 indicates the pricing structure for the 1963 season.

Advance acreage commitments are obtained from growers through field men employed by the processing firm; usually with no price mentioned but with a tacit agreement that the "going price" when established, will be accepted and be retroactive to the beginning of harvest. While written contracts are sometimes made they are very loose, without price specification, and seldom considered legally binding. Most agreements are verbal and some growers deliver to two or more processors in a given season. In the absence of

significant price differentials, acreage is committed primarily on the basis of past loyalties or contacts, convenience of delivery, and other non-price concessions.

The use of some of these non-price concessions is exemplified in the differences existing in the methods of pickup and delivery. Some processors collect the product at the farm while others require delivery by the grower to the plant. Allowances are sometimes made for delivery in the price quotation while other firms simply quote a delivered price. Payment may be made either on grower weight or weight at the plant, and the product may be ungraded or purchased on a strict grade discount system. Various degrees and combinations of these procurement methods result in a number of individual systems. It is therefore, not surprising to find that grading and convenience of delivery are frequently mentioned as influential factors in selection of a processor. Time of payment also varies, from payment upon receipt or pickup, to payment at the close of the harvest season, but the short season makes this difference of minor importance to most growers.

Another important grower service is credit arrangements between processor and grower for crowns and also for operating expenses. This tends to guarantee acreage for the period of repayment but usually affects only a portion of a grower's total acreage. A list of criteria for selection of a processor is shown in Table 16, page 130, along with their relative frequency of occurrence. While price was

mentioned more frequently than any other criterion, it was usually mentioned by growers selling on the basis of a quality premium and therefore did not reflect a true price difference.

Procurement Areas

It is apparent from the preceding discussion that acquisition areas will overlap where there is more than one plant in a geographical area. The non-price factors of competition for raw product do not differentiate between distances from the plant within a geographical region. While perishability of product prevents long distance transporting, the procurement area for each plant is dependent primarily upon the previously mentioned grower criteria for selecting a processor, and transportation costs function only to place limits upon the maximum distances. This results in inefficiencies, duplication of routes, and decreased returns, but given the existing structure of the industry it would be very difficult to alleviate this market imperfection. Since transportation cost is small compared to other procurement costs and processing costs, price competition does not reflect locational advantage.

The Marketing Channel

Description of the Marketing Channel

As with most processed fruits and vegetables, the marketing channel for asparagus is fairly direct from farm to consumer. The processor becomes the first link in this chain and in many cases the function of the second link is also absorbed by the processor, for a large proportion of canned asparagus is sold directly to chain stores using private label brands. These stores purchase at the "going price," take their mark-up and sell what the consumer will buy at that price. The rest of the Michigan pack is distributed through brokers who may be dealing with co-operatives or with independent retailers. In either case the retail stores seldom carry more than a 30-day inventory, but buy as needed from canners' stocks. With the short processing season this means that the processor must carry a large inventory during most of the year and must estimate consumer demand quite accurately, well in advance of delivery. The canner must determine the price which will move his pack before the next season's crop, for there is sufficient deterioration of quality in the can to discourage hold-over. This situation therefore requires continuous adjustment of prices during the year to minimize end of season stocks.

Processors have indicated that prices are determined early in the season primarily by the following factors: (1) current canner stocks, (2) market demand

as evidenced by past and present rate of sales to brokers and chains, and (3) production estimates based upon acreage and fall growth conditions. These prices are then adjusted as the pack is completed for the season and in light of changes in sales and stocks. Price competition forces intraregional prices to identical levels for all firms within a region. There is little bargaining on price between processors and wholesalers, for the price quoted by the processor is based upon his estimate of the market and sales are controlled by what the consumer will take at that price plus retail mark-up. The wholesalers and chains are sensitive to any differences in prices between different processors.

Interregionally, Illinois' harvest precedes Michigan and Michigan canners attempt to benefit from their experiences--using Illinois prices and sales as a guide for establishing their own price levels. California canned asparagus does not compete to any extent with the midwest product due to freight costs. California shipments east of the Mississippi River are almost entirely made up of whole spears and, since Michigan firms process only cut spears, the two areas are not in direct competition. The "cuts and tips" pack produced by California processors is confined chiefly to the West Coast markets and does not enter Michigan sales territory due to a freight differential of approximately 2 cents per pound in the Chicago market. Michigan canners do not generally consider prices and

quantities of other products as influencing asparagus sales and believe that few if any consumer substitutes exist on the market at present relative prices.

Product Forms

The market for asparagus encompasses many broad categories of consumers, product forms, and geographical areas. While the primary emphasis of the present study is upon the canned product from Michigan asparagus, a brief resume of the entire market is necessary to place this segment in its proper perspective.

In terms of product form, asparagus may be categorized into fresh, frozen, and canned with further specifications as to style, size of pack, and quality in each category. As noted previously, the fresh production in Michigan is highly localized and accounts for a relatively small part of the total acreage and production. The frozen product is limited to two processors in Michigan producing both retail and institutional size packages to be distributed over much of the United States. The chief competitor in this market is the product from the Pacific Northwest. Due to the small number of firms freezing asparagus in most regions, quantity statistics are not available on a state basis. The regional breakdown of Table 2, page 14, provides an indication of the relative importance of Michigan in the total market.

Of the various forms of canned asparagus, Michigan processes only the all green, cuts and tips. It is thus

competing on a different basis with California whose production consists primarily of whole spears and salad points, about equally divided between all green, and white asparagus. Although these product forms are substitutes for one another, they tend to be oriented toward different consumer markets.

Regional Market Relationships and Outlets

No significant quantity of Michigan asparagus reaches foreign ports, for the international market is largely dominated by California white asparagus. In the domestic market for canned asparagus Michigan is geographically limited to the surrounding states with some additional outlets along the east coast. Shipment data are not available in sufficient detail to determine the specific market areas for each of the producing regions and the degree of interregional dependence among these market areas. However, an indication of these relationships can be obtained by an analysis of production and consumption quantities on a regional basis. The conclusions from this analysis can then be tested against information from private interviews with processors.

Using regional per capita consumption figures and current population reports, total disappearance of asparagus was computed on a regional basis. By comparing this with total canned pack of asparagus by regions the surplus or deficit was obtained for each of the four major

geographical divisions shown on the map in Figure 19. From the regional production and consumption comparison in Table 7, it is apparent that there exists a large production deficit in the southern region and a smaller one in the north-central region. Production in the western region exceeds consumption by enough to fill the excess demand in the two deficit areas. On the basis of Table 7, production and consumption in the northeastern region is approximately in balance.

Table 7. Regional consumption analysis for 1961.

Region	N.E.	N.C.	South	West	U.S.
Production[a] (000 pounds)	21,875	42,543	12,272	122,405	196,560
Consumption[b] (000 pounds)	21,445	54,716	36,282	34,786	147,240
Exports (000 pounds)	--	--	--	34,950[c]	51,175
Total disapperance	21,445	54,716	36,282	69,736	198,415
Surplus or deficit (+ or -) (000 pounds)	+430	-12,173	-24,010	+52,669	-1,855[d]

[a]Actual cases converted to pounds by a factor of 25.5# per case.

[b]Estimated by interpolation from 1955 survey, "Household Food Consumption Survey," U.S.D.A., using regional population data from Current Population Reports, Series P-23, No. 7, November 1962, page 83. Consumption recorded in pounds of canned asparagus consumed.

[c]Shipments from San Francisco and Los Angeles ports only.

[d]This deficit is accounted for by changes in stocks which decreased during the year of 1960. Balance is only approximate due to conversion approximations from actual case data.

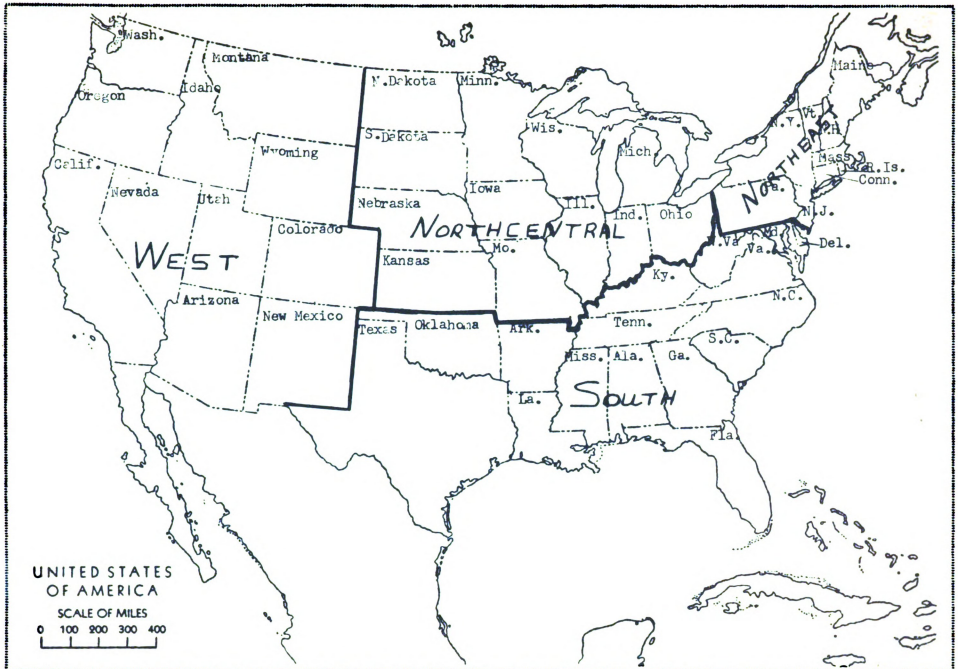

Figure 19. **Market regions of the United States**

While the north-central region is shown as a deficit area the concentration of production in Michigan and Illinois would indicate that these two states are surplus areas within the region, shipping outward to the rest of the north-central states.

If the assumption of a perfect market[1] were met, there would be no cross shipments and the western surplus production would be shipped only far enough east to fill the deficit in the north-central region. The location of the market boundary under these assumptions may be determined graphically as illustrated in Figure 20. The points A, B, and C represent the production areas of California, Michigan, and New Jersey respectively. The height of the three vertical lines represents the costs of production and processing in each of the three regions. The sloping lines indicate the addition to transportation costs as the market is extended. The intersection of these transportation lines indicates the market boundary where delivered prices are equal. A consumer at this point could purchase from either processor and the product plus transportation costs would be the same. The distance RT on Figure 20 includes a sufficient market population to consume the production of Michigan and Illinois. This would imply that the boundary point R lies somewhere near the area of the Mississippi River. The apparent balance of production

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[1] Geoffrey Shepherd, Marketing Farm Products (Ames, Iowa: Iowa State College Press, third edition, 1955), pp. 17-30.

and consumption in the northeast would indicate that the point T coincides with the geographical boundary for this region shown in Figure 19.

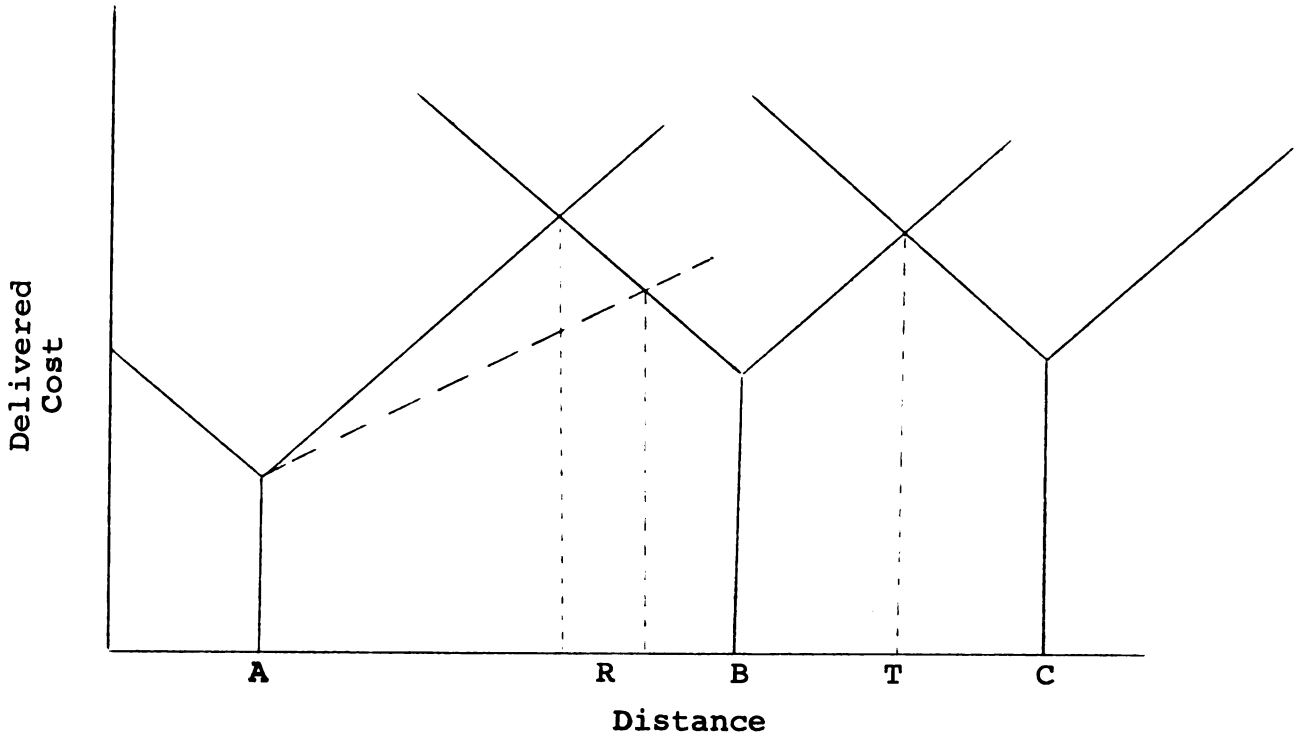

Figure 20. Determination of market area boundaries by delivered cost equalization.

While this model is constructed showing equal linear transportation rates, it is easily adapted to unequal rates. For example, rail rates on long distance shipments from California to Minneapolis are generally cheaper per ton-mile than shipments from Michigan to Minneapolis. The effect of this rate differential is shown as the dotted line in Figure 20 and the market boundary is shifted toward Michigan.

The results of processor interviews tend generally to support the preceding analysis. However market

imperfections, in the economic sense, result in some cross shipments between various regions, with California and Michigan asparagus moving to the east coast and New Jersey processors shipping to midwest markets. The differences in product form also result in cross shipments, for Michigan is actually a surplus region in cut spear pack but a deficit region in whole spears. As a result several Michigan processors indicated that they shipped as far west as Denver, east to New Jersey, and throughout the southern United States. While California also ships to these same markets, the product consists of whole spears, and very little of the California cuts and tips enters the midwest markets.

The boundary lines between markets are tenuous and ill defined and the finely drawn line of Figure 20 becomes an area of irregular shape, where delivered prices are the same from more than one processing point. This is due in part to the structure of transportation rates which are often discontinuous and non-linear. Many personal factors also enter into the availability of market outlets to a given processor, including the extent of knowledge, personal contact, and ability of sales personnel. Chain store buying and distribution techniques also alter the market pattern for a nation-wide chain may purchase asparagus from one processor for national distribution to its retail outlets. In spite of these exceptions resulting from market imperfections in reflecting and equating marginal

products, the analytical model appears to have validity as an indication of the actual market areas which exist.

