AGRICULTURAL ADJUSTMENTS TO THE NATURAL ENVIRONMENT IN SOUTHEASTERN MINNESOTA DURING THE PERIOD OF BONANZA WHEAT FARMING

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The period of bonanza wheat farming in southeastern Minnesota covered approximately the two decades from 1860 to 1880. During all of this period the wheat crop constituted the principal economic activity in the area, and during much of it the counties in this part of Minnesota were the leading wheat producing counties of the state. Peculiar interest attaches to the development and decline of wheat culture on a single crop basis in southeastern Minnesota, because this area was one of the first, if not the first section of the present spring wheat area to be settled and it, therefore, pioneered in spring wheat farming. To appreciate the rapid rise of bonanza farming in the area, it must be remembered that southeastern Minnesota was opened for settlement in 1853, and that in the ensuing four years most of the land within a two days' haul of the Mississippi was occupied. The area, therefore, was settled and considerable of it was under cultivation before 1860. Thus settlers in the area were in a position to be benefited by the high prices for wheat and other farm products which prevailed during the Civil War. Of the crops grown, wheat shortly proved to be the most profitable because it commanded a high price, it produced abundantly on the fertile upland prairies, it was grown with a relatively small amount of labor, and it shipped satisfactorily via the existing means of transportation to eastern markets.

The hard labor and considerable expense connected with the settlement of a new area, and with bringing the prairie into cultivation, placed the pioneers in desperate need of a cash crop. Wheat met this need admirably. As a rule the pioneers had limited financial resources. Many of them had sold a farm or small business to obtain the money to cover their traveling expenses to the West, to pay or partially pay for their new land, and to buy the tools and other equipment needed to break and

cultivate it. Once in Minnesota, the cost of opening a farm was estimated as follows:[1]

The price of their land	$200.00
The price of team and wagon	150.00
The price of two cows	40.00
For rebuilding house	100.00
Breaking twenty acres	60.00
One steel plow, for crossing	14.00
One harrow	6.00
Axes, shovels, spade, forks, scythes, etc	25.00
House furniture, and provisions for family, which must be bought till they can raise them	200.00
	$795.00

That amount now seems a small price to pay for a farm, but it was more than many men could get together at that time. In order to secure the money necessary to purchase land or to develop their property some men had to work for a time as hired men or spend the winter in the pineries working for the lumber companies.

During the first few years of settlement, the chief interest and business of the settler was to plow a part of his farm, though it was not possible or desirable for a man to plow all of it. In general, no more was plowed than a man could cultivate himself, which was about 40 acres.[2] As the sod on the prairie was compact and deep, it was not easy to break. Such strenuous work required a big 16-inch breaking plow and from four to six oxen or horses. As few of the settlers had more than one team, they commonly put their teams together and plowed each man's land in turn.[3] In the wooded areas, plowing was possible only after the trees had been cleared off, and even then the roots of the trees made plowing difficult. For a number of years it was necessary for a farmer to raise most of the food for his family. Corn, potatoes, rutabagas, and turnips did well in newly turned sod, in spite of the fact that in most instances farmers were too busy to give them much attention.[4]

During the rush of settlers in 1855-1856, when foodstuffs had to be imported into Minnesota, a farmer who had a surplus of these crops or of pork or other meat

[1] 1st Annual Report of Commissioner of Statistics for Minnesota (Hartford, 1860), pp. 30, 87.
[2] Ibid., p. 87.
[3] Mills, J. C., in History of Fillmore County (Chicago, 1912), p. 503.
[4] Ibid., p. 505.

undoubtedly found an active market for it. By the second or third year, wheat was planted and it did well. It was ground into flour at small waterpower grist mills which shortly after settlement developed at many points in the valleys. In case a local mill was not available, the wheat had to be hauled many miles to a mill, but this involved much time and labor, and often one-third or more of the flour was taken for grinding. A team of horses or oxen, a few chickens, a hog or two, and a cow represented the stock on an average farm. Some attempts were made to raise sheep, but for a number of years so many of them were killed by wolves that they did not prove profitable.[5]

In addition to the work connected with growing a crop, it must be remembered that the settlers had to obtain fuel for the long, cold winter; cut wild hay on the prairies or the valley meadows for the stock; build homes, barns, fences, and churches; open roads, and bring supplies from market, so that, altogether, the first years of settlement in southeastern Minnesota were characterized by strenuous toil and considerable hardship, and were fraught with anxiety as to whether or not prosperity eventually would reward their efforts. In view of these conditions, it is easy to understand that, when it was demonstrated that large crops of wheat could be produced from the virgin soils and that wheat sold for cash, wheat growing came to be almost the sole economic interest of the farmers.

