SOME ASPECTS OF CRAB APPLE PRODUCTION IN MICHIGAN

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E. H. Bjornseth
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THESIS

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by

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V. R. Gardner

THESIS

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A C K N O W L E D G M E N T S

I wish to extend thanks to Mr. E. Payne and to Mr. M. Hutchinson, of Fennville, Michigan, for the assistance they gave in the securing of data; to Mr. V. R. Gardner for suggestions on organization of the manuscript and for helpful suggestions from time to time.

INTRODUCTION

The crab apple was well known in the early days of Michigan's fruit industry. Its merits are recorded in the records of the Michigan Pomological Society of 1877. Mr. H. D. Adams, in a discourse on the crab apple mentioned its hardiness and productivity. The records of this same society for 1874 mentions the interest of the fruit growers of that time in the different varieties of crab apples, including Hewes Virginia Crab, Red Crab, Waugh Crab, Siberian Crab, and the improved Siberian Crabs such as the Hyslop, Red Siberian Crab, Large Red Siberian Crab, Large Yellow Siberian Crab, Marengo, Montreal Beauty, Oblonga, and Transcendent. In the 1881 Transactions of the Michigan Horticultural Society, a report of a discussion on the varieties of crab apples for the Chicago Market mentions Hyslop as being the best variety, stating that Transcendent was too early in season. Of all these the Hyslop is recognized today as the principal variety. The other varieties are not grown commercially.

The 1908 Report of the Michigan State Horticultural Society contains a discussion on the domestic uses for crab apples. However, little information is available on the economic status of this fruit. It is the opinion of some fruit growers today that crab apple orchards are unprofitable and should be replaced by other crops. Furthermore the officials of the commercial canners know that the production

of crab apple jelly and preserves has been on the decline. However, according to Mr. M. C. Hutchinson of Fennville, Michigan, "This decline in production should not be attributed to a lessening of the consumer demand for these products but rather to the high mortality of the firms engaged in this business". The canneries of Michigan are interested in the maintenance of the crab apple industry principally because of the demand for pickled crab apples.

A review of the literature pertaining to Michigan horticulture shows that very little information is available on the subject of crab apple production, prices and marketing. Though of very limited interest compared with other fruits, the crab apple is grown on many farms and is a source of considerable income. It was therefore decided to study the marketing and production of crab apples in one fairly representative producing area.

METHOD OF MAKING STUDY

This study was made in Allegan County through the cooperation of the Fennville Fruit Exchange. This Exchange is the principal fruit marketing agency for the producers of that area who grow principally apples, pears, plums, peaches, cherries and crab apples. In this diversity of fruit production the section is typical of the Western Michigan fruit area.

Most of the data were secured from the records of the Exchange which contained the following marketing records for each grower: (a) the grading record for each kind of fruit, (b) the washing, grading, package and packing costs, and

(c) the prices for which the fruit was sold and the amounts returned to the grower for each grade.

These data from the Exchange's record of each grower were transferred to special record sheets and assembled to show:

For Apples:	bushels produced, prices and returns for U.S. Fancy, U.S. No 1, U.S. No 2, orchard run, commercial and culls.
For Pears:	bushels produced, prices and returns for U.S. No 1, U.S. No 2, and culls.
For Peaches:	bushels produced, prices and returns for U.S. No 1, U.S. No 1 soft, U.S. No 2, U.S. No 2 soft, orchard run and culls.
For Crab apples:	bushels produced, prices and returns for U.S. No 1, U.S. No 2, and culls.
For Cherries:	pounds produced, prices and returns.
For Plums:	bushels produced, prices and returns.
For Quinces:	bushels produced, prices and returns for U.S. no 1, U.S. No 2 and culls.

A sample of one of these individual grower's records is included in this report. Data on the age and number of trees were secured from the growers.

The individual grower's records were then summarized and transferred to a complete record for the Exchange membership. These assembled records were then summarized to show the total gross income from all fruits sold through the Exchange for the years 1951 to 1953 inclusive, and for the principal crab apple growers for the years 1954, 1955

FRUIT	No 1	Price	Gross	No 2	Price	Gross	Culls	Price	Gross	Peeler	Price	Gross	USF	Price	Gross	TOTALS Amt. lbs.	Gross	%
Richmond	756	2½	18.90															
Montmorency	390	3	11.70															
	1146		30.60													1146	30.60	1.1
Bartlett	333	1.50	499.50	291	.95	276.45												
"	271	.95	257.45	155	.60	93.00	208	.20	41.60									
Clapps	69	1.10	75.90	23	.65	14.95	21	.10	2.10									
Keiffer	149	60	89.92	241	.36	87.05	231	.18	41.70									
Bosc	157	1.25	196.25	66	.75	49.50	96	.40	38.40									
Clarigeau	21	.95	19.95	9	.70	6.30	7	.25	1.75									
Howell	20	.90	18.00	9	.60	5.40	9	.10	.90									
Seckel	2	.90	1.80				1		.00							bush		
	1022		1158.77	794		532.65	573		126.45							2389	1817.87	67.1
Duchess	28	.85	23.80	13	.65	8.45	6	.06	.36	8	.20	1.60						
Astrachon	1		.50															
Sweet Bough	7	.65	4.55	1	.50	.50	1	.15	.15									
Wealthy	18	.60	10.80				36	.10	3.60	12	.30	3.60	1		.85			
"							181		22.73									
R I Greening	6	.75	4.50							59	.30	17.70	5	1.00	5.00			
Jonathan	31	.75	23.25				43	.18	7.74	66	.35	23.10	10	1.05	10.50			
McIntosh	39	.75	29.25				80	.18	14.40	30	.35	10.50	23	1.05	24.15			
N. Spy	1	.80	.80				2	.18	.36	1	.30	.30				bush		
	131		97.45	14		8.95	349		49.34	176		56.80	39		40.50	709	253.04	9.3
										O.R.	Price	Gross				bush		
Elberta										4	1.25	5.00				4	5.00	.1
Gui	148	1.10	162.80	17	.45	7.65	8	.25	2.00									
Lombard				152		91.67												
Monarch	119	1.00	119.00	16		9.94	8	.20	1.60									
Grand Duke	4	1.40	5.60													bush		
	271		287.40	185		109.26	16		3.60							472	400.26	14.7
																bush		
Hyslop	179	1.00	179.00				80	.25	20.00							259	199.00	7.3

Note - The grade No 1 refers to either U.S. No 1 or Michigan A grade, or Equivalent grades
" " No 2 " " " U.S. No 2 " " B " " " "
" " Culls " " " Culls " " C " " " "

and 1936. The gross returns obtained from the sale of apples, pears, crab apples, cherries, grapes, plums and quince for the same years were then determined. These returns were then figured in terms of percentage to show the relative importance of each fruit as a source of income. These figures are presented in Table 1.