Consumption Relationships in the Asparagus Industry

At the end of the marketing chain the ultimate consumer is the motivating force for the relationships that have been discussed. The regional marketing pattern just described in the aggregation of the individual consumers, their tastes and preferences, and their collective purchasing activities.

Characteristics of Consumers

Taste and preference differences may be illustrated by use of consumer data which is aggregated by region and income level. Table 8 which classifies consumption of asparagus by income group for the United States, shows the high correlation between level of income and consumption of canned asparagus. This further substantiates the conclusions of the study by Gatty and Angel discussed on page 15, which suggest that the product image and price range of asparagus orients the market toward the higher income levels. Since this is cross sectional data, it does not necessarily indicate that increased incomes will result in increased consumption but rather that people in higher income groups have a better opportunity to cultivate a taste for asparagus. When the income data are further classified by geographical region (Table 8) the same general

Table 8. Consumption of canned asparagus by income group.

Income group	Total United States: Percent of households using asparagus	Total United States: Quantity of asparagus used per household (pounds per week)
Under $1,000	1.2	.01
1,000 to 1,999	2.9	.04
2,000 to 2,999	3.9	.04
3,000 to 3,999	5.7	.06
4,000 to 4,999	6.6	.08
5,000 to 5,999	8.1	.09
6,000 to 7,999	9.0	.09
8,000 to 9,999	11.0	.10
Over 10,000	10.7	.12

Source: Food Consumption of Households in the United States, Household Food Consumption Survey, 1959, U. S. Department of Agriculture, Washington, D. C.

Income group	North-central Region: Percent of households using asparagus	North-central Region: Quantity of asparagus used per household (pounds per week)
Under $1,000	3.1	.03
1,000 to 1,999	5.0	.06
2,000 to 2,999	6.5	.07
3,000 to 3,999	5.2	.05
4,000 to 4,999	11.0	.13
5,000 to 5,999	8.3	.09
6,000 to 7,999	11.5	.12
8,000 to 9,999	11.8	.10
Over 10,000	9.1	.07

Source: Food Consumption of Households in the North-central Region, Household Food Consumption Survey, 1955, U.S. Department of Agriculture, Washington, D.C.

income-consumption pattern appears, with the exception of the $4,000-$5,000 category.

Three contrasts in consumption are evident from the USDA food consumption survey. (1) Regional: average consumption per household per week in the north-central region is .09 pounds compared to .06 for the south. (2) Income: average consumption for those households under $1,000 is .01 pounds compared to .12 pounds for those above $10,000. Consumption increases through all income categories. (3) Residence: urban consumption in the United States was .07 pounds per household per week compared to .03 pounds for rural farm households.

Consumption Trends

Consumption of canned, frozen, and fresh asparagus has fluctuated over time but a fairly definite pattern has been established as shown in Table 9. The steady growth of the frozen product indicates an area for future expansion of Michigan markets. Although the consumption of frozen asparagus is a small proportion of the total, growth of this segment of the industry has been fairly steady since the 1930's. While its potential cannot be assured the growth pattern of other frozen vegetables would indicate a secure future position for frozen asparagus.

Fresh asparagus consumption has declined as steadily as frozen has increased. While population growth has maintained the total fresh market this form of the product is not gaining consumer popularity.

Table 9. Asparagus--civilian per capita consumption of commercially produced, fresh and processed, United States, 1937-1962.

Year	Fresh	Canned[a]	Frozen[a]	Total
	Pounds			
1937	1.2	.70	.06	1.96
1938	1.1	.61	.11	1.82
1939	1.3	.77	.06	2.13
1940	1.5	.82	.10	2.42
1941	1.5	.82	.11	2.43
1942	1.3	.92	.08	2.30
1943	1.2	.83	.12	2.15
1944	1.2	.85	.21	2.26
1945	1.1	.48	.28	1.86
1946	1.1	1.31	.25	2.66
1947	1.1	.77	.23	2.10
1948	0.9	.94	.29	2.13
1949	0.9	.86	.25	2.01
1950	0.9	.88	.25	2.03
1951	0.8	.94	.26	2.00
1952	0.8	.87	.30	1.97
1953	0.8	1.03	.32	2.15
1954	0.7	.99	.33	2.02
1955	0.7	.88	.31	1.89
1956	0.8	1.00	.38	2.18
1957	0.8	1.02	.31	2.13
1958	0.8	1.03	.30	2.13
1959	0.8	1.02	.38	2.20
1960	0.7	.93	.42	2.15

[a]Data for processed asparagus converted to fresh equivalent basis by standard U.S. Department of Agriculture conversion factors.

Source: U. S. Agricultural Marketing Service, The Vegetable Situation.

With canned asparagus fluctuating above and below the level of 1.00 pounds per person, the three product forms taken together produce a fairly stable pattern of total per capita consumption. The difference between the

high and low over the 35 year period was only .61 pounds per person.

A Theoretical Analysis of the Market

Before the facts and inferences of the preceding descriptive material can be used to best advantage, a theoretical framework is needed into which each piece of information may be placed in its proper relationship with the total model. Once this framework is constructed and developed it can be used in predicting price and quantity relationships under varying conditions. These predictions, in turn, will be used to determine the results of alternative courses of action open to the industry and its organizations.

Consumer Demand

Many of the characteristics of asparagus make demand analysis difficult. Its uniqueness in its retail form eliminates nearly all products as logical substitutes and precludes any useful statistical relationships between products. The type and stability of the consumer group results in a very low price and income elasticity in the short run. Statistical attempts to obtain measurable elasticities are hampered by the limited range of observations on wholesale prices, the high correlation between time and many of the independent variables, and the inaccuracy in the available price data.

The hypothesized shape of the consumer demand curve is shown in Figure 21. The relatively inelastic portion between price OR and OS includes the observable range of price fluctuations. At prices below OR the hypothesized curve would become more elastic, for one of the factors in the inelasticity of demand is the lack of substitute products at present price levels. At lower prices asparagus could be substituted for some of the more common vegetables and would be purchased more frequently on an experimental basis by potential consumers. At the present price level of asparagus it appears that the lower income groups consider the product to be outside the "let's try it once" category, hence consumption primarily depends upon those who have previously developed a taste for it.

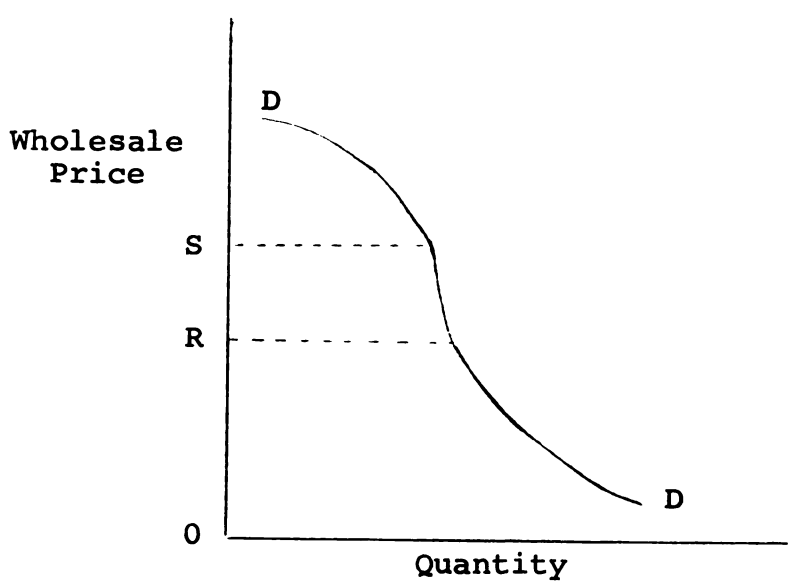

Figure 21. Consumer demand curve.

While the categories of luxury and necessity are of questionable validity and subject to changes in prevailing customs and living standards, it can at least be stated that asparagus is not considered as a necessity by the majority of consumers. Therefore at higher prices (i.e., prices above the range generally accepted to be a "reasonable" price) consumption would fall rapidly and the curve would become elastic at higher prices as well as lower prices.

Statistical substantiation of the demand curve is needed to verify the relevant slope and provide a measure of the response of consumption to changes in price and income. Equation 6 uses wholesale price of asparagus, per capita income, and broccoli production as the independent variables in the demand function. The t-values for the variables of wholesale price and broccoli production indicate very low levels of significance and the negative price elasticity indicates the presence of the identification problem in differentiating between the slope of a curve and the intersection points of two shifting curves. Broccoli, as a substitute vegetable, appears to have very little effect upon the quantity of asparagus consumed. The income elasticity of 1.1 at the mean values is perhaps higher than the true elasticity due to the high inter-correlation with time. Using the consumption data from Table 7, the income elasticity at $5,000 is .53 but at $3,000 it is 1.2.

Equation 6:

$$X_2 = -1261.623 + 442.351\ X_1 + 4.352\ X_3 - .266\ X_6$$
$$\qquad\quad (.336)^* \qquad (.213)^* \qquad (5.305)^* \quad (.680)^*$$

*Numbers in parentheses are t-values

Where:[1]

X_2 = United States pack of asparagus in thousands of cases of 24/303's.

X_1 = United States annual price of asparagus at wholesale for one dozen 303 cans.

X_3 = United States per capita disposable income in dollars.

X_6 = United States commercial production of broccoli in thousands of hundred weight.

$R^2 = .81$

Degrees of freedom = 11

In an attempt to obtain more accurate elasticities equation 7 was fitted using per capita consumption of canned asparagus as the dependent variable. Although the proportion of total variation explained by this set of variables is small ($R^2 = .59$) the sign of both price and income are compatible with the theoretical demand concepts. While price is not significant at the 10 percent level, income is significant at the 5 percent level and the time variable at the 1 percent level. Predictability is thus low with equation 7, but it provides useful indications of elasticities. At the mean values the price elasticity is

[1]A detailed description of the data and their sources is presented in Appendix C.

Equation 7:

$$X_{12} = .9853 - .0625\ X_{13} + .0012\ X_{14} + .0127\ X_{24}$$
$$(2.776)*(.383)* \quad (1.891)* \quad (3.044)*$$

*Numbers in parentheses are t-values

Where:[1]

X_{12} = United States per capita consumption of canned asparagus in pounds

X_{13} = United States wholesale prices of canned asparagus in dollars per dozen 303's. BLS series.

X_{14} = United States per capita income recorded as $y - \hat{y}$ where $y = f$ (time).

X_{24} = time, where 1947 = 1.

$R^2 = .59$

Degrees of Freedom = 11

-.15 and income elasticity is .0098.[2] This provides substantiation of the highly inelastic short run demand curve over the relevant range, as hypothesized previously.

By using income as deviations from the time trend, the computed elasticity is not exactly comparable to the usual concept of income elasticity. It indicates that a 1 percent change in the size of the deviation from the trend will result in an impreceptible change in per capita

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[1] A detailed description of the data and their sources is presented in Appendix C.

[2] Income elasticity is computed with $X_{14} = 7$, one standard deviation from the mean, since the value of the variable $y - \hat{y}$ would be zero at the mean.

consumption. Using the income, time, and quantity relationships of equation 7 results in an income elasticity of .4[1] These two elasticities may be related to the Friedman permanent-transitory income hypothesis[2]--the trend being a measure of aggregate expected income and the deviations being short run changes in income above and below the projected trend. This analysis is consistent with observed consumer attitudes toward asparagus where purchases are quite stable. Short run income fluctuations would not induce strangers to the product to try it, nor those who habitually buy it to reduce their consumption. On the other hand a movement to a higher income bracket would encourage the inclusion of asparagus in "special occasion meals." Thus the two elasticities--temporary income elasticity of .01 and permanent income elasticity of .4--are compatible with consumer studies reporting asparagus as a "company dish," for "special occasions," and a "habit purchase."

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[1]An equation using income as a function of time $Y = f(t)$ resulted in a b value for time of 57.32. Income elasticity was computed from equation 7 and this trend by the following formula:

$$e = \frac{\partial Q}{\partial Y} \cdot \frac{Y}{Q} = \frac{\partial Q}{\partial T} \cdot \frac{\partial T}{\partial Y} \cdot \frac{Y}{Q} = .0127 \frac{(\ 1\ )}{(57.32)} \frac{(1666)}{(.944)} = .39$$

[2]Milton Friedman, A Theory of the Consumption Function (Princeton: Princeton University, 1957).

Predicting Wholesale Prices of Canned Asparagus

The structural relationships and relevant variables of supply and demand discussed in the preceding section, form the basis for prediction of Michigan wholesale prices. This prediction of derived demand forms the linkage between the producer's supply function and consumer demand.

The Relevant Variables

Although many variables are economically relevant in determination of the demand and supply relationships, only a few have sufficient data available to establish statistical significance. The major determinants of supply which must be included in an anlaysis of Michigan wholesale prices are: (1) stocks of canned asparagus on hand (primarily in Michigan and California), (2) United States stocks of frozen asparagus as a substitute for the canned product, and (3) estimated production in the current canning season. As demonstrated in the preceding section the primary factor of demand is consumer income accompanied by shipments in the preceding period as an indicator of current preference patterns.

Equation 8 uses five of these variables to produce a predictive equation with an R^2 of .98. Although the percent of explained variance is large in this equation, it is difficult to give an economic interpretation to the sign of the coefficient for any of the variables except California wholesale prices. The positive correlation

with California canner stocks is partially explained by a negative correlation between stocks and pack in California.

Equation 8:

$$X_{26} = -.2275 + .0006\ X_{11} + .00002\ X_{18} = .0035\ X_{32} - .0035\ X_{14}$$
$$(.480)^* \quad (.474)^* \quad (2.03)^* \quad (7.31)^* \quad (2.15)^*$$

$$+ .6793\ X_{31}$$
$$(.65)^*$$

*Numbers in parenthesis are t-values

Where:[1]

X_{26} = Michigan wholesale price of canned asparagus, May 1, in dollars per dozen #300 cans.

X_{11} = California canners stocks, March 1, in thousands of actual cases.

X_{18} = Frozen asparagus--United States cold storage holdings March 30, in thousands of pounds.

X_{32} = Midwest shipments of canned asparagus, in thousands of actual cases, from January 1 to March 1

X_{14} = United States per capita income recorded as $y - \hat{y} = f(\text{time})$.

X_{31} = California wholesale price of canned asparagus, January 1, in dollars per dozen 300 cans.

$R^2 = .98$

Degrees of freedom = 2

Standard error of estimate = .04

The identification problem previously discussed results in a correlation of a series of observations but there is no way to separate demand and supply factors with the available data.

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[1] A detailed description of the data and their sources is presented in Appendix C.

The regional dependence of January 1, California prices and May 1, Michigan prices is evident in the simple correlation coefficient of .73 (a partial correlation coefficient of .98 in equation 8), between the two variables. This is higher than the correlation between January 1 and May 1 prices in Michigan, where the simple correlation coefficient is only .33.