Although by 1859 it was evident that wheat farming had become the principal money crop in the area, it was not until the decade from 1870 to 1880 that bonanza wheat farming reached its maximum development (Fig. 1). This was due to the fact that a number of problems affecting the industry had to be solved before maximum acreage and production were attained. Of these the discovery that spring wheat was better adapted to local conditions than winter wheat, the introduction of milling processes suited to hard wheat, the improvement of transportation on the river, the establishment of warehouses and eleva-

[5] History of Winona County (Chicago, 1883), p. 263.

tors to handle the grain, and the building of railroads were the more important.

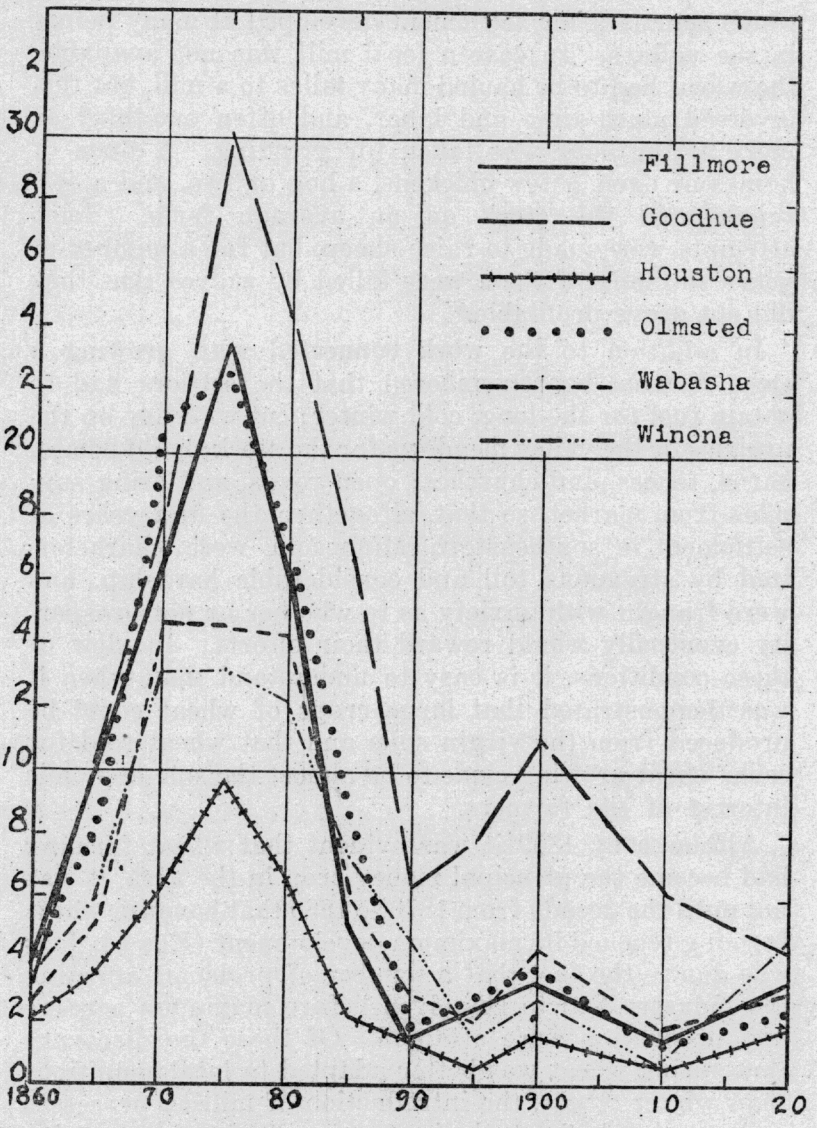

Fig. 1. Production of wheat in units of 10,000 bushels in the six counties of Southeastern Minnesota by five year periods from 1860 to 1920 inclusive. Data for the even years is from the United States Census, for the odd years from the annual reports of the Commissioner of Statistics for Minnesota. Statistics for 1905 and 1915 are not available. The graph shows that in these counties the period of bonanza wheat farming extended approximately from 1865 to 1885.