The records and the orchards of the principal crab apple growers were then selected for a more intensive study. These were orchards whose production averaged 125 or more bushels of crab apples per year. Each of the growers was interviewed to obtain information on the age and number of crab apple trees in their orchards. In some cases the writer counted the trees. The age and number of trees of each grower were tabulated along with the annual yield for the orchard. From these figures the average yields per tree for the years 1931 to 1936, inclusive, were determined. These average yields are shown in Table 3. This table is supplemented with graphs, 1 - 3, showing the yield of some crab apple orchards.

For the purpose of determining how crab apples grade out as compared with other fruits, all the grading records for all fruits were brought together and are summarized in Table 2.

A comparison of U.S. No 1 crab apple prices to the price of other early competing fruits was made by recording the pool price on U. S. No 1 crab apples, U. S. No 1 Bartlett pears and U. S. No 1 Wealthy Apples, along with the average pool price on the various varieties of U. S. No 1 peaches. These prices were recorded for the years 1931 to 1936, in-

clusive, and are shown in Table 4 and Figure 4.

A comparison of pool prices and production is shown in Table 5. This table was made by taking the pool prices of U.S. No 1 peaches, and U.S. No 1 Wealthy Apples and recording the respective total amounts of crab apples, pears, peaches, and apples produced for the years 1931 to 1936, inclusive. This was done to compare the prices of fruits with the local supply of these fruits. Figures 5, 6 and 7 were made to supplement the tables on production and prices and are intended to show the effect of national and Michigan production of the various fruits such as apples, pears and peaches on the price of crab apples. Figure 5 pertains to the United States and Michigan production of apples and their effect on crab apple prices. Figure 6 pertains to the United States and Michigan production of apples, pears, peaches and the effect of these productions on crab apple prices. Figure 7 shows the relationship between the production of the orchards of the members of the Fennville Fruit Exchange and the price of crab apples. The last three years recorded on the graph represent the production of the orchards of the principal crab apple growers and not the entire membership of the Exchange.

The costs per bushel for washing, handling, grading and package for crab apples were secured from the Fennville Fruit Exchange accounts. The cost per bushel for picking was determined from the daily wage rate and the average amount picked by one man per day. These charges are shown in Table 6.

The marketing costs recorded in Table 6 were transferred to Table 7, along with the price received per bushel of crab apples, and the average annual yield per tree. This was done to secure information on the return per tree and per acre of crab apple orchard. The return per tree and the return per acre are figured as the difference between gross income for these units and the marketing costs. Production costs such as for pruning, spraying, cultivating and thinning have not been accounted for in these returns.

PRESENTATION OF DATA

Total Returns and Relative Importance.- The relative commercial importance of the crab apple, as determined from data collected from the records of the Fennville Fruit Exchange, was fifth among the kinds of fruit handled by this Exchange. The gross income from crab apples was 4.4 percent of the total gross income from the sale of all kinds of fruit by this marketing organization (Tables 1, parts A and B). The figures in part A of this table show the gross returns from the various kinds of fruits sold by the entire membership of the Exchange for the years 1931 to 1933, inclusive, when the members numbered 79, 75 and 61, respectively.

Part B of Table 1 shows the returns of the principal crab apple growers of the Exchange from the various fruits which they produced. These leading crab apple growers were also the largest growers of other fruits, having received 36.6 percent of the gross returns of the Exchange for the period of 1931 to 1933 and 61 percent of the gross returns from crab apple sales for this same period. This same group

Table 1. Part A.

Fruit Exchange's Gross Incomes
from Different Fruits
for the Years
1931 - 1933

Kind of Fruit	Year	Gross Income	Percentage	Total Gross Income
Apples	1931	$40,014.06	36.9	
Pears	1931	26,635.53	24.5	
Peaches	1931	15,708.99	14.5	
Crab Apples	1931	5,350.30	4.9	
Cherries	1931	15,606.77	14.4	
Grapes	1931	1,786.45	1.6	
Plums	1931	3,025.46	2.7	
Quince	1931	203.80	.1	
				$108,331.36

Kind of Fruit	Year	Gross Income	Percentage	Total Gross Income
Apples	1932	$59,501.31	46.0	
Pears	1932	31,028.03	23.9	
Peaches	1932	24,288.19	18.7	
Crab Apples	1932	5,124.20	3.9	
Cherries	1932	1,543.90	1.1	
Grapes	1932	1,397.54	1.0	
Plums	1932	6,260.00	4.8	
Quince	1932	140.75	.1	
				$129,233.92

Kind of Fruit	Year	Gross Income	Percentage	Total Gross Income
Apples	1933	$48,094.77	52.3	
Pears	1933	22,727.07	24.7	
Crab Apples	1933	4,100.30	4.4	
Peaches	1933	1,882.25	2.0	
Cherries	1933	5,586.15	6.0	
Grapes	1933	1,000.25	1.0	
Plums	1933	8,522.32	9.2	
Quince	1933	8.25	.0	
				$ 91,921.36

The principal crab apple growers' share of the Exchanges gross income - $35,148.09 or 32.4% in 1931, $52,096.23 or 40.2% in 1932 and $34,303.68 or 37.3% in 1933.

The percent of gross income of the Exchange from crab apples contributed by the principal crab apple growers - $3,132.10 or 58.5% in 1931, $2,655.38 or 51.8% in 1932 and $2,992.00 or 72.9% in 1933.

Table 1. Part B.
Gross Incomes from Different Fruits of the Principal
Crab Apple Growers of the Exchange
for the
Years 1934 to 1936

Kind of Fruit	Year	Gross Income	Percentage	Total Gross Income
Apples	1934	$45,685.23	63.6	
Pears	1934	17,598.97	24.5	
Crab Apples	1934	3,450.50	4.80	
Cherries	1934	1,916.40	2.6	
Grapes	1934	638.05	.8	
Plums	1934	2,476.35	3.4	
Quince	1934	3.50	.01	
				$71,769.00

Kind of Fruit	Year	Gross Income	Percentage	Total Gross Income
Apples	1935	$13,354.83	29.9	
Pears	1935	20,983.18	46.3	
Peaches	1935	4,911.07	10.8	
Crab Apples	1935	3,408.50	7.5	
Cherries	1935	1,163.87	2.5	
Grapes	1935	No Data		
Plums	1935	1,484.94	3.2	
Quince	1935	8.40	.0	
				$45,314.79

Kind of Fruit	Year	Gross Income	Percentage	Total Gross Income
Apples	1936	$39,932.16	57.9	
Pears	1936	16,478.65	23.9	
Peaches	1936	2,667.80	3.8	
Crab Apples	1936	5,617.30	8.1	
Cherries	1936	2,020.52	2.9	
Grapes	1936	186.00	.2	
Plums	1936	2,001.62	2.9	
Quince	1936	4.85	.07	
				$68,908.90

FIGURE 1.