All of the independent variables in equation 8 are predetermined and available prior to the pricing period being used, except national income. Income estimates on a per capita basis are available, enabling prediction of May 1 prices during April. Until a larger number of observations are available the reliability of the specification of the variables and the structural form will remain uncertain. With only two degrees of freedom and a small range of data for the dependent variable, reliability has not been well established.

Equation 9, covering a longer time period and substituting Michigan wholesale price, January 1, for cold storage holdings results in a lower R^2 but coefficients more easily explained by economic theory. Michigan price January 1 adds little to the predictive ability of the equation. The coefficient of the income deviations variable indicates a price increase with increased income. California Canners stocks in contrast to equation 8, has a negative coefficient, significant at the 5 percent level, showing a decrease in Michigan price

Equation 9:

$$X_4 = 1.0678 + .0679\ X_6 + .0042\ X_5 - .009\ X_9 + .0009\ X_7 + .4260\ X_8$$
$$(1.02)^* \quad (.18)^* \quad (.96)^* \quad (2.77)^* \quad (1.82)^* \quad (2.27)^*$$

*Numbers in parentheses are t-values

Where:[1]

X_4 = Michigan wholesale price of canned asparagus, May 1, in dollars per dozen 303's.

X_6 = Michigan wholesale price of canned asparagus, January 1, in dollars per dozen 303's.

X_5 = United States per capita income recorded as y - y where y = f(time).

X_9 = California canners stocks, March 1, in thousands of actual cases.

X_7 = Midwest shipments of canned asparagus, in thousands of actual cases, from January 1 to March 1.

X_8 = California wholesale price of canned asparagus, January 1, in dollars per dozen 303's.

$R^2 = .73$

Degrees of Freedom = 4

Standard error of estimate = .135

of $0.08 per dozen cans for an increase of 10,000 cases in California stocks. The coefficient of .0009 for midwest shipments from January to March indicates an increase of $0.09 per dozen cans for an increase of 10,000 cases in

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[1]A detailed description of the data and their sources is presented in Appendix C.

early season sales. California wholesale prices January 1 show the same positive correlation with Michigan May 1 wholesale prices as discussed under equation 8.

The choice between these two predicting equations may be based upon several criteria. (1) The coefficient of determination and the R-Bar-Squared point toward a structural form in equation 8 which the observed data fit more closely. (2) The standard error of the estimate in equation 8 (.029) indicates the range of error is smaller than for equation 9 which has a standard error of .135. (3) The economic interpretation which substantiates equation 9 provides a more reliable basis for extrapolation outside the range of observation. A comparison of the estimates from the two equations with the actual values is shown in Table 10.

Table 10. A comparison of estimated Michigan wholesale prices with actual prices May 1, 1954-1962, dollars per dozen 303's.

Year	Estimated Price Equation 8	Actual Price	Estimated Price Equation 9
1954	2.33	2.35	2.25
1955	2.36	2.35	2.44
1956	2.29	2.30	2.27
1957	2.14	2.15	2.05
1958	1.88	1.90	1.99
1959	1.86	1.85	2.00
1960	2.13	2.10	2.01
1961	2.16	2.15	2.16
1962	2.45	2.25	2.19

For a one or two year extrapolation, equation 8 would be expected to yield better estimates, for the chance of

changes in unspecified variables is small during this short period. If the prediction period is extended there will be greater opportunity for these variables to alter the structure, and the economic relationships of equation 9 may provide better estimates and explanation of changes. Both of these equations need additional observations to improve their reliability. Additional data from succeeding years will provide opportunity to isolate other causal factors as well as to improve upon the structural form of the variables already identified.

Summary and Implications

The analysis of the demand and market relationships has important implications for the bargaining potential and organizational opportunities in the asparagus industry. The structural form of the processing sector determines the nature of the second party in the bargaining negotiations visualized by a producer organization. With processing highly concentrated in a few firms the required number of processors for successful bargaining is limited. With 80 percent of the total processing industry represented by 33 percent of the firms, the remaining 77 percent have a negligible influence upon pricing decisions. Any price established for a majority of the production becomes the prevailing price in the market due to the pricing structure which exists. Except for a few instances involving quality control or grower selectivity, the market price is uniform

for all processors buying raw product.

The direct marketing channel from processor to retailer makes the processor more sensitive to changes in consumer demands and also requires a risk bearing function not ordinarily borne so directly by processors. This function appears as a hidden cost in computation of processor profits and must be considered when evaluating processor margins.

Regional dependence illustrated in Figure 20 and the statistical price correlations limit the extent to which raw product price increases can be passed on to consumers on a regional basis. An increase in Michigan prices relative to California prices would have little effect upon total consumption but would expand California's geographical market area at the expense of Michigan.

On a national scale, the low price elasticity of demand would indicate that increased prices would increase total returns if the increase were kept within the inelastic range. At prices above this range total returns would be decreased. Similarly attempts to increase consumption by lower prices would reduce total returns unless cost reductions could be effected enabling a sufficient price reduction to make asparagus competitive with other vegetables. If asparagus could capture some of the 12# per person market enjoyed by canned corn or 7# per person consumption of green peas, then total industry returns could be increased with lower prices.

The long run income elasticity of .4 obtained from time series data, indicates an expanding potential for asparagus through time. So long as per capita income continues to increase the market for asparagus should expand--other things being equal. The cross sectional survey data provides a basis for exploiting the market potential of the various income categories. Combined with motivation research and consumer education this income information could be used to expand the market for canned asparagus.

The structural equations serve to identify some of the causal factors which determine wholesale prices in Michigan. The predictive equations enable pre-season estimation of wholesale prices for Michigan processors. To the processor this means a quantifiable technique to supplement his market and price estimates. For the producer it provides a value for the wholesale price variable used in equation 3, page 45, for estimating farm price prior to harvest.

The development of the interrelationships between the various environmental and theoretical components in the preceding chapters has delineated a general area within which a producer organization must function. This area places a series of restrictions upon the industry, separating the possible from the impossible. This brings the analysis to the crux of the problem--the feasibility of organization within the given environment of the industry.

CHAPTER V

ORGANIZATION WITHIN THE INDUSTRY

Any organization involving people and personalities is dependent upon the environment and activities of the past for its present structure, beliefs, and values. A familiarity with the history of the Michigan industry and its organization is a necessary prerequisite for understanding and interpreting the results of the grower survey discussed in the second part of this chapter. This historical perspective is particularly pertinent in the Michigan asparagus industry, for within the past thirty years Michigan growers have tried a wide range of alternative objectives, tactics, and activities which provides a basis for evaluation of future opportunities for organization.

A History of Organization in the Michigan Asparagus Industry[1]

The history of commercial production of asparagus in Michigan starts in 1898 with approximately 8 acres of Columbian and Palmetto asparagus planted southeast of

[1]The history of the asparagus industry was compiled from minutes of the various grower organizations, newspaper files, processor records, and interviews with industry personnel. Not all of the data could be substantiated by written records but specific dates and figures have been varified wherever possible.

Lawton in Van Buren County, by Mr. C. Dunham, Mr. A. B. Jones, and Mr. R. Jones. About this same time another bed was established by Mr. Webb west of Paw Paw. The produce from these acres was shipped by train to commission firms in Chicago and Detroit for resale to retail outlets such as hucksters and independent grocers. The asparagus--sorted and bunched--was delivered by rail to Detroit and to Chicago by rail, or rail-water combination loading from the South Haven docks.

Prior to 1898 some local deliveries of fresh product were made but the retail market was limited and sporadic. Lack of local transportation prohibited expansion of this market and the rail-water connections with Chicago and Detroit provided larger outlets as other growers entered the industry. The producing areas in southwest Michigan were expanding with additional beds being established at Decatur, Paw Paw, Eau Claire and Watervliet. By 1920 several producing areas were developing around urban centers and improved transportation permitted wider distribution from specialized production areas. The crop reporting service of the Michigan Department of Agriculture reported 130 acres of commercial production in 1920 averaging slightly over 1 acre per grower.

Retail prices in these markets were unstable, fluctuating from day to day and even from one hour to the next. Shipments to the large cities competed with locally grown produce, and daily supplies and prices were largely dependent upon temperatures of the preceding day. When

processing started in 1924 it provided an alternative market whose stability was welcomed by the growers.

Early records indicate that the Hartford Canning Company of Hartford and the South Haven Preserving Company at Gobels were processing asparagus as early as 1924. In 1926 the Lawrence Packing Company of Lawrence and a small firm in Paw Paw entered the industry. In 1927 the South Haven Preserving Company merged with the newly formed Michigan Fruit Canners and the asparagus operation was moved to Benton Harbor. By 1929 the processed market was expanding and the Plainwell Canning Company initiated asparagus operations in Allegan County.

Expansion was slow during the early years as both the wholesale market and the raw product supply area had to be developed. Sales in the early years required personal trips to Boston and other potential markets to provide outlets for the Michigan product. However, the midwest markets soon developed so that sales were confined to Michigan and the adjacent states. Difficulties with length specifications, quality standards, andlabor requirements soon resulted in an early transition from whole spears to cut spears in all the Michigan plants.

Although the processing industry was expanding during the first four years, most of the 1467 acres of asparagus reported by the census of 1930 was still sold to the fresh market. Larger producers were trucking into the major cities, while door to door sales and local retail

stores provided the primary outlets for growers with small acreages. The Wins-Favor Canning Company (formerly the Hartford Canning Company) contracted asparagus in the Van Buren County area for 8¢ per pound during the 1930 season with K. V. Washburn acting as receiver at the Decatur station. During the 1930 season 210 tons of asparagus was processed by this particular firm.

Dissatisfaction with prices and processor actions resulted in most of the Wins-Favor growers in the Paw Paw and Decatur area contracting with the Lawrence Packing Company for the 1931 season. This shift did not alleviate grower dissatisfaction and under the leadership of Mr. Washburn a group of local farmers organized the Decatur Green Asparagus Growers Association in 1932. Their objectives were entirely market oriented with the specific purpose of utilizing the fresh market outlets. The limited capital required for starting the venture was obtained by a membership fee and operating expenses were obtained by a deduction from gross sales of members. The commission house of Peter S. Scanlon and Sons agreed to handle the asparagus for 7% of gross sales. Trucks were hired to collect the packaged and crated asparagus, assemble it at the Washburn farm and transport it to the Detroit market. Some packing and grading services were provided at the assembly point, but most of this work was done by the individual growers. Quality and grade standards were established by the association to insure a high quality

product of uniform description and a label was adopted to identify the source. The "Green" designation was emphasized in promotion and on the label to differentiate the pack from California competitors producing white asparagus. At its peak in the late 1930's the organization included 50 members and 150 acres within the Decatur and Paw Paw area. While the group was small the members were generally satisfied with the results of their marketing plan.

Several of the local processors during this period decreased or discontinued their packing operations. The Lawrence Packing Company and the Michigan Fruit Canners were the only two still processing asparagus in Van Buren County in 1932. The latter had transferred its asparagus operation from its Benton Harbor plant to South Haven in 1929. Van Buren County had expanded to over 500 acres by 1932 giving the association only a small per cent of the total in the area. The supply area for the Decatur Green Association was quite local but other independent truckers were making collections of fresh product to be sold in the larger cities.

The increasing labor costs of the 1940's made the fresh market operation less profitable to the growers while increasing prices of canned goods relative to fresh prices enabled the processors to pay more for raw product. As a result the retail outlet rapidly became less and less attractive. By the 1943 season very little of the commercial

acreage in Van Buren County was being used for the fresh market outlets and canning operations were increasing rapidly. The Paw Paw Canning Company opened in 1939, and Eau Claire Canning Company in 1938, The Culby Canning Company in Benton Harbor operated from 1935 to 1939 in Benton Harbor.

Meanwhile another area of commercial production was opening in Oceana County where the New Era Canning Company in cooperation with the Michigan State College Extension Service was encouraging plantings by local farmers. Farmers were assisted in obtaining crowns and establishing the plantings by the processing company and extension personnel in 1929 and by 1931 the delivery of asparagus from approximately 20 acres introduced the first processing in Oceana County. As in other areas growth was slow as markets and acreages were developed. By 1939 Oceana reported a total of 133 acres and 45 growers.

The Decatur association was designed primarily to provide an improved outlet through the fresh market, and as these opportunities declined, the need for a different orientation became apparent. The association attempted to negotiate with the processors and establish contractual agreements but it had neither the membership nor the organization necessary for successful use of market power. Recognition of the need for a broader perspective prompted contacts, by members of the Decatur group, with growers in other counties and states, with legislative personnel on grading laws and standards and with organizations

in other areas and other crops.

In 1945 the first step in broadening the membership base of the asparagus growers representation was made with the formation of the Van Buren County Asparagus Growers Association. The objectives of this group were centered primarily around bargaining with plans to include all growers in the state in price negotiations. Although processors agreed to deal with the association, they continued to contact growers individually and make private price concessions, thus weakening the bargaining position of the organization.

Similar organizations were being formed in other areas, including a group in Berrien County. By 1951 the Van Buren County group had a membership of 108 growers including some from adjoining counties, and interest increased in forming a state organization with sufficient strength to bargain successfully. Despite the rising membership and increased unrest among growers no formal attempts had been made to exert pressure upon the processors in bargaining negotiations by any of the county groups. In March of 1952 the Van Buren group passed a motion to prepare the by-laws and articles of incorporation necessary for forming a state cooperative association. In consultation with Arthur Howland, Department of Agricultural Economics, Michigan State University, the legal documents were prepared and filed, officially creating the Michigan Asparagus Growers Cooperative Association on January 14, 1953.

Illustrative of the greater breadth of this new organization are the following objectives stated in the by laws.

1. To enhance and encourage advancement of the industry in Michigan to the end that growers may receive better returns from their labor and operations.

2. To disseminate information with regard to growing and marketing of asparagus.

3. To buy, sell and otherwise deal in asparagus and other farm products of concern to asparagus growers.

4. To buy and sell supplies used by asparagus growers.

5. To act as an agent for the growers in the sale of asparagus.

An attempt was made to include the Berrien County group at this time but they were apprehensive of the effect such action would have upon existing grower-processor relationships. The original Decatur Green Association retained its identity but merged its membership and support with the new state organization.

Despite the interest and enthusiasm of growers indicated in 1953 newspaper releases, only 123 tons of asparagus were placed under contract at the beginning of the 1953 season. Without official support from the Berrien County growers, the state association was not in a position to attempt negotiations. While the novelty of the bargaining concept for Michigan agriculture undoubtedly attracted some membership it also prompted many growers to adopt a "wait and see" attitude--the anathema of all bargaining groups.

Although unsuccessful in their bargaining attempts during the early 1950's, both the county and state organizations made contributions in other areas. Various changes in grading laws were brought to the attention of the Washington legislature and Department of Agriculture, exerting at least some influence upon the present regulations and standards. Michigan asparagus growers initiated part of the action for and supplied considerable support to the establishment of a national asparagus growers' organization and a national vegetable growers' organization. Newsletters were published providing information on production and marketing. Perhaps one of the major contributions during this period was the reopening of the fresh market to Michigan growers via a marketing agreement between the association and Millburg Growers Exchange, whereby the association guaranteed Millburg a specified quantity of product of fresh market quality. This contract also provided the first opportunity for Michigan growers to contribute to a promotion fund through processor deductions. A deduction of 1/2¢ (later decreased to 1/10¢) per pound was made by the processor and turned back to the grower association for purpose of promotion.

