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VARIABILITY OF CROP YIELDS IN MINNESOTA

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The year-to-year fluctuations of crop yields in Minnesota differ considerably from county to county. These variations affect many agricultural problems, such as the determination of land values and loan risks, the planning of livestock production, and the planning of production control and crop insurance programs. The data presented in this report have been prepared in order to obtain a more accurate measure of the variability of crop yields in different parts of the state. The yields reported annually by the United States Department of Agriculture and the Minnesota Department of Agriculture (cooperating) have been used as the basis of these calculations. Yields by counties have been reported for corn, oats, barley, spring wheat, winter wheat, rye, flax, and potatoes since 1917, and for tame hay since 1920.

The mean coefficient of variation of yields of the above crops for each county is presented in Figure 1. The coefficient of variation was calculated as follows: First, the deviations of the annual yields from the normal yields were averaged. Second, this average was expressed as a percentage of the long-time average yield. Thus, an average deviation of 7 bushels represents a 33 per cent change in production if the average yield is 21 bushels; but it represents only a 20 per cent change if the average yield is 35 bushels. One characteristic of this measure is that in approximately one-third of the years, the yield will differ from normal by percentage greater than that expressed by the coefficient of variation. For example, in about one year in three, the crop yields of Meeker County will be above or below average by more than 28 per cent. These coefficients of variation range from a high of 38 per cent in Big Stone County to a low of 17 per cent, or less than half as much, in Faribault and Martin Counties. In general, the variability of yields is greatest in the west central part of the state in an area extending from Wilkin County southward thru Lincoln and Lyon Counties. This is the area which has suffered most severely from droughts. Another area of relatively high variability extends across the central part of the state, from Clay County on the west to Pine and Chisago Counties on the east. Yields are least variable in the south central counties.

The coefficients of variation of each of the crops studied are presented in Table 1. In order to permit comparisons between the different sections of the state, averages have been calculated for each of the nine types-of-farming areas. These areas are outlined on Figure 1. In most of the areas, the yields of potatoes and spring wheat fluctuate more widely than those of the other crops. The yields of flax and winter wheat show the least variation. In comparing individual crops

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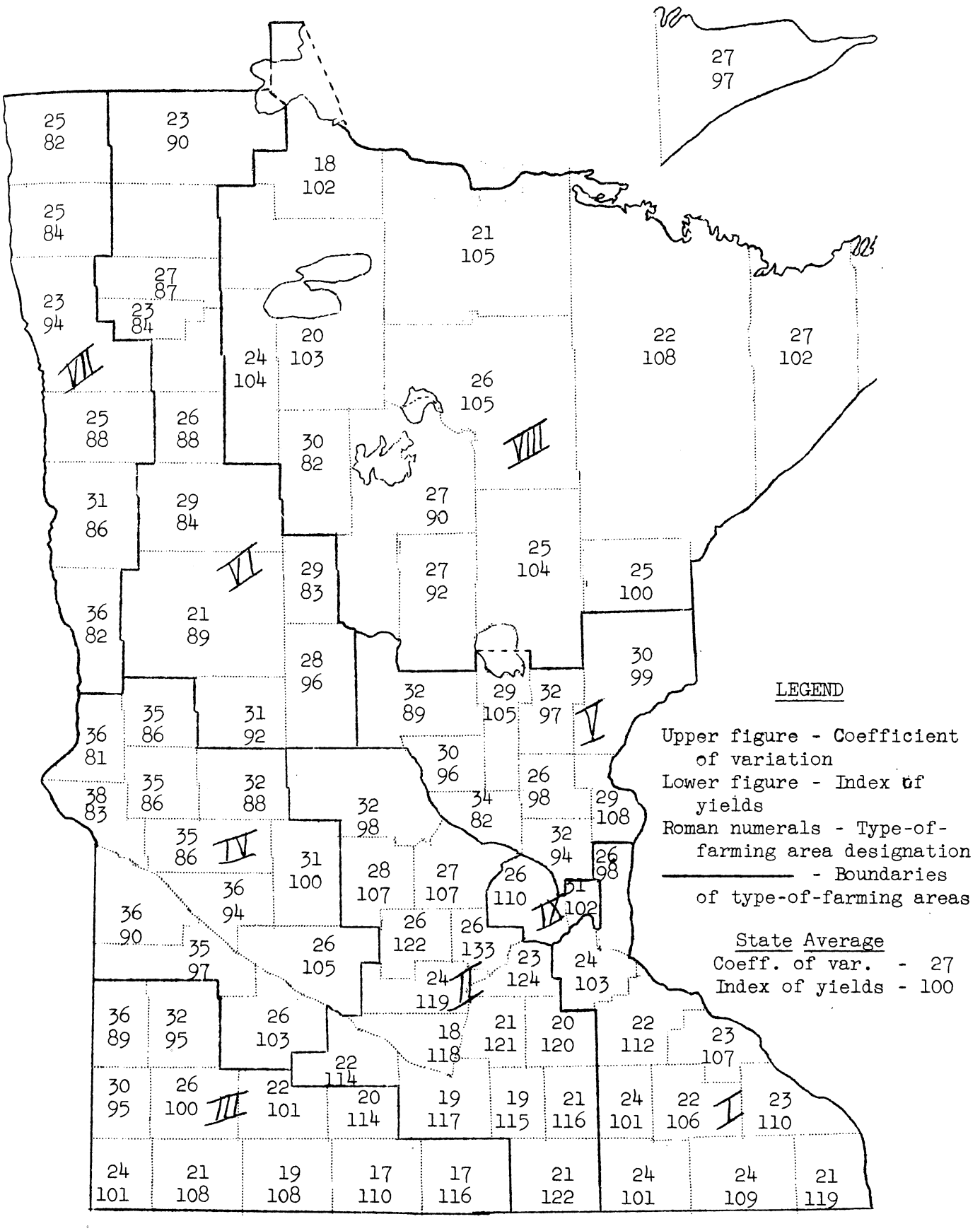