GRAPHS SHOWING THE ANNUAL YIELDS OF CERTAIN INDIVIDUAL ORCHARDS 25 TO 35 YEARS OLD 1931 TO 1936 INCLUSIVE.

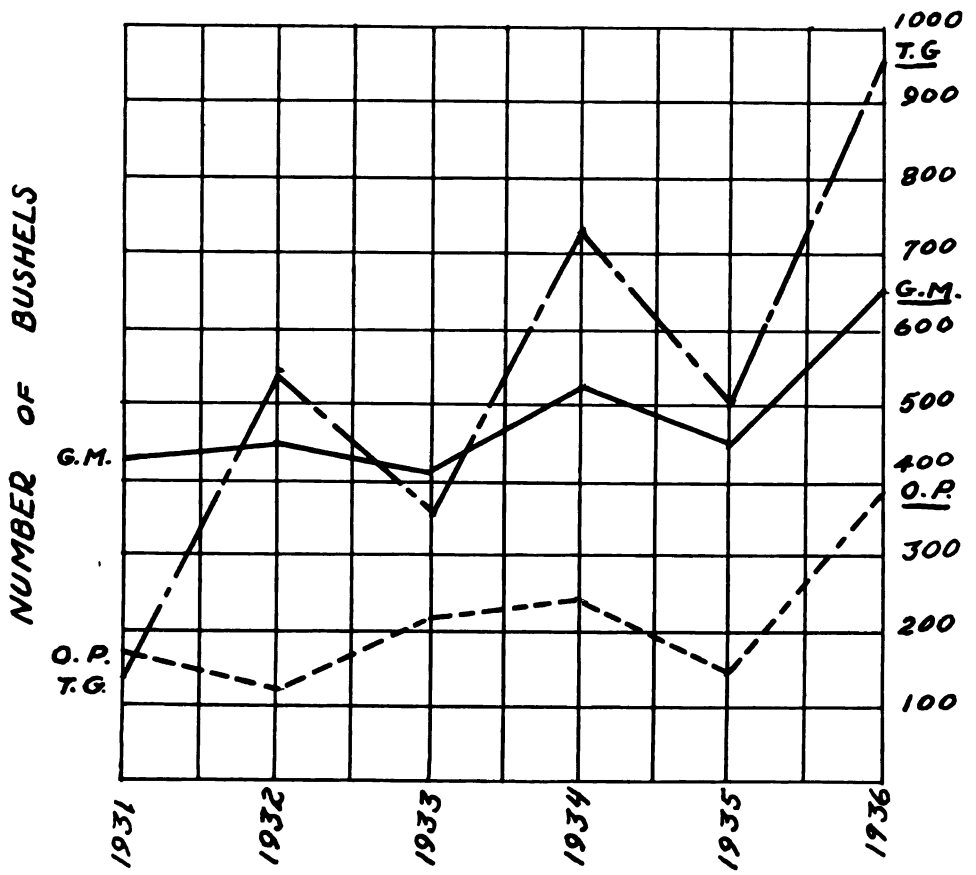
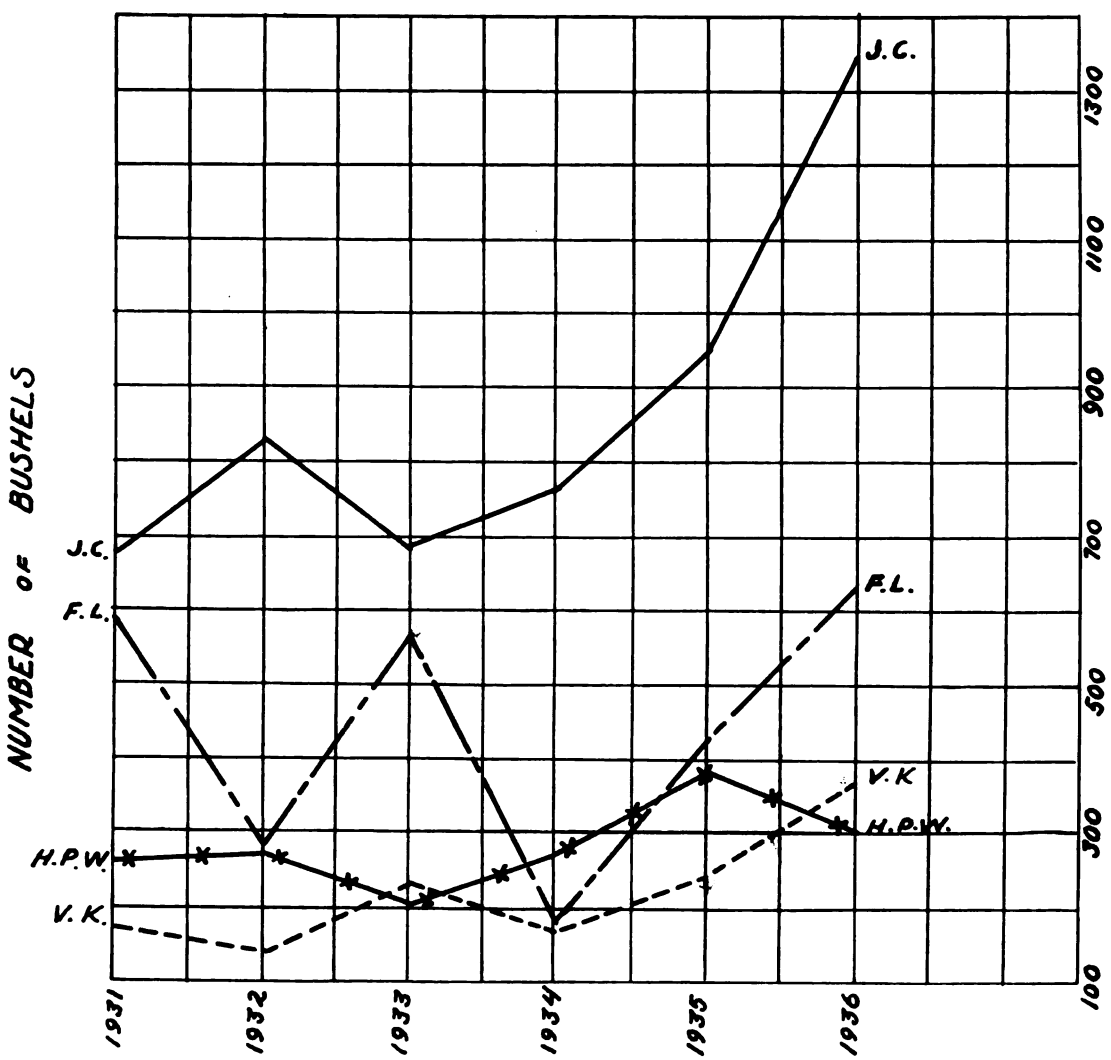


FIGURE 2.