In addition to these activities other outlets were investigated by the association as well as by the Millburg Exchange, eventually resulting in sales of Michigan asparagus to Canada and a few Eastern markets.

Continuation of price levels below those of other geographical areas led to increasing interest in bargaining and additional bargaining strength in terms of membership. On March 12, 1956, 173 persons attending the annual association meeting unanimously agreed upon a proposed marketing plan to establish a price via an appointed grower committee, and negotiate with the processor for that price. Alternate outlets were specified and a show of hands indicated a willingness to withhold deliveries until the processors accepted the stipulated price. The appointed committee specified a price of 16-1/2¢ per pound for snapped asparagus--an increase of 1¢ over the price of the previous season. By May 1956, only 150 of the 300 members had signed marketing agreements which authorized the association to bargain for 1,000 tons of raw product, but contract terms were sent to all processors suggesting a meeting to discuss the terms. Fourteen of the sixteen processors contacted met with the bargaining committee but in all cases rejected the terms of the contract. The processors not only refused the 1¢ increase but announced a 1¢ decrease with a price of 14-1/2¢ per pound for the 1956 season. At a growers' meeting on May 14, 1956, it was announced that the bargaining attempt had failed due to the small proportion of the crop placed under the association's control. A resolution was passed at this meeting instructing the board to hire a manager and increase the efforts to obtain a sufficient number of

contracts to gain control of the supply. The price reductions of 2¢ per pound in 1955 followed by the 1¢ reduction in the face of the bargaining threat in 1956 may have added impetus to the drive.

In 1957, 1,500 acres were under contract and a second attempt was made to negotiate with the processors. Again the processors remained adamant and refused to sign the contract. Realizing that alternate outlets were not sufficient and alternate sources of supply too available, the growers were released from their contracts. The situation was repeated in 1958.

Despite the bargaining failures, increased cooperation from the processors and growers with the association's promotion deduction, permitted the expansion of advertising and research expenditures. Millburg Growers Exchange and the Growers Association jointly contributed funds to finance a study of relative costs and yields under the cutting vs. snapping method of harvesting asparagus. Under the guidance of Jack Bittner, District Marketing Agent, the fresh market outlet, available since 1952, was further expanded with the introduction of "Pan Ready" asparagus; washed and prepackaged, ready for cooking. Through the facilities of the Millburg Growers Exchange retail outlets were secured and serviced in Detroit, Kalamazoo, Benton Harbor, St. Joseph, and Chicago during the 1959 season. The association contributed $1,500 toward an advertising campaign which was handled by the Paxson Advertising Agency of Benton

Harbor. Although the product was well accepted by the retail trade it became increasingly difficult in the 1960 season to maintain the volume of supply necessary. As processing prices improved, the unstable fresh market prices lost their appeal to many growers. In addition the quality and length specifications necessary for the fresh product resulted in considerable waste and subsequent losses to the growers. Although the patented trade name was retained for possible future use the product was discontinued in 1961 and the processed trade again became the major outlet for the growers of this area.

During 1959 and 1960 the growers and processors worked more closely together on promotion and research contributions and relationships improved. Increases in prices reduced grower pressure, and improved communications between the two promoted a better understanding, on the part of the growers, of the processors' problems.

In 1961 the Michigan Agricultural Cooperative Marketing Association division of the Michigan Farm Bureau, was established with asparagus as one of the three original commodities. A close association between Farm Bureau and the asparagus association during the preceding years facilitated recognition that the stated objectives of both organizations were quite similar. As a result an informal merging of personnel and coordination of activities occurred during 1961 and 1962 although the asparagus association retained its identity in order to utilize funds which had

been contributed by members for specified purposes. On March 11, 1963, the growers association moved to dissolve the existing organization and turn the remainder of the general fund as well as its present membership over to the Farm Bureau Division.

Although contracts were signed authorizing bargaining during the seasons of 1962 and 1963, the growers were released prior to harvest due to insufficient acreage commitments. A continuing drive for increased membership and contract acreage has not, as yet, resulted in an effective bargaining negotiation.

Producer Characteristics And Attitudes Which Influence Group Action

Out of the past organizations and grower relationships, Michigan asparagus producers have developed beliefs and attitudes which constitute a region of acceptability within which an organization must operate if it is to retain grower support. The social role in which growers place an organization determines what they expect from the organization and the activities they will support. It is therefore important to identify and understand this role in order to develop a successful organization.

There are many facets to this role which each grower constructs and it may differ greatly among individuals. For the purpose of exploring these various roles a survey questionnaire was sent to all growers within a five county

area in Michigan.[1] Analysis of the results of this questionnaire provides insight into the desires and expectations of growers with respect to group activity in the asparagus industry. What an organization is expected to do, what it can do, and what it should not do are all important considerations in a grower evaluation of any organization or potential organization. If these aspects can be associated with certain characteristics in the population then their usefulness is increased. While no organization can meet the criteria of every individual in the group, attitudes of the sub-groups need to be identified in order to knowingly direct the organizational program toward those for whom it is intended.

The survey provided a means for identifying many of these characteristics although the extent of bias in the mail survey was not determined. Based upon the sample of growers obtained, the average acreage was greater than for the state as a whole, primarily because the counties selected were the ones where most (86%) of the commercial acreage is grown. The average acreage was 10.6 for the respondents compared to 4.7 for the state. Average age of respondents was 52 years and average farm size was 113 acres. The majority of the growers own their land with 80% of the total land operated, owned by the operator. The importance of asparagus in the total cropping system

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[1]The mail survey was sent to approximately 1,000 growers with 280 completed questionnaires used in the analysis. For a more detailed description of the questionnaire see Appendix A.

is reflected by the fact that on the average 22% of farm income was obtained from asparagus.

Many other characteristics could be listed but the distribution of respondents among the various categories within a class of characteristics is more meaningful for analysis than the average. An organization oriented toward only the average grower probably would result in a very small membership. A classification of grower characteristics and their relationship with attitudes, provide the basis for much of the analysis of the organizational potential which follows. The characteristics to be discussed include the attitude of growers toward the question of "Who benefits from existing grower organizations?," the effect on farm income of various forms of governmental and organizational activity, organizational objectives selected by the growers, and grower-processor relationships in the industry.

Grower Group Benefiting from Organization

The actual experiential results of organizational activities are of less importance in eliciting support than beliefs about past and future results of alternative actions. What the individual believes to be true influences his attitudes and actions much more than truth itself. If, for example, a grower believes that an organization has not been effective in raising product prices then his actions will be based upon this belief even though prices would have been lower if the organization had not been

active. The presence of this phenomena was demonstrated in several cases by remarks on the questionnaires in which one grower used the Great Lakes Cherry Grower Cooperative Association as an example of how an organization could raise producer prices, while another grower used the same organization (and prices) as an example of an organization which had lowered farm prices. The support from these two people are based upon their beliefs regardless of what the actual effect upon cherry prices has been.

This situation is particularly relevant in the responses to the question "Do you believe that most fruit and vegetable grower organizations benefit the small producer ____, large producer ____, neither ____, all producers____?" The answers to this question may contradict a dollar and cents, farm level benefit-cost analysis or organizations, but if a grower believes he is not benefiting from organization membership he will not continue to actively support its programs regardless of the actual income relationships. The results from this question are shown in Table 11 where the response is classified by average farm size and average asparagus acreage. Of the growers who responded, 54% felt that all growers benefited, while 16% felt that none received any benefit. The 23% who stated that only the large producer benefited from these organizations is an important group primarily in its composition. As indicated by average acres operated and average acreage of asparagus, these were primarily the

Table 11. The relationship between farm size and asparagus acreage, and respondents' belief as to which group benefits from organization.

Category of grower believed to benefit	Number of respondents selecting each category	Average farm size of respondents	Average asparagus acreage of respondents
Small producers	17	159	11.1
Large producers	56	88	5.9
Neither	38	78	15.0
Both	130	135	12.3
All categories	241	113	10.5

smaller producers who felt that these organizations were not interested in the small farmers. The distribution by farm size shown in Figure 7, page 29, assumes a greater importance in light of these organizational attitudes exhibited by particular size categories of growers. The 23% who felt that only large producers benefit from organization suggest that steps must be taken to alter this "large grower" image if support from this numerically large group of producers is to be obtained. Since about two-thirds of the growers, by number, harvest less than ten acres of asparagus, and this group operates over one-fourth of the sampled acreage, total support is greatly influenced by the extent to which organizational objectives coincide with the interests of the small growers.

Effect of Organizational Form on Farm Income

Much of the limitation to organizational support results from the belief that the organization cannot achieve its stated objectives. It is thus relevant to determine the form of organization which the majority of producers believe will increase farm income and the objectives which they desire for this organization.

Table 12. Tabulation of responses to the question, "To what extent will each of the following activities increase farm income?".

Form of activity to increase income	Expected Income Increase		
	None	Some	Considerably
Market orders	41	40	20
Farmer cooperatives	31	67	44
Grower bargaining organizations	16	76	71
County agent assistance	22	86	52
Production research	9	66	93
Marketing research	8	86	47
Government price supports	105	22	11
Grower organizations (other than bargaining)	25	68	30

Three numbers stand out in Table 12. One is the large number of respondents expecting considerable income increases from production research and the corresponding low number expecting no income improvement. A similar situation exists for marketing research except that the majority of growers expected only some increase in income. The third relationship is the high proportion of growers who indicated no income improvement from price supports.

This was further accentuated by marginal interjections from the respondents such as "keep government out of this!" While this questionnaire did not analyze values in sufficient detail to make generalizations, this reaction to government price supports with the nearly equal split on market orders, would substantiate the hypothesis that the asparagus growers are reluctant to accept government regulation and direction of decisions.

Objectives of the Organization

One of the important decisions to be made by an organization is the objective upon which it is based. This decision will largely determine the sub-group of growers toward which the organization is oriented. A knowledge of the composition of the producer group based upon their desired objectives will aid the organization in structuring its policies as well as in directing its membership efforts toward the right sub-groups.

Table 13 is the classification by various characteristics of the responses to the question, "If you were asked to help organize the asparagus growers, what would you select as the most important objectives for the organization so as to benefit the grower?"

Selection of any one objective by the respondent implies an attitude towards what an organization should be and do. Identification of these attitudes and the sub-group

Table 13. Number of respondents selecting alternate objectives for organization. Respondents grouped by age, farm size, asparagus acreage, and percent of farm income from asparagus.

Objectives of organization selected by respondents	Age of Operator					Total Acres Operated				
	0-40	41-50	51-60	61-70	70-90	0-19	20-39	40-99	100-199	above 200
Price bargaining	26	59	68	25	8	25	17	63	48	33
Supplying market information	13	33	43	17	7	13	12	39	29	20
Supplying technological information	21	42	41	14	7	17	11	45	34	18
Advertising and promotion	20	40	46	16	5	16	11	43	34	23
Functioning as a selling agent for producers	11	28	31	9	2	7*	5*	29*	24*	16*
Operating a cooperative processing plant	7	20	20	9	2	12*	7*	22*	9*	8*
Regulate supply	6	15	13	6	3	3**	3**	21**	12**	4**
Total respondents	36	79	83	33	11	34	25	79	62	42

Table 13.--Continued.

Objectives of organization selected by respondents	Acreage of Asparagus				Percent of Farm Income from Asparagus					
	1-10	11-20	21-30	31-160	0-5	6-15	16-25	26-50	51-75	76-99
Price bargaining	141**	27**	6**	12**	74	52	27	22	4	7
Supplying market information	76	22	5	10	41	35	17	13	2	5
Supplying technological information	89	22	4	10	49	39	14	13	3	7
Advertising and promotion	86	27	7	7	43**	39**	21**	18**	3**	3**
Functioning as a selling agent for producers	58	16	1	6	30	28	12	8	1	2
Operating a cooperative processing plant	49*	5*	1*	3*	24	13	7	9	2	3
Regulate supply	37*	5*	1*	0*	20	10	8	3	0	2
Total respondents	175	41	11	15	97	67	33	28	6	11

*Columns are significantly different at the 25% level.

**Columns are significantly different at the 10% level.

which holds them is necessary to enable the organization to orient its purposes and objectives toward the segment of the industry it intends to serve. The asparagus growers constitute a social strata which may be categorized into sub-groups on the basis of various characteristics, each of which provides a dimension of the group. By classifying these characteristics according to the objectives which the grower selected, these dimensions may be identified.

Using tabular analysis and chi-square tests of significance the data in Table 13 reveal several relationships. Three of these are discussed in detail below.

The Price Bargaining Objective

Interest in bargaining for price is associated with total farm size in that 71% of the respondents operating less than 40 acres selected this as an objective. In the group whose farm size exceeded 40 acres, 80% selected bargaining. This indicates that the larger farmers are more interested in bargaining than the smaller ones. This relationship found in the size of farm does not carry over to asparagus acreage although there is a difference between acreage categories. Only 63% of the producers having 21-30 acres of asparagus selected bargaining, compared to 82% in the 1-10 acre group, and 80% of those having over 30 acres. These two groups interested in bargaining were probably motivated by different purposes but their contrast with the 11-30 acre group has important implications for organizational policy.

Advertising Objective

Advertising is often an important part of producer organization and cannot be overlooked in the asparagus industry despite the diversity of opinions on its usefulness. From Table 13 it may be noted that larger farmers tended to favor advertising, although the group with 1-10 acres of asparagus indicated a strong preference for this objective.

Additional information was obtained on the advertising objective and is presented in Table 14.

Table 14. Attitudes of respondents towards advertising.

Question	Number of responses	
	Yes	No
Would advertising increase consumer demand for canned asparagus?	151	24
If advertising increased consumer demand, would it be reflected in farm price?	180	38
Would you contribute to an advertising campaign?	139	79

When asked if advertising could increase the demand for canned asparagus 151 (or 87%) answered yes and 24 answered no. Given that the demand could be increased by advertising, the respondents were asked if this increase would be reflected in farm prices of asparagus. Eighty-two percent answered yes. When carried still farther with

the question, "Would you contribute to a campaign to advertise canned and frozen asparagus?," the proportion of affirmative answers dropped to 63%. While the explanation of this was not evident from the survey, personal interviews with several growers indicated an awareness of consumer substitutibility between food commodities. Since nearly all of Michigan fruit and vegetable farms are widely diversified into several crops, these growers were concerned that an increase in the demand for one crop through advertising would decrease demand for another. The result would be a self defeating advertising campaign in all their crops with the end distribution of product sales the same as before advertising was started.

Restriction of Supply by the Organization

Because of its relevance to a bargaining organization, restriction of supply was explored in more detail to determine grower attitudes toward internal organizational control of supply and grower willingness to curtail production at various guaranteed price levels. These results are summarized in Table 15. The data were obtained from three questions. One asked the respondents to indicate the objectives they would select for a growers' organization. Table 15 analyzes only the objective of "control supply at the farm." A second question was "Should any organization of growers be given authority to limit the acreage of all growers if they could increase

Table 15. Acreage reduction for a guaranteed price compared to selection of supply control as a organizational objective.