Fig. 1. Coefficient of Variation of Crop Yields and Index of Crop Yields Based upon 1917-36 Yields for Nine Crops.

among the areas, it is observed that corn yields are most stable in the three southern areas. These are the areas where corn is an important crop. The yields of potatoes and tame hay, however, are most stable in the northern areas. These crops occupy an important place in the farm organization in the northern counties. Small grain crops apparently are not affected by this difference in latitude.

Table 1

Coefficients of Variation of Crop Yields in Minnesota by Type-of-Farming Areas
Means of County Coefficients, Weighted by 1929 Acreages

Type-of-farming area	Corn	Oats	Barley	Spring wheat	Winter wheat	Rye	Flax	Potatoes	Tame hay	All crops (weighted mean)
1	19	25	24	27	21	22	20	30	28	24
2	21	24	23	27	22	23	18	36	28	24
3	21	25	25	32	28	28	24	34	28	24
4	32	33	34	36	32	30	28	41	29	33
5	30	31	29	37	27	29	24	31	31	30
6	30	28	28	35	32	27	24	32	27	29
7	35	27	26	28	21	26	23	27	24	27
8	27	25	24	25	22	26	18	26	24	24
9	26	27	26	28	28	25	-	34	25	27
State	25	28	27	32	23	27	24	30	27	27

The coefficients of variation are expressed in terms of the average yield. In order to permit a complete analysis of the importance of this variability, an index of crop yields is presented in Figure 1. In this index the weighted average yield of these same crops for each county is expressed as a percentage of the average yields for the state. The average yield, by types-of-farming areas, of each of the crops is presented in Table 2. In general, the coefficients of variation are large in the areas where the average yields are low.