GRAPHS SHOWING THE ANNUAL YIELDS OF CERTAIN INDIVIDUAL ORCHARDS 15 TO 20 YEARS OLD. 1931 TO 1936 INCLUSIVE.



of growers, 16.9 percent of the Exchange membership, with the larger incomes received 6.8 percent of their total gross revenue from their orchards for the years 1934 to 1936 from the sale of crab apples. One of them with a gross income varying from $ 10,000 to $12,000 annually received 12 percent of this total gross income from the sale of crab apples.

Table No 1 shows that none of the other fruit crops raised in the Fennville area yielded as regular an income year after year as crab apples. Peaches, cherries, grapes and plums, in the order named, were the least stable as sources of income. This fluctuation in annual returns from these different fruits may be attributed to severe winters and attendant winter injury to trees or their flower buds, to spring frosts, to a marked tendency toward biennial bearing, and to low prices during the years of heaviest production. Crab apples are hardy and may be depended upon more than any of the other fruits to produce more even sized crops year after year, a factor which tends greatly to stabilize the yearly income.

Grading Records.- One of the advantages of crab apples as a fruit crop is their relatively high grading percentage. A comparison of the grading percentages for crab apples, apples, pears, and peaches, as given in Table 2, shows that crab apples grade out the best of these four fruits. The percentage of U.S. No 1 crab apples was 72.5 for the entire membership of the Exchange for the years 1931 to 1936 inclusive, while for the principal crab apple growers of the Exchange for the years 1934 to 1936, inclusive, it was 86.7. The average grading percentage for pears was 55.9, peaches, 52

Grading Records.- One of the advantages of crab apples as a fruit crop is their relatively high grading percentage. A comparison of the grading percentages for crab apples, apples, pears, and peaches, as given in Table 2, shows that crab apples grade out the best of these four fruits. The percentage of U.S. No 1 crab apples was 72.5 for the entire membership of the Exchange for the years 1931 to 1933, inclusive, while for the principal crab apple growers of the Exchange for the years 1934 to 1936, inclusive, it was 86.7. The average grading percentage for pears was 55.9, for peaches, 52, and for apples, 40 during this same period.

The high grading percentage for crab apples may be attributed in considerable part to the rather uniform size of the fruit. It was observed that very few crab apples were culled for lack of size. The variety is also known for its good color. Furthermore, it is the writer's opinion that it is easier to produce crab apples free from scab and worm injury than other tree fruits because of the slower rate at which the fruit grows, thereby increasing the effectiveness of fungicides and insecticides. The amount of spray residue on crab apples is probably greater than the amount of spray residue on other fruits. This supposition is supported somewhat by the concern of some growers as to whether their crab apples will pass the tolerance test for arsenic and lead for marketable fruit. Some growers make a rough estimate of the amount of spray residue on their other varieties of apples by the amounts of lead and arsenic

Table 2.

Comparison of Grading Percentages for
Various Fruits.
Fennville Fruit Exchange

1931	U.S. No 1 (bushels)	Total All Grades (bushels)	U.S. No 1 (percent)
Crab Apples	5,221	6,531	79.9
Apples	24,752	99,087	24.9
Peaches	17,953	36,204	49.5
Pears	17,199	33,857	50.7
1932			
Crab Apples	5,674	7,473	75.9
Apples	44,098	119,062	37.0
Peaches	17,004	41,399	41.0
Pears	36,569	64,203	56.9
1933			
Crab Apples	3,554	5,746	61.7
Apples - U.S.F.	17,757	95,840	37.0
Apples - U.S. No1	17,757	95,840	37.0
Peaches	807	1,323	60.9
Pears	15,455	27,922	55.3
1934			
Crab Apples	2,709	3,217	84.2
Apples	28,243	53,539	52.7
Peaches			
Pears	10,404	18,146	57.3

Table 2.
(continued)

Comparison of Grading Percentages for
Various Fruits.
Fennville Fruit Exchange

*1935	U.S. No 1 (bushels)	Total All Grades (bushels)	U.S. No 1 (percent)
Crab Apples	4,550	5,165	88.0
Apples	10,582	28,405	37.2
Peaches	3,654	7,711	47.3
Pears	13,574	19,894	68.2

*1936			
Crab Apples	6,669	7,569	88.1
Apples - U.S.F.	112	44,282	51.4
Apples - U.S. No 1	22,657	44,282	51.4
Peaches	1,454	2,271	64.0
Pears	8,582	18,034	47.5

*These figures are based on the yields secured by the principal crab apple growers who are members of the Exchange.

FIGURE 3.