Question asked of the respondent	Number of respondents indicating affirmative answers	Number of affirmatives who selected supply control as an organizational objective	Number of affirmatives who did not select supply control as an organizational objective
Would you decrease acreage by 10% for a guaranteed price of:			
16 cents per pound	31	13	18
18 cents per pound	74	20	54
20 cents per pound	133	43	90
Would you decrease acreage by 25% for a guaranteed price of:			
16 cents per pound	14	5	9
18 cents per pound	69	17	52
20 cents per pound	121	29	92

deprived them of the right to make their own production decisions. Others qualified their affirmative answers with the stipulation that the "right" people be given the authority to make these decisions. Favorable attitudes toward group control of supply decreased as acreage of asparagus increased and increased as the average age of the respondent increased. Those above 70 years of age were 56 to 44 against such controls while those below 30 years were 80 to 20 against them. Growers having less than 10 acres of asparagus voted 65 to 35 against controls compared to growers with more than 40 acres who were against controls 78 to 22.

income for the group as a whole by this restriction?" The third question required selection of the guaranteed price at which an acreage reduction would be acceptable.

Control of supply as an objective bears a relationship to acreage reduction at a guaranteed product price. Of those who selected supply control as an objective, 30% indicated they would cut back acreage by 10% at a guaranteed price of 16¢. Of those who did not select supply control, only 9% would have made this reduction. At a price of 20¢ per pound for raw product, 100% of those selecting supply control would have reduced acreage by 10% compared to 45% of those who did not select supply control as an objective. Table 15 shows the cumulative totals for acreage decreases of 10% and 25% for each price level. Although total gross returns would have been increased with a 10% reduction and a 20¢ price or a 25% reduction and a 25¢ price, several respondents indicated they would not reduce their acreage at these price levels.

The query on the right of an organization to internally control the supply brought a variety of responses. Many growers became quite emphatic upon this point using the questionnaire margins for such comments as "No! The only way they have to enforce these limitations is through violence." Or, "Any forceable reduction of crops by government or grower organizations contains great dangers of misjudgment and will prevent the result wanted." The majority of growers did not favor any restrictions which

Importance of Asparagus in the Cropping System

Several grower characteristics have been illustrated as important in determining the beliefs and attitudes of growers. One additional characteristic needs to be discussed for its causal relationship with many of the attitudes. The importance of asparagus in the farm cropping system has been indicated by means of acreage (Figure 7, page 29), and by the percent of farm income from asparagus (Table 13). An additional indication is available in the reasons given for including asparagus in the farm plan. The high proportion indicating "early money" as the primary reason may be checked for consistency by using the question, "Do you consider asparagus to be more profitable than the next best alternative for the same land?" Of those who selected early money as the primary reason for growing asparagus, 64% said the alternative crop was more profitable. Those who grew asparagus because it is a high profit crop indicated in a 26:1 ratio that no other crop would have been more profitable than asparagus on this land.

Attitudes and characteristics may be associated in numerous combinations some of which may be obtained from the tabular analysis of Table 13, page 121. The usefulness of additional comparisons would depend upon a need for specific relationships all of which cannot be covered in this study. Enough have been made to illustrate the importance and usefulness of stratifying the population of

growers by several classifications and determining the attitudes associated with each dimension of the strata.

Grower-processor Relationships in the Industry

A series of responses was elicited from growers concerning their attitudes toward and relationships with processors, in order to determine the extent to which growers and processors could work together in areas of mutual interest and benefit and also to determine the extent to which processors are able to influence grower attitudes. Influencing this area of reciprocal attitudes is the past activities of groups and individuals, and previous experiences in working together.

Although the general structure existing between grower and processor is essentially the same for all growers and all processors, individual differences arise in the attitude of growers toward processors and vice versa. It is evident from analysis of the survey that grower attitudes toward organization are affected by the processor dealt with and the relationship existing between grower and processor.

Criteria for Selecting a Processor

As mentioned previously, geographical proximity of plants precludes price differentials except when associated with quality restrictions. With the similarity of prices exhibited in Table 6, page 71, the frequency with which

growers selected price as a criteria for evaluating processors must actually reflect quality and grading restrictions which affect price indirectly. Classifying each criteria as either price or non-price, Table 16, substantiates the previous hypothesis that non-price competition is in the majority.

Table 16. Criteria for selection of a processor.

Criteria	Number of respondents selecting criteria
Price	139
Convenience of delivery	210
Method of payment	77
Reputation of processor	135
Grading procedures	120
Allowances other than price	29
Credit arrangements	19
Personality of processor or fieldmen	97

Convenience of delivery or pickup, reputation of the processor, and grading procedures are the major non-price criteria. On an individual basis price was second in importance but there exists a positive correlation between those processors who pay a quality premium and their suppliers who selected price as a criteria as shown in Table 17.

Grower Loyalty to a Specific Processor

The use of non-price factors as a basis for obtaining increased quantities of raw product make it necessary for a grower to evaluate the relative offers of all processors

Table 17. The relationship of criteria for selecting a processor and the processor selected.

Processor	Percent of suppliers selecting price as a criteria for choosing a processor
1	15%
2*	66%
3*	50%
5*	20%
7	22%
8	25%
9*	50%
11	15%

*An asterisk indicates those processors whose price quotations include a premium bonus for quality, or have shown a higher quoted price with the quality restriction placed privately.

within his market area. Competition for the available supply results in changes in these offers and the relative advantages of one processor over another, suggesting frequent shifts between processors if a grower wishes to maximize his returns. Responses to the mail questionnaire indicate the converse, i.e., grower loyalty to a particular processor appears quite high. The criteria of processor reputation, personal contacts, and method of payment all combine to produce a stable core of growers who tend to remain with a given processor unless sufficient provocation arises. The threshold concept[1] of human behavior explains

[1]Warren J. Bilkey, The Basic Relationships In Consumer Expenditure Behavior, Harvard Studies in Marketing Farm Products, Number 4H, Cambridge, 1951, pp. 39. "Interview findings suggest that people's adjustment to changing circumstances occurs in a way which is consistent with the reaction threshold concept of psychology, i.e., that reaction does not occur until a force of given intensity strength is applied."

the lack of grower response to slight differentials which would tend to stimulate a grower to seek new outlets. One other factor not on the questionnaire was the relationship between a market for the asparagus and a market for other crops. While a grower might find it to his advantage to take his asparagus to another plant in any given year, he would then find it difficult to return with his other products, and in some cases might be forced to seek other outlets for his later season vegetables and fruits. Most growers make a "package deal" delivering all their crops to one processor. Processor interviews substantiated this attitude and several processors also indicated that they did not attempt to directly influence growers away from a competing firm but increased their supply of asparagus through new growers and expanded acreage.

One measure of grower loyalty is the number of times that a grower changes processors and the number of different processors to whom he sells. Out of 267 growers indicating the processor to whom they sold, 200 had not changed processors nor tried additional outlets during the five years from 1959 to 1963. Forty-nine had made only one change during this time, 13 had made 2 changes (usually trying a different processor for one year and returning to the original processor the next year), four had made three changes, and one had changed four times in the five years. In addition, 193 of these growers sold to only one processor during this time, 57 to two processors, 15 to

three, 1 to four and 1 sold to five processors. This stability of outlets has resulted in certain relationships between grower and processor and implies the presence of certain attitudes on the part of both participants. The amount of grower support which the respondents believed essential to bargaining success appeared to depend upon the processor to which the grower had been selling asparagus. Asked to indicate whether it would require 25-50 percent, 50 to 75 percent, or 75-100 percent grower support to obtain a price increase, those growers selling to the largest firm in the Michigan industry responded as shown in Table 18, column one. Responses of those selling to one of the smaller firms is shown in column two.

Table 18. Grower support required for bargaining success, classified by size of processor to whom sold.

Percent of grower support required	Growers selling to largest firm in Michigan	Growers selling to one of the smaller firms
25-50	2	2
50-75	27	16
75-100	46	14

Grower-processor Organization

One of the more important attitudes reflected in this table is shown by the response to the question, "Would it be possible to organize the growers and the processors to work together to increase income to both parties?" The attitude of growers toward the feasibility of a joint

organization did not appear to be associated with any quantificable characteristics of the processors, but differed widely from one processor to another, indicating the processor image which has been developed in the grower by his relationships with a particular firm. The total numbers indicated about an equal distribution between "yes" and "no" answers when the individual processor effects were averaged out despite the wide range indicated by processor. Processor interviews disclosed little interest in such an organization, little awareness of any useful contribution to be made, and very pessimistic predictions that such an organization would ever be created.

Grower Estimates of A "Fair Price"

In order to ascertain the growers' evaluation of the distribution of industry profits between grower and processor, each grower was asked to indicate the price for the 1963 crop which he would have considered fair to both processor and grower. While there was a wide range in the prices given, the current price of fifteen cents per pound was selected as the "fair price" by 37% of the respondents. Several factors probably enter into determination of the price level that the grower considers to be fair, but one of these appears to be the relative profitability of the crop to the individual grower. Sorting prices according to this criterion, the average value for a fair price was 15.6 cents for those who considered asparagus profitable

during the past five years, compared to an average of 16.6 cents for those who considered asparagus unprofitable. An analysis of cultural practices indicated that a fair price below 15 cents was associated with more frequent use of chemical weed and insect controls and fertilizer applications. The two groups of respondents--those specifying a fair price as 15 cents or below and those specifying a fair price as above 15 cents--are shown in Table 19 with the frequency with which they indicated they had used various cultural practices during 1963.

Table 19. Frequency of cultural practices related to level of fair price specified by growers.

Specification of a level of fair prices as:	Cultural Practices Used in 1963							
	Chemical weed control respondents checking		Chemical insect control respondents checking		Fertilizer Application			
					After harvest respondents checking		Prior to harvest respondents checking	
	Yes	No	Yes	No	Yes	No	Yes	No
15 cents or below	73	28	91	10	65	36	77	24
Above 15 cents	60	40	87	13	46	54	84	16

The proportion of respondents indicating that they had used these cultural practices during the 1963 season was higher for the group selecting a lower fair price, in three of the four practices analyzed. The difference is most apparent in the case of application of fertilizer following the harvest season. The majority of respondents in the higher price category did not use the practice, compared to 64%

of the other group who had used the practice. While it has not been established that the use of "approved practices" is synonymous with more efficient production, it is probably true that the more efficient producers tend to use more modern methods in the production of their crops.

Results from the relative profitability question discussed on the preceding page, and the approved practices list would indicate that the level of the fair price specified is affected (if not determined) by the level of costs to the individual producer. The aspiration level of prices appears to be determined by a "cost plus" concept on the part of the growers and differs with the efficiency of the individual in the production of asparagus. The acreage of asparagus grown also substantiates this hypothesis for 41% of the 111 respondents choosing a fair price above 15 cents harvested 10 acres or more in 1963, compared to 319 for the group indicating that a fair price would not need to be higher than the current price of 15 cents.

Many additional relationships exist between processor and grower, and also among growers, which are relevant factors in analysis of group formation. The ones selected for inclusion are based on judgment as to their importance and because of their adaptability to quantifiable research. The relevance of each will be made more specific in the following chapter as the organizational potential is evaluated and the limitations specified in terms of the total industry environment.

CHAPTER VI

RECOMMENDED ACTIONS FOR THE INDUSTRY

The Approach to Organization

Evaluation of group formation in agriculture may be based upon either of two alternative precepts: (1) Group action should contribute to total national growth and goals, or (2) Group action should increase the welfare of its membership relative to other groups in society. The relationship of the two may be compared to increasing the size of the pie to be divided vs. cutting one sector of society a bigger slice of the pie as it now exists.

As an illustrative example of the first precept consider the development of a new variety of asparagus whose productivity is twice that of present varieties. The higher yields may be met with lower prices leaving the producer only slightly better off than before. The processors and distributors may receive profits at least equal to previous levels, and the consumer will obtain more food at lower prices. Many of the technology changes in agriculture during the last 50 years have been of this type where increased productivity has resulted in more food at lower cost to consumers and an increase in the standard of living for both consumer and producer. While relative gains between sectors of society may not have been equal, the

total effect has been to increase the quantity of goods available for consumption--i.e., a bigger pie to be divided--whether measured with deflated gross national product or by the individual standard of living.

An illustration of increasing the welfare of one group relative to another is found in the pure bargaining situation in which the objective is to transfer profits from processor to producer via higher raw product prices. If the processor passes this price increase on to the consumer then the final transfer of income may be from consumer to producer. In either case one group gains at the expense of the other. It is also conceivable that the loss to one group is not compensated by the gain to the other but this does not prevent a final distribution of income which gives at least one group a "bigger slice of the pie."

Subscription to the "larger pie" philosophy need not imply that no individual or group may be made worse off by the actions taken, but only that the sum of all benefits is greater than the sum of all losses. This may be a non-Pareto better action in which some participants are made worse off, and requires interpersonal utility comparison for determining the sums of losses and gains. Such measurement is usually made in absolute dollar values under the assumption that the loss of a dollar by one individual is exactly compensated by the gain of a dollar by another individual (i.e., they have equal and constant marginal utility of money). Organization upon this precept

would increase the welfare of a particular group by increasing the total product in society. Objectives of such a group could be oriented toward increased efficiency in production, marketing, and allocation of resources. It is possible, but not necessary, that they benefit relative to the rest of society, for their standard of living may be increased while retaining a constant share of an enlarged total product, or they may be able to receive the entire increase without altering the incomes of any other sector.

The more frequently observed approach to agricultural organization is the "bigger slice" orientation intended to alter the distribution of existing product--or income--within society. In the case of agricultural groups this is usually promoted as bringing about a more equitable distribution of income based upon some real or imagined misallocation which has resulted from unequal power relationships in the past. Under this condition the basic requirement of the group is the attainment of market power to balance that of the buyer or seller with whom they are dealing. The basic weakness of this approach is the precariousness of the criteria for deciding what constitutes an equitable distribution of income. Through legal and legislative channels society often places limits and otherwise aids in the determination of what constitutes an equitable distribution of income. The anti-trust laws are examples of the restrictive actions of society to prevent increased gains of one group at the expense of another.

The Capper-Volstead Act and various tax exemptions are examples of stimulative action to increase the share of total product being received by a particular group relative to others. Despite these attempts, the complexity of modern society presents an obstruction to the expression of societal values through legal and legislative processes, and equitability is often determined largely by the relative strength of the participants under the existing institutions and regulations.

Possible Objectives for a Growers Organization

Given this basic orientation, the objectives of an organization may be classified into four general categories: (1) bargaining for grower prices, (2) increasing total profits for the industry, (3) providing technical assistance and information to growers, and (4) altering existing marketing techniques and channels. This classification is neither completely exclusive nor exhaustive and seldom is an organization limited to any one of these groups. However, the categories are useful for purposes of discussing the alternative objectives and combination of objectives which might form the focal point of an organization.