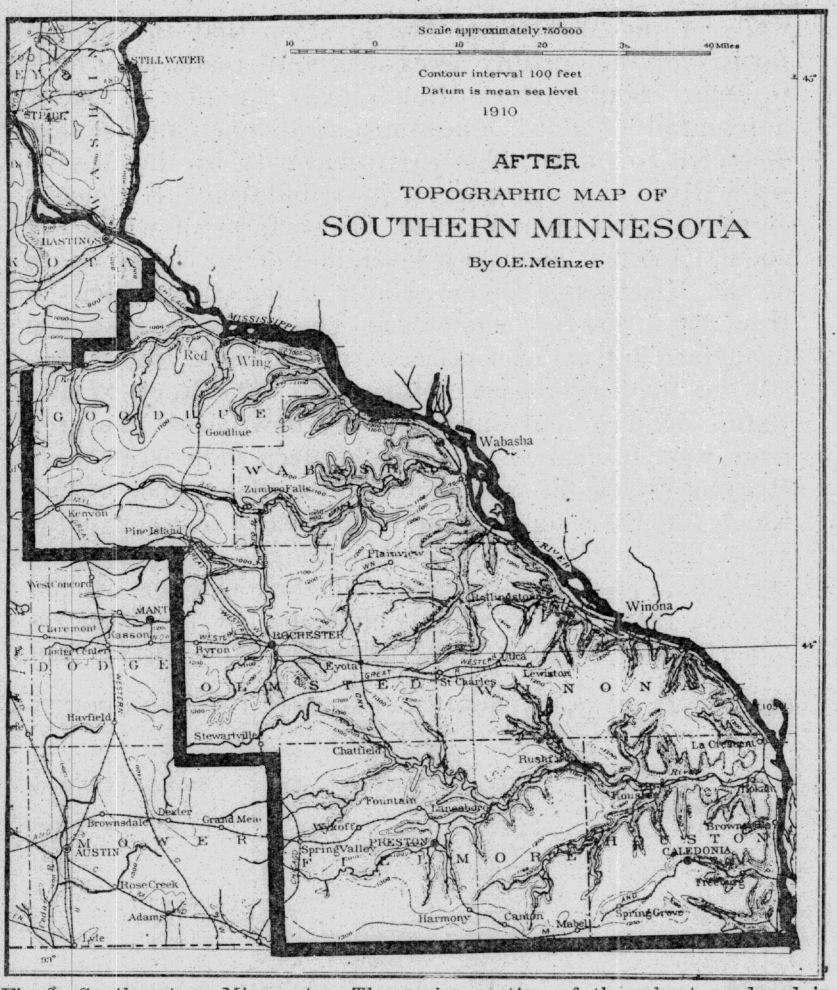

Fig. 2. Southeastern Minnesota. The major portion of the wheat produced in Southeastern Minnesota has been grown on the broad, nearly-level, loess-covered, upland into which the deep, steep-sided valleys of Root, Whitewater, Zumbro and Cannon rivers are cut.

Wheat culture in the area began in 1853 when a crop of winter wheat was raised on the alluvial terraces in Rollingstone Valley in Winona County,[6] and probably also in some of the terraces in Houston and Fillmore counties. Such alluvial terraces rise in many places above the flood plains of the streams, and comprise the principal areas farmed in the valleys. Wheat raising spread to the upland somewhat slowly because the valley

[6] Ibid., p. 262.

walls of the Mississippi are so steep that the upland farms were not readily accessible, until roads were built to them. Southeastern Minnesota is a region of nearly horizontally bedded limestone, sandstone, and shales, dissected to topographic early maturity by the Mississippi River and a number of its tributaries. It consists of nearly level upland tracts, the surfaces of which are about 1,150 feet above sea level, and of the valley floors of the Mississippi River and its tributaries, which lie from 350 to 400 feet below them. The upland corresponds in surface to most of southeastern Minnesota, and it constitutes the larger part of this area. The Root, Whitewater, Zumbro, and Canyon rivers flow across the area from west to east (Fig. 2). The deep valleys of these streams divide the upland into wide, flat-topped ridges which, like the rivers, extend from west to east across the area. The broad summits of these ridge-like remnants of the upland are fine farm lands, but their margins are not because they are too greatly dissected by the head ravines of the streams. The following table shows that

SHIPMENTS OF FARM PRODUCE FOR RIVER POINTS IN SOUTHEASTERN MINNESOTA IN 1859[7]

(Bushels)

Ports	Wheat	Oats	Corn	Barley	Potatoes
Red Wing	30,000*	.....	.....	.....	.....
Lake City	18,000	.....	.....	.....	3,400
Wabasha	4,800	10,000	.....	.....	2,000
Reed's Landing	3,000	5,000	.....	.....	1,000
Minneiska	12,000*	.....	.....	.....	.....
Mt. Vernon	3,000*	.....	.....	.....	.....
Winona	177,000	35,000	.....	9,000	6,000
La Crescent	15,000	1,000	2,000	.....	2,000
Hokah	3,000	.....	.....	.....	.....
Brownsville	32,000	4,000	.....	1,000	.....

in 1859 wheat had already attained first place among the crops.