GRAPHS SHOWING THE ANNUAL YIELDS OF CERTAIN INDIVIDUAL ORCHARDS 15 TO 25 YEARS OLD 1931 TO 1936 INCLUSIVE

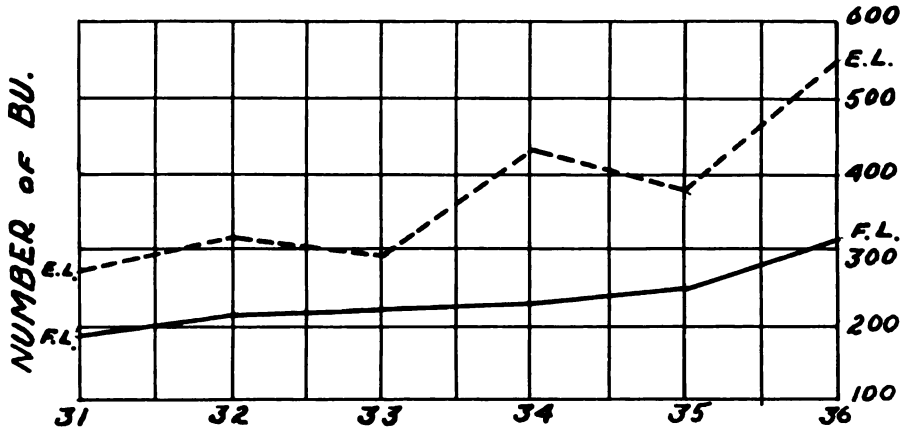
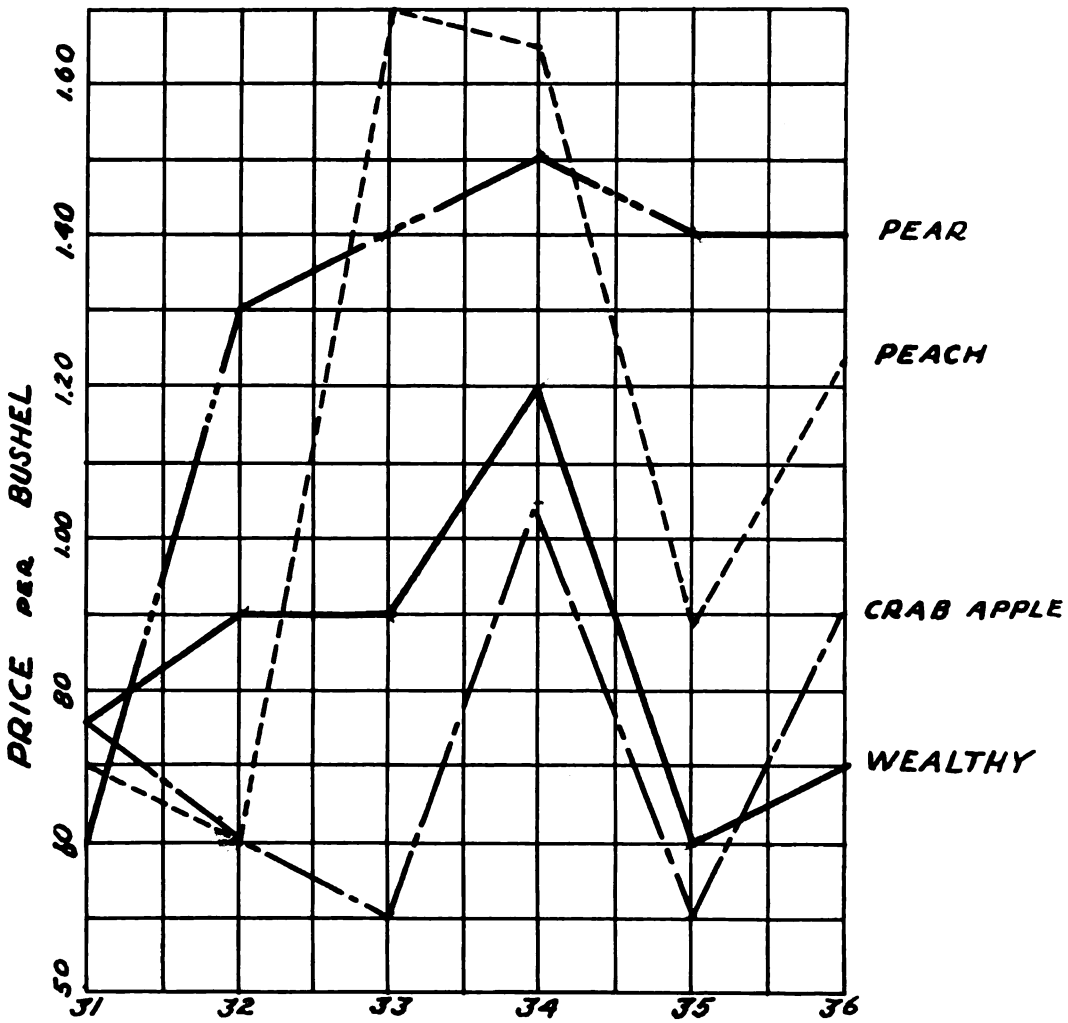


FIGURE 4. GRAPH OF ANNUAL PRICES FOR VARIOUS FRUITS. Note - These figures were secured from the YEAR BOOK of AGRICULTURE.



which are found on crab apples. Growers are of the opinion that if their crab apples are below the tolerance limit for these spray materials their other varieties of apples will also be below this tolerance limit.

Yields.- Yields of crab apples produced in these orchards included in this study are shown on Table 3. As would be expected there is much variation. The crab apple trees in the orchard of H. P. W. consistently out-yielded the trees belonging to G. M. This difference in yield may be attributed to the difference in the methods practiced by these two growers. The annual yields of crab apples for the orchards of the principal growers showed a gradual increase as the trees became older. Some of this increase in yield probably was due to the growth of the tree, some to climatic and other factors. The year 1936, the last for which yields were recorded, was the exception in which most growers secured a relatively large yield. The average yield for this year was 4.1 bushels per tree, while the lowest yield was obtained in 1931 with an average of 1.8 bushels per tree. One grower obtained as large a yield of fruit from trees 7 years old as a number of other growers secured from trees ranging in age from 10 to 30 years. A yield of 23 bushels was secured on one 35-year-old tree in the orchard of a grower who was not a member of the Exchange.

Some idea of the yielding ability of crab apple trees can be obtained from the data in Table 3. Individual crab apple trees often show more or less of a biennial habit of

FIGURE 5.

GRAPH SHOWING U. S. APPLE PRODUCTION, MICHIGAN APPLE PRODUCTION, LOCAL SUPPLY AND CRAB APPLE PRICES 1931 TO 1936 INCLUSIVE.

SCALES USED FOR GRAPHS

UNITED STATES	1 = 20,000,000	BUSHELS
MICHIGAN	1 = 800,000	BUSHELS
PRICE	1 = 10 ¢	

NOTE - THESE FIGURES WERE SECURED FROM THE YEAR BOOK OF AGRICULTURE.