In the bargaining group as usually visualized, the primary focus is product price, in which the growers attempt to establish and maintain a price above that desired by the processors.[1] Quantity controls may or may not be included

[1]Objectives are sometimes stated as stabilizing price at the equilibrium level but given the usual elasticity of demand for asparagus, total revenue would be greater with

in the objectives of the organization, but growers would decrease their production only if the price increase were sufficient to result in a larger total revenue. In most cases bargaining for price implies that the total supply will be sold at the accepted terms. The gains to the growers must come from either the processor or the final consumer and benefits to society in total (including the consumer), are less than, or at most equal to, those which existed prior to bargaining.

An alternate organization focus revolves around maximization of joint profits in the industry. While the usual theoretical development of joint profit maximization is based upon agreement or quasi-agreement between horizontally structured firms,[1] there exist joint actions between firms in a vertical relationship, which will increase income to both parties. These actions include such things as promotional activities, grading regulations and quality standards, and the adoption of marketing and production techniques which increase efficiency in the industry. The use of the snapping technique for harvesting asparagus is an example of the latter, which required cooperation on the part of both processor and producer. The maximization of industry profits may include exploitation of the consumer

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unstable prices and producers would not be better off with stabilized prices unless they are higher than equilibrium levels.

[1]For a presentation of the theory of joint profit maximization see William Fellner, Competition Among The Few (New York: Knopf, 1949).

by adjusting price and quantity as if the industry were an integrated monopoly. Increased industry returns without diminishing consumer welfare result through disseminating technical information, stabilizing raw product supply, improving quality, and increasing efficiency in marketing.

Alternatively the organization may exclude price variables completely and focus only upon supplying technical advice and information to its members. Group efforts would be directed toward (1) research and extension activities which would help reduce production costs, (2) promotional activities with the processor on either a regional or national basis, (3) supplying market information, and (4) product improvement at both producer and processor levels. The differentiation between the joint profit maximization focus and the advisory focus is primarily one of independence versus some degree of cooperation between processor and grower. Although such organizations as the Michigan Peach Sponsors and the American Meat Institute are usually accepted and encouraged by processors, the organization having an advisory orientation may operate without the support of processors in the industry. This is not the case in an organization oriented toward joint maximization of industry profits, for the support and knowledgeable cooperation of the processors are necessary for its operation.

The fourth focus of an organization is one which emphasizes marketing activities and is oriented toward increased grower returns through the various techniques

of orderly marketing and marekt development. Allocation of the product through time, form, and space dimensions could be used to equate marginal revenues in all markets. This marketing organization could assume various levels of control, from dispersion of market information to acting as the marketing agent for the growers. This latter position could be extended to include regulation of supplies as well as distribution control and manipulation of supplies to maximize grower returns in all markets. Various forms of market development are also applicable, including promotion and development of foreign markets. The extreme position would be for the institution to establish a processing plant and actually market the product in finished form in competition with independent processors, as is done by the cooperative formed by the National Grape Growers Association.

Limitations to Organization

The four alternative focal points described above, include the major potential activities of grower organization. The approach taken by any organization depends upon all of the environmental and attitudinal factors discussed in the preceding chapters. These place restrictions upon the range of choices open to an emerging organization and in the final analysis determine the organization and its activities. These restrictions may be classified as economic limitations, institutional limitations, and grower imposed limitations.

Economic Limitations

The major economic limitation to increased grower returns lies in the potential supply response of growers. Although it was not possible to statistically establish the elasticity of supply due to the identification problem, the analysis of Chapter III and the elasticity of supply obtained from equation 2, substantiate the shape of the curve shown in Figure 17, page 63. Historical trends and the survey responses indicate that present prices are near the top of the inelastic portion and additional price increases may well result in large acreage increases. Fringe counties in the asparagus region, such as Cass and St. Joseph, have doubled and tripled their acreage in the last ten years; indicating a good profit potential (relative to other crops) in these areas. If there exists economies to scale, then the increased plantings by small growers are an additional indication that price is approaching the point where even the less efficient growers will find it profitable to increase their acreage. Any marked increase in asparagus profits relative to other crops could result in rapid acreage increases in Michigan. Such an increase in production would threaten the industry with a second economic restriction--the inelastic demand. The elasticity computed on page 92 indicates that an increase in quantity would result in a decrease in total returns to the industry. Consumption will be based mostly on population growth and increased income over time. These economic limitations apply to all

of the four alternative focal points of organization in that any increase in grower returns probably will result in increased acreage. The results of the grower survey indicated that 30 percent of the respondents would increase acreage at a price of 16 cents per pound if this price were expected to continue for at least five years. As shown in Table 6, page 71, prices reached this level in 1963 for top quality asparagus. If the anticipated price were raised two cents for a projected five year period the survey indicated that 40 percent of the respondents would expand their present acreage.

The effectiveness of a bargaining organization on a state basis is limited by the interregional relationships in the industry. Since the markets of the three producing regions are separated primarily by the transportation cost, any increase in Michigan price probably would result in some loss of markets to other producing regions; especially California. This possibility is demonstrated by the regional shifts in acreage during the period when California was operating under a marketing order. The regional differences in production and marketing discussed in Chapter II limit the opportunity for a cohesive interregional organization and effective bargaining on a national basis. The regional market structure and substitutability of the regional packs limit the opportunity for effective price bargaining on a local level. When these two factors are considered along with the potential supply response, a small range of

feasible activity remains for an organization with only price bargaining objectives.

Institutional Limitations

The structure of the processing sector meets the criteria of "a limited number of buyers," often given as necessary for a successful bargaining environment. There are only five or six major processors with which a producer organization would have to negotiate, for the other ten would be forced to follow due to the extent of product concentration among the top five firms. Further, the processors handle a specialized commodity with no other source of supply. These conditions favor the grower, but the concentration of product in a very few firms provides a balance of power at the bargaining table which is quite favorable to the processors. The marketing channel and competitive relationships in the midwest wholesale markets prevent individual processors from deviating from the regional market prices. The potential of other geographic production regions, precludes midwest processors quoting prices which differ by more than the transportation cost. Consequently, any increase in raw product price must come out of processor margins. This also restricts the success of both the bargaining oriented group and a joint industry profit group if their strategy includes higher prices for raw product.

One limitation of the institutional framework which has not been previously discussed is the legal environment in which the industry operates. Since enabling legislation has not been enacted in Michigan, state marketing orders are not in the present range of possible alternative actions, and interregional structure prevents easy enactment of a federal market order for asparagus. In more general terms, the structure and mores of society are such as to discourage many actions such as supply control programs which restrict acreage by force. The increasing public opinion against transferring income from consumers to farmers also places limits upon what organizations may do without creating future political-legal hazards to their existence.

The activity of an information oriented organization is also limited by institutional arrangements since active dissemination of market and production information by government agencies makes this readily available to non-members as well as members. The information oriented organization must provide something beyond the services of the Cooperative Extension Service if it is to make a unique contribution to its membership.

The opportunities for an organization to assume the marketing function of its members is limited by the characteristics of the crop. The short processing season results in high fixed costs if the entire overhead must be charged to asparagus. Any plan to start processing asparagus should probably be combined with plans of growers

of other products. The problems of collection and transportation of raw product added to the costs of processing would require that considerable future benefits be anticipated to justify a cooperative plant. It is possible that the bargaining power obtained by such an action would justify subsidizing the processing plant for a period of time.

Limitations Imposed by Grower Relationships

One of the more obvious limitations imposed by grower relationships is found in the structure of the producer sector, for the large numbers and small acreages of growers is an obstacle to organization in itself. In addition the complementarity of the crop and its minor importance in the total farm program of many growers may make it difficult to create enthusiasm among the growers for group formation.

From an historical perspective bargaining has had a poor record in this industry. Unsuccessful attempts are frequent throughout a history of several organizations operating at various levels from the township to the entire state. While these organizations succeeded in other aspects of their program, none has ever been successful in obtaining a negotiated price. This raises doubts among the growers as to the feasibility of bargaining and decreases support.

If one single characteristic were to be selected as the most detrimental to a bargaining organization, it would be the lack of dissatisfaction with present prices

and relationships in the industry. The specification of a "fair price" so close to current prices (see Table 19, page 135) combined with the expressed apprehension of growers that any further price increases would damage present consumer acceptance, are evidence to support the contention that growers in general are not interested in campaigning for higher prices at the present time. As evident from the historical analysis, organization interest increases in periods of low prices but wanes rapidly as prices rise.

The low support for any acreage controls expressed in the grower survey, places a real restriction upon the effectiveness of any long range program to increase income much above current levels. Although some were willing to accept self imposed acreage restrictions, approximately 70 per cent were against any regulation of acreage even by their organizational representatives. Many of those who favored acreage restriction did not feel that it could be enforced.

If the restrictions placed upon an organization by every individual were accepted as a restriction, no organization could ever be formed, for the summation of all the objectives would produce an incompatible combination of criteria. The task of an organization is to select a compatible subgroup of restrictions which can be identified with a strata of growers large enough to enable the organization to attain its objectives.

A Possible Basis for Effective Action by a Growers' Organization

Although the bargaining orientation has been foremost in current discussions of organization, its potential appears to be severely limited at the present time due to production and marketing characteristics of the crop and the social and institutional relationships of growers and processors.

A history of premature bargaining attempts accompanied by rebuffs from processors, has left many growers reluctant to make public bargaining commitments. Combined with present favorable price levels, grower enthusiasm may be expected to be low.

Relying upon the survey as a reflection of grower attitudes and concern, the organization should have multiple objectives which include promotion, technical information, marketing information, and possibly bargaining if it is to meet the criteria of the majority of the members. In light of other restrictions dictated by the growers attitudes it would appear that the latter objective would not receive sufficient support at the present time to be workable because: (1) the growers are not willing to delegate production authority, and (2) most growers believe it will require support of 75 to 100 percent of the growers to succeed. Without this they are unlikely to commit themselves. While nearly one-half of the respondents were in favor of bargaining, considerably less than this proportion

are supporting the present bargaining organization. The survey may well be biased in favor of bargaining but it is also possible that many who favor bargaining do not feel that this is the time or circumstances in which bargaining can succeed.

The interest in increased research in production technology, varieties, yield, and harvesting mechanization was indicated by both grower and processor. This provides a possibility for a joint contribution to industry welfare by both parties, through financial support of research, cooperation on research projects, and stimulation of research interest in asparagus. Although the multiple objectives imply multiple focal points, these should be given a timing priority in terms of progressive development of the organization. During membership growth the bargaining should be minimized and tangible evidence of assistance such as information services, should be emphasized. By producing a useful service, the organization can increase membership and support from growers, and with proper public relations can elicit at least minimal cooperation from the processors. The public relations should be carried still further in building an organization image which appeals to a larger grower clientele. As additional strength is gained negotiations may be instigated on non-price points of difference. Support for each new negotiated point is highly dependent upon success of the previous negotiation regardless of how small the point of difference may have been. Every failure to

successfully negotiate alienates additional support for the next attempt.

While the processors were not generally in favor of a processor-grower organization and the growers were about equally divided as to its feasibility, several areas of development could be initiated under such a joint arrangement. One of these is the foreign market potential which might offer future opportunity for outlets of Michigan asparagus. This would require sufficient market development expenditures to necessitate cooperative efforts from both processors and growers. The biggest detriment to this project is the present availability of markets for all the asparagus which Michigan produces. The probability of acreage expansion altering the picture in the near future is high and some exploratory work needs to be done in finding additional markets for the Michigan product. Another area well adapted to a joint organization effort is the problem of data collection and statistical compilations on both a regional and national basis. As the enterprise becomes more specialized in production and of greater importance in the processors' product line, statistical analysis will become a more important tool in making management decisions. Many of the demand and supply relationships suggested by this study need additional exploration and development with the aid of more accurate data covering a longer period of time. Particularly helpful would be data on acreage, classified by newly planted, harvested, and plowed out, to

aid in analyzing grower reaction to price changes.

The analysis of the form and orientation of an asparagus growers organization which has been presented, implies that some form of organization will exist. This is a basic premise which should be questioned by growers as well as agricultural leaders. It should be determined if the possible benefits to growers, to the industry, and/or to society warrant the expenditures of time and other resources which will be required for maintaining such an organization. With limited funds and personnel, agricultural leaders must also determine the relative benefits from organizing asparagus growers as compared to using these resources to develop alternative commodity organizations. Neither of these two questions are dealt with in this study and the non-quantifiability of most of the criteria for such a decision makes such an analysis highly dependent upon a more detailed knowledge of existing value systems in society in general and producers in particular.

Regardless of the form of the organization which continues from this point in the asparagus industry in Michigan the two basic orientations of the "bigger pie" versus the "bigger slice" must be kept in mind. The basic question remains that of "will the proposed actions of this organization result in an increase in total welfare as well as my own or will it reallocate the existing goods of society to my benefit without increasing total welfare?"

The choice of the two alternatives is less important than an awareness of their existence and the inevitability of choosing one when any action is taken. Each alternative may be correct under the particular conditions at the particular time. In favor of the former it must be remembered that the existing consumer-producer relationships are less than favorable toward a transfer of income from urban society to rural. The following remarks of Christopher Sower and Paul Miller summarize much of the analysis of this study into advice quite apropos to a potential organization of asparagus growers.

> The ability of the organization to achieve its goals--whether it be to affect the legislative process or to affect the behavior of farmers and other recipients--seem directly related to the ability of the organization to set clearly definable goals and to maintain itself with minimal internal and external conflict. Also, it seems that any organization is more likely to have dedicated members if its goals are justified by the rest of the society as for the public good.[1]

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[1]Christopher Sower and Paul Miller, Changing Structure in Agriculture and Rural Society (Department of Sociology mimeograph. Michigan State University, 1961).

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APPENDIX A

THE EFFECT OF THE SNAPPING TECHNIQUE ON RETURNS TO MICHIGAN GROWERS

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THE EFFECT OF THE SNAPPING TECHNIQUE ON RETURNS TO MICHIGAN GROWERS

Equilibrium in the asparagus industry implies stability of relative prices between regions over time if there has been no change in the demand and supply factors during the period. A change in farm prices in one region relative to another, will result in a shift of acreage between regions. Similarly, a technological change which alters production costs only in one region, will stimulate adjustments in farm prices as well as regional production.

Such a technological change occurred in Michigan with the introduction of the snapping process for harvesting rather than cutting the spears below the ground. While resulting in increased efficiency, this method has been adopted only in Michigan - chiefly due to climatic limitations. In warmer regions the "stumps" left in the field by snapping above the ground, result in feathering out (i.e. development of ferns rather than spears) and increased damage from diseases and insects which may develop in decaying stumps. The result has been a price adjustment for the Michigan industry accompanied by concern on the part of growers and processors as to equitability of current prices compared to

those of other regions. Although some research has been undertaken to ascertain those prices which will provide comparable returns between regions, sufficient evidence is not available to satisfy either growers or processor.