Table 2

Average Yields of Crops in Minnesota by Type-of-Farming Areas
1920-36 Yields for Tame Hay, 1917-36 Yields for Other Crops

Type-of-farming area	Corn	Oats	Barley	Spring wheat	Winter wheat	Rye	Flax	Potatoes	Tame hay	Index of yields
1	36	34	25	15	18	16	10	96	1.5	107
2	37	37	28	15	20	18	10	98	1.7	115
3	33	35	26	13	16	16	10	86	1.4	104
4	29	31	24	12	15	16	9	79	1.4	93
5	27	32	24	12	16	15	8	89	1.4	95
6	26	28	18	12	15	15	8	84	1.3	89
7	23	27	22	12	14	13	7	77	1.3	87
8	25	32	24	14	17	15	9	107	1.5	99
9	32	35	28	16	18	18	-	103	1.6	108
State	32	33	24	13	18	16	9	87	1.5	100

The supply of crops for feed and for sale is highly variable in those areas where the coefficient of variation is large. Livestock production in those regions is more hazardous than in other portions of the state. The supply of feed will frequently be reduced to a point where drastic reductions in rations will be necessary. It is, therefore, necessary that a large supply of feeds be carried over from the years of high yields to the lean years; or that provision be made for fairly drastic adjustments in the number or rations of livestock. This variation in crop yields is also likely to affect the value of lands in those regions. A program of crop insurance would be helpful there, but the rates would necessarily be high.

MINNESOTA FARM PRICES FOR MARCH, 1938

Prepared by W. C. Waite and W. B. Garver

The index number of Minnesota farm prices for the month of March, 1938 was 76. When the average of farm prices of the three Marches, 1924-25-26 is represented by 100, the indexes for March of each year from 1924 to date are as follows:

March 1924 -	84	March 1932 -	47
" 1925 -	105	" 1933 -	36
" 1926 -	111	" 1934 -	54
" 1927 -	109	" 1935 -	84
" 1928 -	101	" 1936 -	81
" 1929 -	108	" 1937 -	104*
" 1930 -	97	" 1938 -	76*
" 1931 -	68		

*Preliminary

The price index of 76 for the past month is the net result of increases and decreases in the prices of farm products in March, 1938 over the average of March, 1924-25-26 weighted according to their relative importance.

Average Farm Prices Used in Computing the Minnesota Farm Price Index, March 15, 1938, with Comparisons*

	Mar. 15, 1938	Feb. 15, 1938	Mar. 15, 1937	Av. Mar. 1924-25-26	% Mar.15, 1938 is of Feb. 15, 1938	% Mar.15, 1938 is of Mar. 15, 1937	% Mar.15, 1938 is of Mar. 15, 1924-25-26
Wheat	$.87	$.96	$1.30	$1.38	91	67	63
Corn	.42	.43	1.06	.65	98	40	65
Oats	.23	.24	.45	.36	96	51	64
Barley	.54	.57	.93	.60	95	58	90
Rye	.55	.61	.94	.84	90	59	65
Flax	1.87	1.93	2.00	2.44	97	94	77
Potatoes	.41	.41	1.45	.83	100	28	49
Hogs	8.50	7.60	9.40	9.97	112	90	85
Cattle	6.20	5.70	7.20	5.90	109	86	105
Calves	8.10	8.40	8.00	9.16	96	101	88
Lambs-sheep	7.38	6.66	9.56	11.53	111	77	64
Chickens	.132	.138	.108	.173	96	122	76
Eggs	.146	.135	.190	.20	108	77	73
Butterfat	.32	.33	.37	.46	97	86	70
Hay	6.05	6.18	9.50	11.08	98	64	55
Milk	1.75	1.80	1.90	2.13	97	92	82

*Except for milk, these are the average prices for Minnesota as reported by the United States Department of Agriculture.

Indexes and Ratios of Minnesota Agriculture*

	Mar. 1938	Feb. 1938	Mar. 1937	Av. Mar. 1924-26
U.S. farm price index	68.0	68.0	91.0	100.0
Minnesota farm price index	76.0	77.0	104.0	100.0
U.S. purchasing power of farm products	84.0	84.0	109.0	100.0
Minnesota purchasing power of farm products	94.0	95.0	124.0	100.0
Minn. farmer's share of consumer's food dollar	47.2	46.2	53.1	53.3
U.S. hog-corn ratio	16.3	15.0	8.7	12.2
Minnesota hog-corn ratio	20.2	17.7	8.9	15.6
Minnesota egg-grain ratio	14.2	12.3	10.0	12.9
Minnesota butterfat-farm-grain ratio	38.6	38.2	22.3	39.8

*Explanations of the computation of these data may be had upon request.