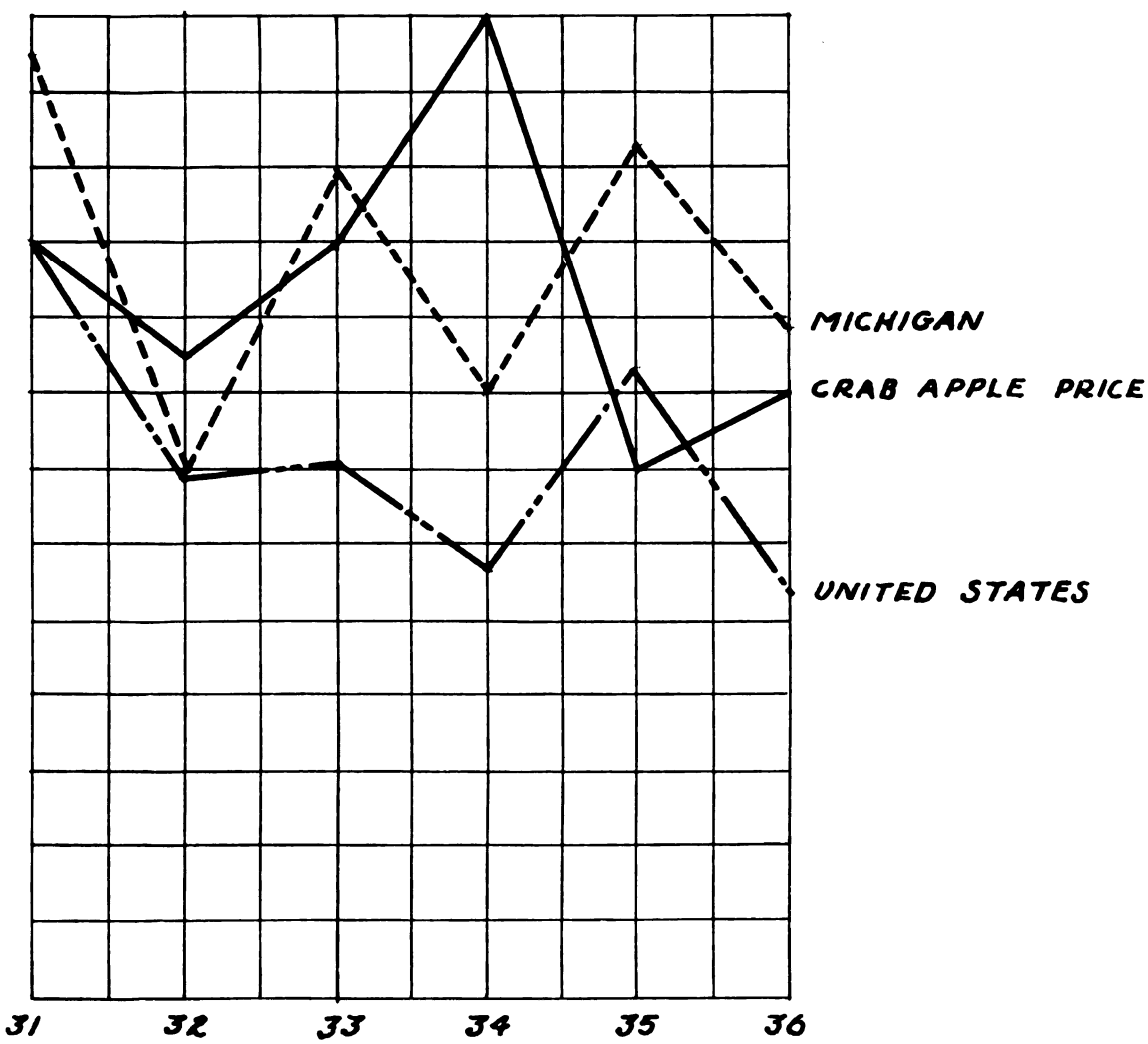


Table 3

Individual Growers' Yields of Crab Apples per Tree for a 6 Year Period

Grower	Trees		1931	Yield	1932	Yield	1933	Yield	1934	Yield	1935	Yield	1936	Yield	Average
	No.	Age in 1936	Total	Per Tree	Total	Per Tree	Total	Per Tree	Total	Per Tree	Total	Per Tree	Total	Per Tree	Yield 31 to 36
J. C.	500	20	963	1.9	1450	2.9	1172	2.3	1331	2.6	1707	3.4	2512	5.0	3.0
V. K.	118	17	166	1.3	83	.7	259	2.2	154	1.3	300	2.5	529	4.4	2.0
F. H. L.	364	20	596	1.6	363	1.0	953	2.6	190	.5	665	1.8	1048	2.8	1.7
G. M.	350	30	424	1.2	452	1.2	415	1.2	534	1.5	446	1.2	646	1.8	1.3
O. P.	75	25	170	2.2	131	1.7	218	2.9	247	3.2	153	2.0	381	5.0	2.8
E. W.	200	15	336	1.6	495	2.4									2.0
S. W.	175	15	190	1.0	296	1.6									1.3
H. P. W.	81	20	336	4.1	364	4.4	203	2.5	360	4.4	594	7.4	419	5.1	4.6
F. L.	50	20	85	1.7	115	2.3	122	2.4	133	2.6	147	2.9	210	4.2	2.6
E. R.	98	12	132	1.3	46	.5									.9
R. V.	30	30	137	4.5	91	3.3	41	1.3	139	4.6			93	3.1	3.6
E. L.	125	20	161	1.2	210	1.6	190	1.5	335	2.6	279	2.2	451	3.6	2.1
T. G.	152	28	143	.9	543	3.5	357	2.3	727	4.7	506	3.3	966	6.3	3.5
Aver.				1.8		2.0		2.1		2.8		2.9		4.1	2.6

Average annual yield for 6 years - 2.6 bushels.

of fruiting and this may extend to entire orchards. This is shown in the slight alternation of somewhat larger and somewhat smaller yields of the orchards for which records are presented in Table 3 and Figures 1 - 3.

Prices.- A study of the prices of crab apples and other fruits going on the market at about the same time shows that crab apple prices are more or less independent of the prices received for other fruits (see Table 4 and Figure 4). It is evident that crab apple prices follow somewhat those of the other fruits, but not at all closely. Perhaps the most noticeable feature about them is that they show less extreme variation from year to year.

The price of crab apples in any one year shows some relation both to the annual production of apples in the United States and in Michigan. Figure 5 shows that this was more evident during the period 1933 to 1936, inclusive, than during the period 1931 to 1933. Figure 6, showing the production of apples, pears, and peaches for Michigan and the United States, along with crab apple prices, indicates very little relationship between crab apple prices and the production of pears and peaches in the United States or Michigan, while the price of crab apples shows a tendency to vary inversely with the total apple production in the United States.