The price differential is necessitated by the fact that snapping reduces the gross weight marketed by the grower without altering the quality of canned product which the processor may obtain from a given acreage. The lower one or two inches of the spear, which must be trimmed off by the processor if the spears are cut, is left in the field when the snapping technique is used. Snapping thus results in several sources of increased efficiencies: (1) less total weight to be handled by producers and processors, (2) less handling and preparation of the crop after receipt by the processor, resulting in an estimated reduction of labor costs by two-thirds, (3) an estimated fifty percent reduction in harvesting costs, and (4) some indications of increased yield due to humus added by decaying stubs and due to decreased knife damage to emerging spears. The resulting pricing problem consists of the proper weighting of all those factors to enable both grower and processor to benefit from the improved technology. The distribution of these benefits between grower and processor is determined primarily by the institutional, and social environment within which the industry operates and the power relationships which exist and emerge.

If the new price were established at a level which would maintain processor profits at previous levels, then

all the gains from the increased efficiency of the harvesting technique would accrue to the grower. If the new price were such that grower receipts net of harvest costs were unaffected, then all gains would accrue to the processor. In either case neither grower nor processor would be any worse off than before in absolute terms, but the distribution of profits within the industry would be quite different for the two prices. The range between these two extremes constitutes the bargaining range over which processors and growers have been negotiating since snapping was introduced.

Assuming a U-shaped average cost curve for both grower and processor, a family of profit curves may be constructed for each.[1] Two of these curves for the grower and two for the processor are shown in Figure 22. The pair labeled "a" indicate a high profit for the grower and a low profit for the processor. The curves labeled "b" show a high profit for the processor and a low profit for the grower. Each grower (processor) curve represents a certain profit level for the grower (processor) and indicates the various combinations of price and quantity with which this profit may be obtained. The pair of curves labeled "a" indicate the profit distribution resulting from the highest price that could be extracted from the processor.

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[1]For the derivation of these profit curves see the discussion of Stackleberg curves by William Fellner, Competition Among the Few (New York: Augustus M. Kelley, 1960), pp. 98-119.

The "b" curves indicate the profit distribution resulting from the lowest price that could be forced upon the producer.[1] Any price between these two points would indicate increased profits for both processors and growers. The line cc is

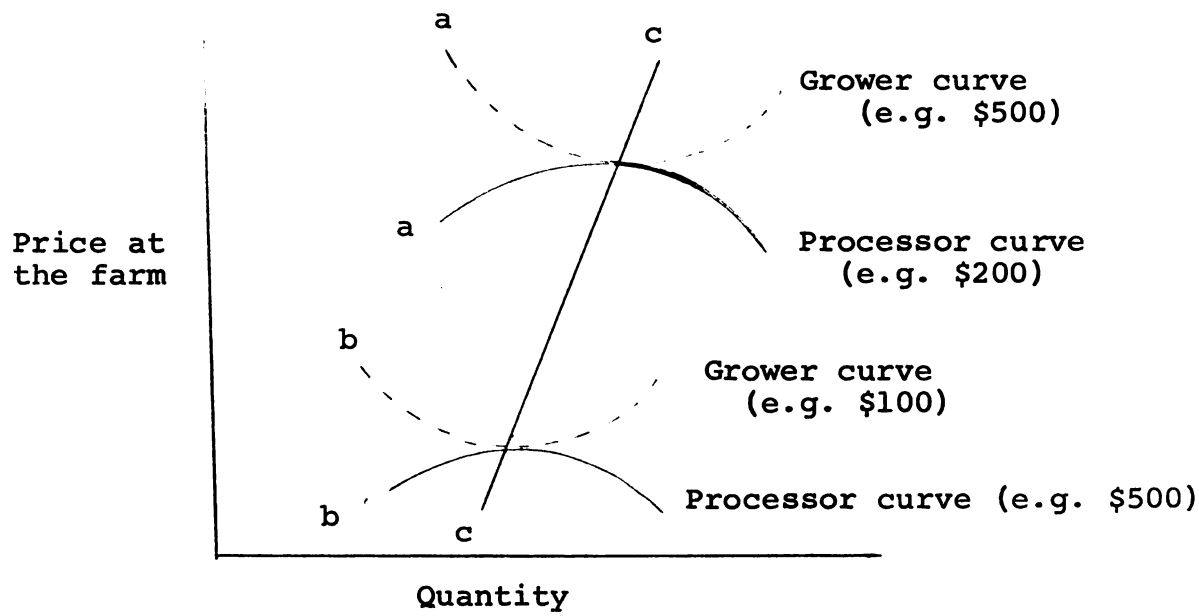

Figure 22. Grower and processor is 0-profit curves.

formed by connecting the points of tangency of each pair of curves and represents all combinations of quantity-price relationships which would result from rational economic adjustments. At any point off this line it would be possible to make a Pareto better adjustment, benefiting one party

[1]These limits may be specified in more than one way, but for this exposition it is assumed that there have been no changes in relative power, thus making it impossible to decrease the profits of either party below what they were prior to the introduction of snapping.

without inflicting losses on the other. Permitting compensation to take place, would facilitate increased profits to both parties by adjustment to the cc line from any point off this line. The actual bargain will come to lie on this curve, and it will be expressed by that point of the curve which corresponds to the accepted distribution of the joint profit. This curve in essence becomes a contract curve of the Edgeworth type although it was never applied by him to this type of analysis.[1]

The change to snapping in Michigan resulted in a movement to a new set of profit curves and contract curve, and a new basis for the quoted price per pound paid to growers. Experimental work in the late 1930's and again in 1950 essentially determined the cut to snapped ratio which would equate grower returns from either technique. The difference of opinion as to the "right" price has thus been based upon adjustments between the two extreme profit distributions illustrated in Figure 22. Price negotiations have not been for the purpose of preventing losses relative to the earlier period, but to determine the distribution of the additional industry rents resulting from the increase in efficiency.

If sufficient detail were available on costs and returns for processors and producers, the illustrative

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[1]Application of the contract curve concept to a similar problem was discussed by Fellner, op. cit., p. 235.

profit curves of Figure 22 could be quantified and the present position within the bargaining range determined. In lieu of such aggregate cost data, an historical analysis may provide a relevant comparison between regions and grower returns. Figure 23 compares an index of gross returns per acre for Michigan with a similar index averaged for California, Washington, and New Jersey. The index for each state was constructed by using average returns from the respective state during the 1939-44 period as the base for each state index series. The indices for the three states were then averaged to provide a comparison between Michigan and the three areas which continued to harvest by cutting. This comparison assumes that no other technological changes have occurred which could alter the relative costs and returns. The base period selected precedes the introduction of snapping in Michigan. Year to year variations indicate adjustments resulting from changes in demand and supply factors. In 1948 Michigan's gross returns fell below the average of the other three states and the spread continues to increase during the remainder of the period. The greatest divergence between the two indices occurs following the 1953 season--the year when Michigan processors required essentially all of their suppliers to harvest by snapping. The inset in Figure 23 showing the percent of Michigan asparagus harvested by the snapping process, relates the increased acceptance of this technique to decreasing relative returns per acre for Michigan.

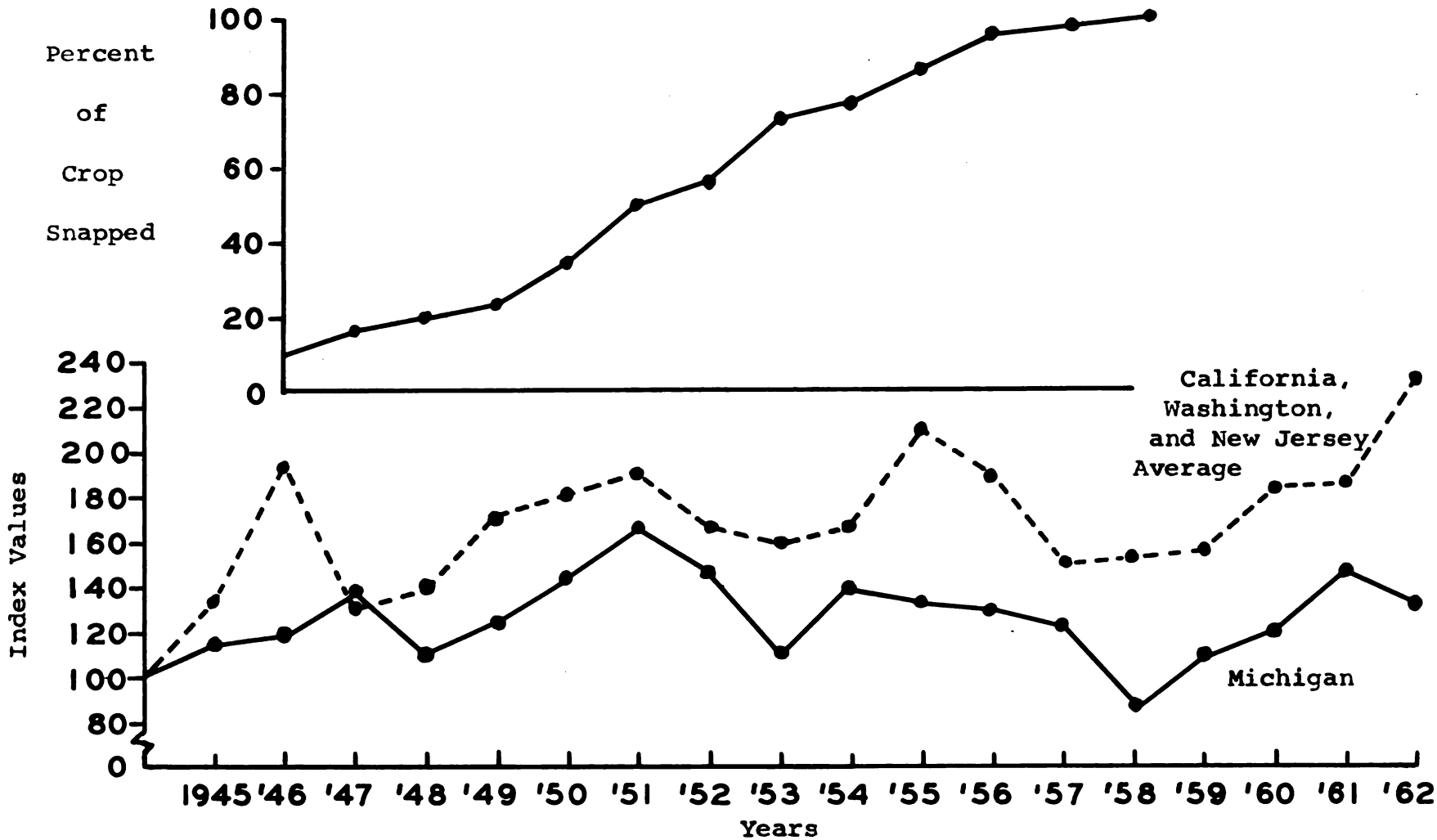

Figure 23. Index of gross returns per acre, from asparagus, Michigan and Average of California, Washington, and New Jersey.

Source of data: Ag. Stat., U.S. Dept. of Agriculture, Washington D.C. (Annual Issues) and estimates of Michigan Crop Reporting Service.

The variation in gross returns per acre is shown in Figure 24 using gross returns in dollars rather than as an index. Approximately equal returns per acre in 1947 and in 1962 would indicate an industry position somewhere between the two pairs of curves in Figure 22; for the grower's profits have increased by the amount of the decrease in his average harvesting costs. Thus, neither grower nor processor have wielded sufficient power to force the other party to the extreme limits on the contract curve. The bargaining negotiations since 1957 have been an attempt to define the limits as well as to test the power of the other party. The low returns of 1953 and 1958 were due in part to bad crop years, but they served to stimulate grower unrest and activity (see Chapter V for a description of grower actions at this time) and were followed by price increases as the processors moved upward along the contract curve, redistributing total profits more favorably toward the growers.

Since wholesale price data by state is not available prior to the introduction of snapping, it is not possible to make regional comparisons of processor returns on a basis similar to the analysis of grower returns just discussed. Without knowledge of cost and production relationships, the exact position of the industry within the bargaining range cannot be determined, but knowing that the range exists and that its bounds are determined partially by net profits relative to other regions and partially by

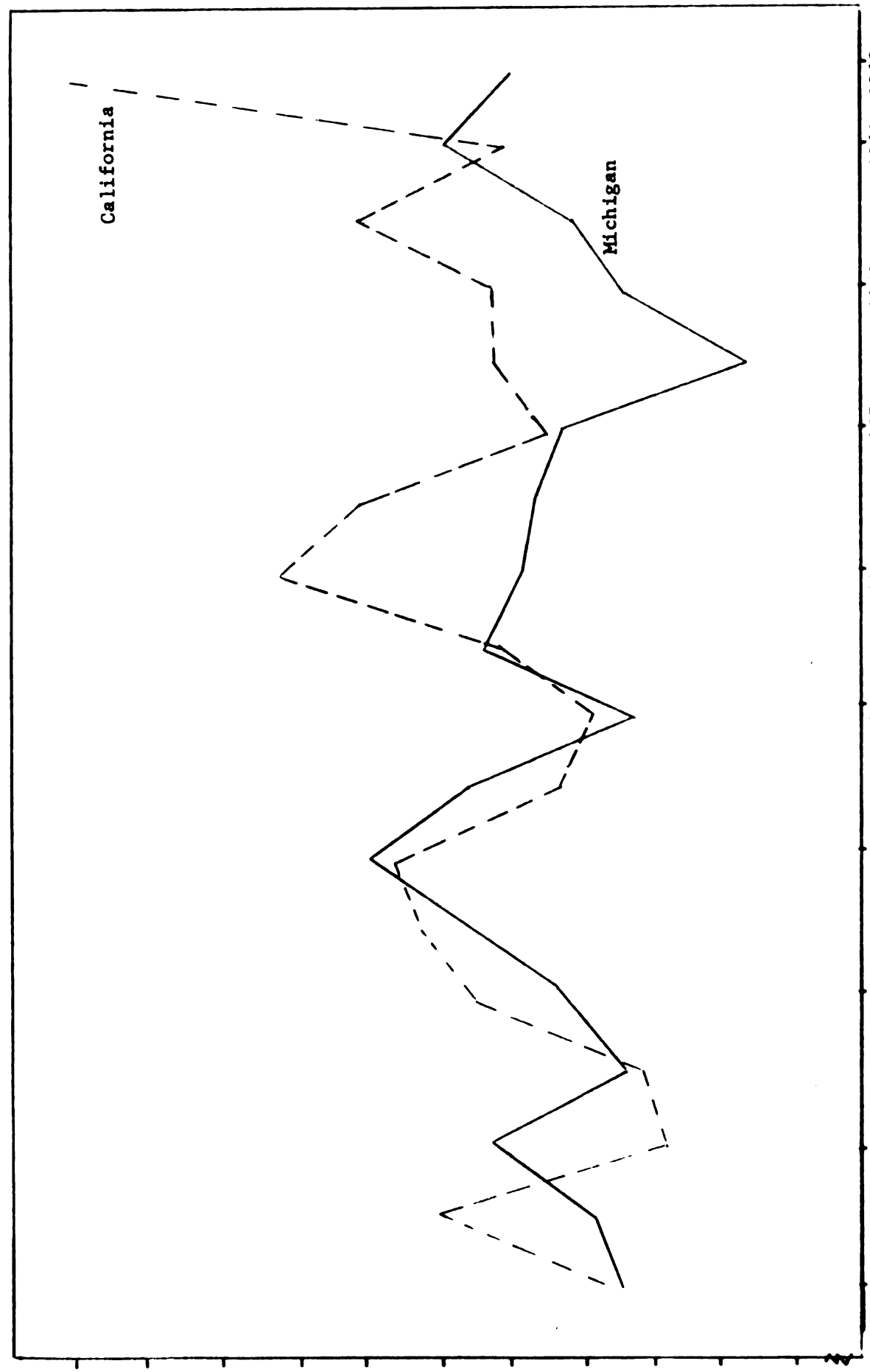

Figure 24. Gross returns per acre from asparagus, Michigan and California, 1945-1962
Basic Source of data: Agricultural Statistics, United States Department of Agriculture, Washington, D. C. (annual issues)

net profits per acre in Michigan, is useful in defining the pricing problem facing growers and processors. Changes in alternate uses for Michigan asparagus acreage tends to alter the aspiration level of the growers as to the price they expect. This change in aspiration levels will alter relative bargaining power and thus affect the outcome of negotiation.[1]

The Michigan industry has been placed upon the contract curve by economic forces. It remains for social and political forces to determine the point upon this curve which is accpetable to both parties. As is true of most human relations this will be a continuing area of struggle, for each party is striving for an ever increasing share of the total product. A basic value often expressed,--that economic growth should be shared by those sectors contributing to it[2]--would suggest that the socially acceptable distribution would lie between the two extremes. These extremes are determined by another value concept present in American society: ". . . increased rewards from growth for certain groups should not be allowed to adversely affect others."[3]

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[1]Sidney Siegel and L. E. Fouraker, Bargaining and Group Decision Making (New York: McGraw-Hill Book Co., Inc., 1960).

[2]Dale E. Hathaway, Government and Agriculture (New York: Macmillan Company, 1963), p. 15.

[3]Loc. cit.

APPENDIX B

THE SURVEY QUESTIONNAIRE

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THE SURVEY QUESTIONNAIRE

A mail survey was used to determine beliefs, and attitudes of growersand to obtain data on size, organization, and recent history of the production units in the industry. The mailing list used had been compiled on a county basis over a period of several years by organization personnel interested in contacting prospective members. It was therefore not a complete listing and in addition, many of the listed names were not currently producing asparagus. Questionnaires were sent to all known growers in the five counties of Allegan, Berrien, Cass, Oceana, and Van Buren--a total of 1756 questionnaires. The counties selected were the top producing counties in the state and accounted for approximately 85 percent of total production. Responses indicated that at least 25 percent of the list were not asparagus producers, leaving approximately 1200 growers in the universe being sampled. Using two follow-up letters, a total of 291 completed questionnaires were obtained, of which 280 were used in the analysis. No attempt was made to determine the sampling bias and all statistical analyses were made under the assumption that the respondents represented a random sample, of all growers in these counties.

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County of residence _____ Your age _____

Let's start with some general information about your farming operations.

1. How many acres are you operating this year (1963)_____?
   How many of these acres do you own _____?

2. What are the major agricultural enterprises on your farm and what proportion or percent of your total net farm income did you receive from each enterprise in 1962?

Enterprise	Acres grown	Proportion or % of your income
Asparagus	_____	_____%
Other Vegetables	_____	_____%
Fruit	_____	_____%
Grain	_____	_____%
Livestock	_____	_____%
Other (specify): _____	_____	_____%

3. What are the major fruit and vegetable crops on your farm and approximately what was your planted acreage of each in 1963?

Kind	Acres	Kind	Acres
Asparagus	_____	Peaches	_____
Tomatoes	_____	Pears	_____
Pickles	_____	Cherries	_____
Celery	_____	Plums	_____
Apples	_____	Strawberries	_____
Other	_____	Raspberries	_____
Other	_____	specify_____	
Other	_____	specify_____	
Other	_____	specify_____	

4. What proportion of your total income comes from farming?
   All _____
   Over 1/2 _____
   Less than 1/2 _____

5. How many years have you grown asparagus for the commercial market? _____

6. Can you recall your annual acreage of asparagus and the changes in acreage during the period from 1959 through 1963? Please indicate these acreages in the table below:

	Col. 1 Acres of asparagus grown	Col. 2 Old acreage plowed out	Col. 3 New acreage planted
1959	_____	_____	_____
1960	_____	_____	_____
1961	_____	_____	_____
1962	_____	_____	_____
1963	_____	_____	_____

7. For any acreage listed in column 2 above which of the reason(s) in the list below best explains why the acreage was plowed out.

_____ a low yielding bed due to age, disease, stand, etc.
_____ low prices for asparagus
_____ to make room for a more profitable crop
_____ other reasons (specify) _____.

8. For any acreage listed in column 3, in question 6, how did you obtain the crowns which you planted?

_____ cash purchase from processor
_____ contract arrangement with a processor
_____ purchase from a commercial nursery
_____ other (specify) _____.

9. What crops do you consider the best alternative for growing on the same land where you now raise asparagus?

_____

Would this crop have been more profitable than asparagus during any of the years from 1959 through 1963? Yes _____ No _____

If yes, which years? _____

10. What is the major reason that you include asparagus in your farm cropping system? (check one)

_____ (1) early money
_____ (2) soil and location well suited to asparagus
_____ (3) labor requirements fit well with other enterprises
_____ (4) asparagus is a high profit crop compared to other uses for this land.
_____ (5) other (specify) _____.

11. Following is a list of practices sometimes recommended in growing asparagus. Indicate by checks which of these you used in 1963 or during the period 1952-62. Please also check whether or not you considered the practice successful.

Practice	Used in 1963	Used at least once between 1952-1962	Successful	
			Yes	No
Chemical weed control	____	_____	___	____
Chemical insect control	____	_____	___	____
Fertilizer application after harvest is completed	____	_____	___	____
Spring fertilizer application	____	_____	___	____
Irrigation	____	_____	___	____

12. Has price influenced your decision to increase your acreage of asparagus during the past 5 years? Yes ___ No___

13. What would be your guess as to asparagus prices in 1964? _____cents per pound at the farm.

14. Which of the following did you use in making this estimate of 1964 prices? (Check more than one if applicable).

_____ (1) price in 1963
_____ (2) prices during the last five years
_____ (3) prices of asparagus in other areas such as California
_____ (4) inventories of canned and frozen asparagus held by processors
_____ (5) other (specify)_____.

15. Suppose there were a price increase for 1964 which you expect to continue for at least five years. How high would this price have to rise before you would expand your total acreage in 1965? _____ cents
Could not expand _____ cents per pound

16. Suppose there were a price decrease for 1964 which you expect to continue for at least 5 years. At what price would you take out some or all of your asparagus acreage? (check only one).

_____ 5¢/lb.	_____ 9¢/lb.	_____ 13¢/lb.
_____ 6¢/lb.	_____ 10¢/lb.	_____ 14¢/lb.
_____ 7¢/lb.	_____ 11¢/lb.	_____ 15¢/lb.
_____ 8¢/lb.	_____ 12¢/lb.	_____ __¢/lb.

17. What price do you feel would have been fair to both grower and processor for the 1963 season? _____ cents per pound at the farm.

18. Do you feel that asparagus has been a profitable enterprise over the last five years? Yes ____ No ____

19. Do you consider asparagus to be a high risk enterprise with a chance for good profits in some years but large losses in other years? Yes ____ No ____

20. To what processors have you sold asparagus over the past five years?

1959 _____, _____

1960 _____, _____

1961 _____, _____

1962 _____, _____

1963 _____, _____

21. In deciding on the processor you sell your asparagus to, which of the following do you consider?

1) ____ convenience of delivery or pickup
2) ____ method of payment
3) ____ reputation of the processor
4) ____ price
5) ____ grading procedures
6) ____ allowances other than price such as furnishing boxes, transportation, credit on fertilizers, spray
7) ____ contracts for purchasing crowns which specify delivery to a specific processor
8) ____ personal experiences and acquaintance with a processor or fieldman
9) ____ other reasons (specify) _____

22. Which reason in the above list do you consider the most important one? (circle the appropriate number)
1 2 3 4 5 6 7 8 9

In question 23 through 29 I would like your opinion of the various grower organizations connected with the fruit and vegetable industries. By "grower organizations" I mean those connected with a specific crop or group of crops such as The Michigan Blueberry Growers Association, The Great Lakes Cherry Producers Marketing Cooperative, The Michigan Peach Sponsors, or The Michigan State Historical Society. The general farm organizations, such as the Grange, and farm supply cooperatives are not included in the term "fruit and vegetable growers organizations."

23. Do you believe that most fruit and vegetable grower organizations benefit the small producer ____? large producer ____? neither ____? all producers ____?

24. In your opinion why do growers join these organizations?

_____

_____

25. If you were asked to help organize the asparagus growers what would you select as the most important objectives for the organization so as to benefit the grower (check all that are applicable).

_____ bargaining for price
_____ providing market information to growers
_____ providing information to growers on production and harvesting techniques
_____ advertising and promotional activities
_____ acting as a selling agent
_____ establishment of a cooperative processing plant
_____ control supply at the farm
_____ other (specify) _____

26. Would you predict that an organization with the objectives you selected above would be able to improve the income of its members? Yes _____ No _____

27. What proportion of the growers do you think would have to support a bargaining organization before they could enforce a 3¢ per pound price increase from the processors? 25 to 50% _____? 50 to 75% _____? 75 to 100% _____?

28. Advertising and promotion are used extensively in many agricultural industries. Do you feel that an advertising campaign would increase consumer demand for canned and frozen asparagus? Yes _____ No _____ Don't Know _____
If it could increase the demand would it have any effect upon farm prices of asparagus? Yes _____ No _____

29. Would you contribute to a campaign to advertise canned and frozen asparagus? Yes _____ No _____

30. Do you think it would be possible to organize the growers and processors in the asparagus industry to work together to increase income to both parties? Yes _____ No _____
If no, why not? _____

_____

31. Would you be willing to decrease your production of asparagus in 1964 by 10% if you were guaranteed a price of 16 cents per pound for the rest? Yes _____ No _____
If you were guaranteed a price of 18 cents per pound? Yes _____ No _____
If you were guaranteed a price of 20 cents per pound? Yes _____ No _____

32. Would you be willing to decrease your production of asparagus in 1964 by 20% if you were guaranteed 16 cents per pound for the rest? Yes ____ No ____
If you were guaranteed 20 cents per pound? Yes ____ No ____
If you were guaranteed 25 cents per pound? Yes ____ No ____

33. Should any organization of growers be given authority to limit acreage of all growers if they could increase income for the group as a whole by this restriction? Yes ____ No ____

34. In your opinion to what extent can each of the following increase farm income in Michigan?

	None	Some	Considerably	Uncertain
Marketing orders	____	____	____	____
Farmer cooperatives	____	____	____	____
Grower bargaining organizations	____	____	____	____
Assistance from the County Agents	____	____	____	____
Research on production methods and new varieties	____	____	____	____
Marketing research	____	____	____	____
Government price supports	____	____	____	____
Grower organizations (other than bargaining)	____	____	____	____

The next three questions refer to any and all organizations directly related to agriculture.

35. In what farm organizations do you presently hold membership? _____

_____

36. Is there any particular organization in which you do not now hold membership that you would like to join? Yes ____ No ____ If yes, which one and why? _____

_____

37. Is there any particular organization in which you do not hold membership that you would refuse to join under any conditions? Yes ____ No ____ If yes, which one and why? _____

_____

APPENDIX C

DESCRIPTION AND SOURCES OF VARIABLES USED IN EQUATIONS 1 THROUGH 9

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DESCRIPTION AND SOURCES OF VARIABLES USED IN EQUATIONS 1 THROUGH 9

Michigan production of processed asparagus, adjusted to a snapped weight basis; annual issues of Michigan Agricultural Statistics, Michigan Department of Agriculture.

Annual acreage of processed asparagus harvested in Michigan: annual issues of Michigan Agricultural Statistics, Michigan Department of Agriculture.

Michigan farm prices for processed asparagus: Annual issues of Michigan Agricultural Statistics, Michigan Department of Agriculture.

Michigan Wholesale Prices, May 1 and January 1, in dollars per dozen #300 cans: obtained from Midwest Prices, fancy all green, cuts and tips, annual issues of The Almanac, National Canners Association, Washington, D.C.

United States acreage of asparagus harvested for processing: Agricultural Statistics, United States Department of Agriculture, annual issues.

Yield of processing asparagus in Michigan: annual issues of Michigan Agricultural Statistics, Michigan Department of Agriculture.

A three year moving average farm price for Michigan

processed asparagus. Computed from annual price data: Michigan Agricultural Statistics, Michigan Department of Agriculture.

Michigan acreage harvested by snapping, computed from acres harvested for processing and percent of crop harvested by snapping.

Last day of raw product delivery to selected processors, obtained from personal correspondence.

United States Pack of Asparagus: National Canners Association, Division of Statistics, Canned Food Pack Statistics, Washington, D.C.

United States wholesale prices converted from index of wholesale prices: reported by U. S. Bureau of Labor Statistics, 1947-1962.

Per Capita disposable income: annual issues The Handbook of Basic Economic Statistics, Economic Statistics Bureau, Washington, D. C.

United States Commercial Production of Broccoli: annual issues of Agricultural Statistics, United States Department of Agriculture.

United States per capita consumption of asparagus: United States Agricultural Marketing Service, The Vegetable Situation, October, 1961, p. 21.

California Canners Stocks, March 1: quarterly release of National Canners Association Division of Statistics and Economics, Washington, D.C.

U. S. Frozen storage holdings, March 30: annual issues of U. S. Agricultural Marketing Service, Summary of Regional Cold Storage Holdings.

Midwest shipments of canned asparagus, January 1 to March 1: Quarterly releases of National Canners Association, Division of Statistics and Economics, Washington, D. C.

California wholesale prices dollars per dozen #300 can, January 1, fancy all green: annual issues of The Almanac, National Canners Association, Division of Statistics and Economics, Washington, D. C.

Year	% of Crop Harvested[1] by Snapping in Michigan	Average Number[2] of days in June with temperature exceeding 85%	Total rainfall[2] in inches during Aug. & Sept.	Peak day[3] of strawberry delivery in June
1947	17	3.6	3.91	22
1948	20	4.3	6.86	12
1949	24	8.6	3.47	12
1950	35	3.9	4.25	19
1951	50	2.8	4.42	17
1952	57	11.3	8.29	15
1953	73	9.4	5.41	12
1954	76	13.7	5.00	13
1955	87	4.1	5.57	14
1956	96	10.4	5.91	17
1957	94	4.7	3.29	13
1958	95	.7	5.18	15
1959	100	8.2	5.53	7
1960	100	.3	5.05	19
1961	100	5.6	4.23	25
1962	100	6.4	11.73	17
1963	100	14.0	3.57	16

[1]Source: Unpublished estimates, crop reporting service, Michigan Department of Agriculture.

[2]Source: Average of nine reporting stations in Western Michigan, from monthly issues of Climatological Data, Michigan, U. S. Department of Commerce.

[3]Source: Date of peak delivery of Michigan strawberries in the Benton Harbor market, Daily Fruit and Vegetable Report, Federal-State Market News Service, Benton Harbor, Michigan.