Local production of crab apples apparently has very little effect on their price (see Figure 7). The first three years recorded on the graph is for the production of

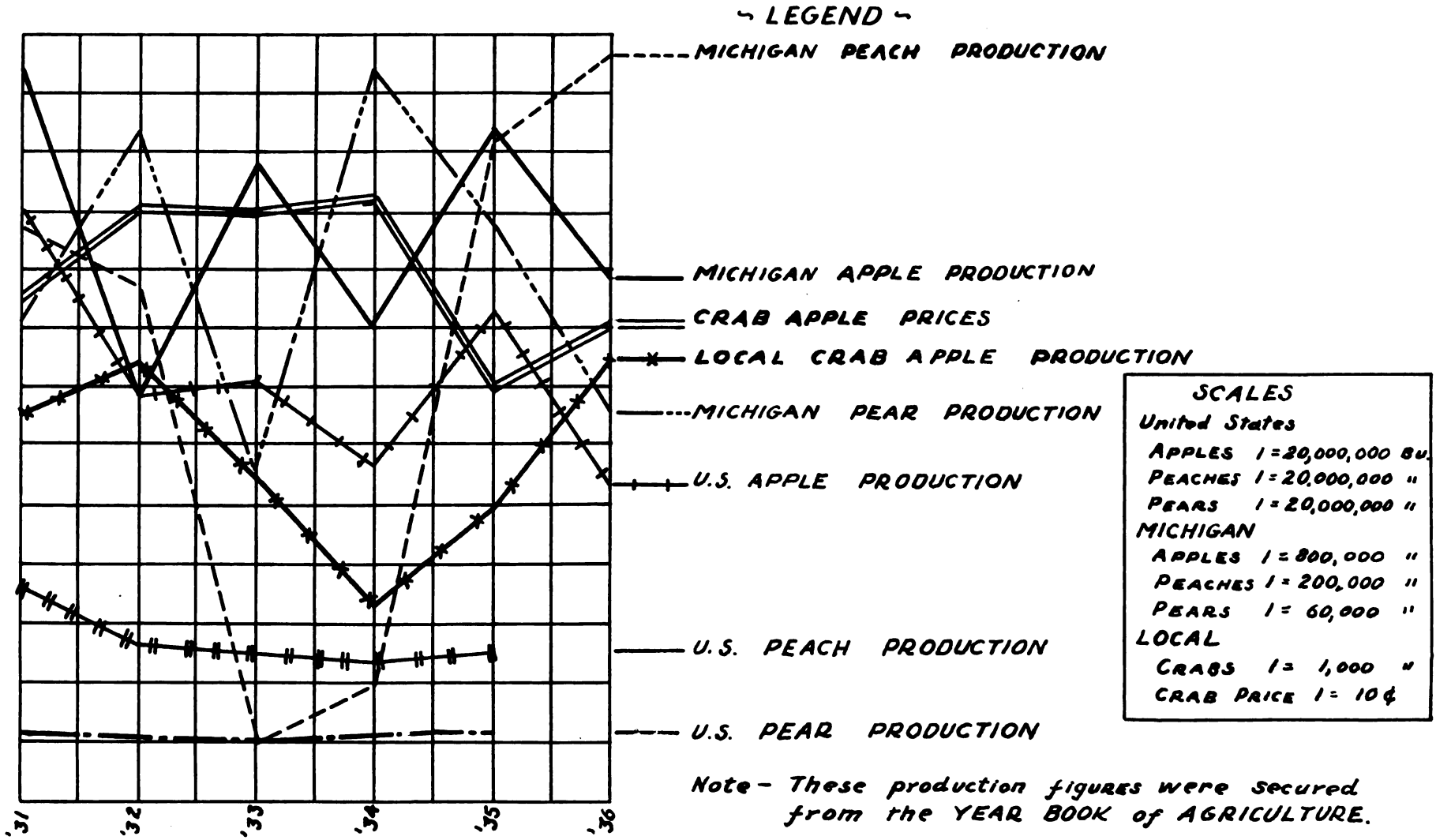
Table No 4

Year	Average Crab Apple Prices	Crab Apple Produced Bushels	Average Bartlett Prices	Pears Produced Bushels	Average Peach Prices	Peaches Produced Bushels	Average Apple Prices	Apples Produced Bushels
1931	$ .85	6,531	$ .68	33,857	$ .80	36,204	$ .85	99,087
1932	1.00	7,473	1.40	64,203	.70	41,399	.70	119,062
1933	1.00	5,746	1.50	27,922	1.80	1,323	.60	95,840
*1934	1,30	3,217	1.60	18,146	no crop	no crop	1.15	53,539
*1935	.70	5,165	1.50	19,894	1.00	7,711	.60	28,405
*1936	.80	7,569	1.50	18,034	1.35	2,271	1.00	44,282

* Note - These figures are for the principal crab apple growers in the Exchange and not for the entire membership.

Figure 6.

GRAPHS SHOWING UNITED STATES AND MICHIGAN PRODUCTION OF APPLES, PEARS, PEACHES AND CRAB APPLE PRICES.



Note - These production figures were secured from the YEAR BOOK of AGRICULTURE.

the entire membership of the Exchange, while the last three years are for that of the principal crab apple grower. However, the principal crab apple growers produced 61 percent of the crab apples sold by the Exchange and for this reason the production of crab apples for the entire membership would be considerably greater than that recorded for the last three years. 1936 was the year of the greatest local production, yet the price was 10 cents per bushel higher than the year before. The annual local production of crab apples will vary between the 5,000 and 8,000 bushels per year and apparently that amount is too small to have any considerable influence on the price of crab apples in the various Midwest markets.

Marketing Costs.- The marketing and production costs for crab apples vary from year to year. The charge for washing varied from 1 - 2½ cents per bushel. During 1936 early apples were washed for the minimum rate of 2 cents per bushel, while late varieties of apples, including crab apples, were washed for the maximum rate of 2½ cents per bushel.

The handling and grading charge varied from 6 cents per bushel in 1933 to 8 cents per bushel in 1931. The price of the package varied from 15 cents in 1932 to 19 cents per bushel in 1934. These charges were determined by the management of the Exchange for each year. The cost of picking ranged from 6 cents per bushel in 1932 to 12 cents per bushel in 1936. The higher cost of picking in 1936 was

Table 6.

Annual Packing and Handling Costs
per Bushel

Fennville Fruit Exchange

	1931 (cents)	1932 (cents)	1933 (cents)	1934 (cents)	1935 (cents)	1936 (cents)
Washing	.01	.01	.01½	.01½	.02	.02½
Handling and Grading	.08	.07	.06	.06½	.06½	.07
Package	.17	.15	.15½	.19	.17	.17
Picking	.07½	.06	.10	.10	.12	.12
Total Charge	.33½	.29	.33	.37	.37½	.38½

Table 7

Total marketing costs, prices received, amount left, yield per tree, and the return per acre, for the years 1931 to 1936. These data are for the orchards of the principal crab apple growers in the Fennville area.

Year	Total Handling and marketing costs per bu. U.S. No 1	Price rec'd per bu. U.S. No.	Am't left per bu. U.S. No 1	Yield per tree U.S. Nol (bushels)	Income return per tree U.S. Nol	Yield per tree culls (bushels)	Price per bu. culls	Income return per tree culls	Total return per tree	Return per acre 50 trees
1931	$ .335	$1.00	$ .665	1.4	$ .95	.4	$ .10	$ .04	$ .99	$ 49.50
1932	.29	.85	.56	1.5	.84	.5	.15	.07	.91	45.50
1933	.33	1.00	.67	1.3	.87	.8	.25	.20	1.07	53.50
1934	.37	1.30	.93	2.0	1.86	.8	.45	.36	2.22	111.00
1935	.375	.70	.33	2.1	.69	.8	.25	.20	.89	44.50
1936	.385	.80	.43	3.0	1.29	1.1	.25	.27	1.56	78.00
Aver.	.345	.94	.595	2.2	1.08	.7	.24	.19	1.27	63.66

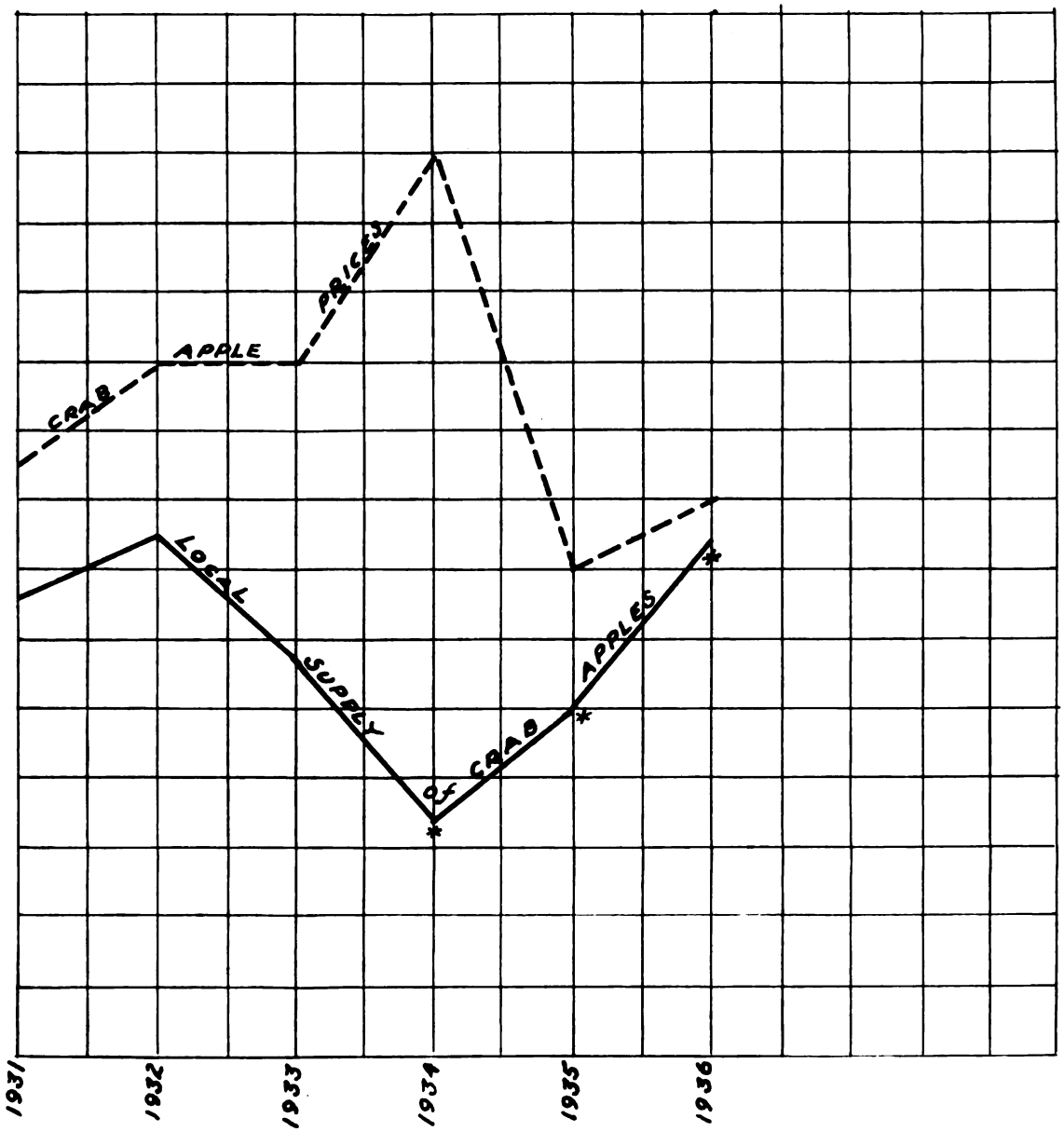
Note - The above returns per acre and per tree are figured as the difference between gross income and marketing costs. Production costs such as spraying, cultivation, pruning etc. have not been subtracted.

FIGURE 7.

GRAPH SHOWING CRAB APPLE PRICES and LOCAL SUPPLY of CRAB APPLES

Scale 1 = 1,000 Bushels
1 = 10 ¢.

NOTE - * PRODUCTION of the PRINCIPAL CRAB APPLE GROWERS of the EXCHANGE.



due principally to an increase in the wages of the pickers.

The total marketing cost was the lowest in 1932 with a charge of 29 cents per bushel for these various services while in 1936 it was the highest with a charge of 38½ cents per bushel of crab apples. These marketing costs are given for each year in Table 6.

Returns.- The average yields of U.S. No 1 crab apples and culls produced per tree, together with the various packing and handling costs and prices per bushel for these grades, were used in determining the income per tree and per acre of fifty trees. It will be noted (Table 7) that the net income per acre, before subtracting overhead and current orchard maintenance costs, of crab apples varied from $44.50 in 1935 to $111.00 in 1936. The average return for the six year period was $63.66 per acre.

DISCUSSION

The raising of orchard fruits in Michigan involves much financial risk. The grower who depends upon only one or two kinds as the principal source of income is accepting more risk than the grower who raises a greater diversity. The production of crab apples on the average fruit farm provides a means of spreading and minimizing this financial risk.

The demand for crab apples is about the same year after year; for this reason it is not advisable greatly to increase the acreage. New plantings should be limited for the most part to replacements of those trees taken out of production.

S U M M A R Y

1. Though crab apples would be classed as one of the minor fruit crops, they are a popular supplementary fruit crop in the Fennville district of Michigan, 70 percent of the growers raising them for income.
2. The production of crab apples is holding about stationary.
3. In comparison with other fruits crab apples are easily grown, as shown by their high grading percentage.
4. Crab apples sell for prices comparable to those paid for apples, but their prices are subject to less fluctuation than those of most other fruits.
5. The trees yield reasonably well and more regularly than those of most apple varieties.
6. The fruits grade out considerably better than those of the apple, seldom showing size or color deficiency.
7. Prices are usually within the price range being paid for other fruits of the season, and average net returns per tree or per acre are reasonably satisfactory.