The large shipments of wheat from Winona were due to the fact that Winona County was settled early, and that a larger tract of undissected upland suited to farming is tributary to Winona by wagon haul than to any other point along the river. A road was built at an early

[7] Robinson, E. V.: Early Economic Conditions and the Development of Agriculture in Minnesota (Minneapolis, 1915), p. 45, as corrected from 1st Annual Report of Commissioner of Statistics for Minnesota (Hartford, 1860), p. 155.

* All grains, but principally wheat.

date from Wabasha Prairie, a river terrace on which the city of Winona is located, to the upland along each of the several small valleys which focus on the terrace.

During the pioneer years some attempts were made to grow winter wheat on the upland prairies. Of those in Olmsted County local reports state that winter wheat was a success only once in three years[8], and this experience was found to hold on other prairies. In most years the wheat was killed during the winter because the prairies were so broad, open, and windswept that the snow was blown off, leaving the wheat exposed to the alternate freezing and thawing occasioned by diurnal and cyclonic temperature changes. In some years the fall of snow was too light or came too late in the season to protect the wheat[9]. In other years a warm spell melted the snow and covered the fields with water, which if it became ice killed the wheat.

In the valleys and timbered tracts, snow drifts much less than on the prairies, so that winter wheat was grown successfully. In 1859, the commissioner of statistics addressed specific inquiries to the different counties, asking for reports on the success of winter wheat. The replies showed that it was a failure in the counties which were mainly prairie, but was a success in those which included large areas of bluff lands or timber[10]. Until the improved methods of milling were introduced, the winter wheat crop in the valleys and wooded tracts in the southeastern part of the state was important. Good flour was made from it in the small water-power mills located near rapids or falls in the streams. Some of these mills gained a considerable local reputation for their flour. A few of them have been in business for more than fifty years, grinding the small amount of wheat annually produced in the communities tributary to them.

The pioneers shortly discovered that spring wheat is adapted admirably to the conditions on the upland prairies. The crop seldom is damaged by frost[11], as the growing season, varying from 140 to 150 days, is ade-

[8] First Annual Report of Commissioner of Statistics (Hartford, 1860).
[9] Ibid., p. 94.
[10] Ibid., p. 94.
[11] Purcell, V. G.: Climatic Conditions of Minnesota, Minnesota Geological Survey, Bull, No. 12, pp. 19-21.

quately long for this crop. Wheat is sown in the latter part of April or early in May, and grows rapidly through May, June, and the early part of July, which are the months of greatest rainfall. It ripens and is harvested in August, in which month hot, dry spells of weather are characteristic. The farmers have discovered that if sowing is delayed by a late spring or by other causes, the crop may come into "the milk" during a late summer dry spell and be injured. Judging by a comparison of crop yields with the weather records spring wheat has done well in most seasons since its culture began in this area. However, the decrease in yield per acre after 1875 was attributed incorrectly, by some writers, to vagaries of the weather[12].

By 1860, in the river counties of Minnesota, houses and barns were built and other improvements made, so that the farmers had time to cultivate more of their farms. In that year fifty per cent of the improved land in the counties facing on the Mississippi, and thirty per cent in the counties remote from the river but still within hauling distance, were planted to wheat[13]. As it became evident that wheat was the most profitable crop, more and more land was devoted to it. A man's income increased with the size of his crop, and consequently large acreages were planted.

The establishment of the one-crop system in this area was favored by the large yields of wheat produced from the fertile soils. The average yield per acre for the state as a whole was 22.05 bushels in 1860[14]. With the exception of Houston County, all of the counties in this area had an average yield per acre greater than that for the state. In some townships in these counties the average yield per acre was exceptional. In New Hartford township in Winona County it was 33.2 bushels, in Douglas township in Fillmore County, 27.7 bushels, and in Goodhue township in Goodhue County, 27 bushels[15]. In the next decade the average yield per acre varied from time to time, according to the season, but in 1875, twenty

[12] History of Winona County (Chicago, 1883), p. 99.
[13] Second Annual Report of Commissioner of Statistics, pp. 128, 129, 131.
[14] Second Annual Report of Commissioner of Statistics of Minnesota (St. Paul, 1861), p. 57.
[15] Ibid., p. 58.

years after settlement, the average yield per acre was 21.08 bushels in Goodhue, 18.02 in Fillmore, 19.64 in Olmsted, 18.06 in Wabasha, 17.55 in Winona, and 17.34 in Houston County[16]. After 1880, however, the average yield rapidly decreased. While statistics are not available to show which type of soil maintained high yields for the longest time, there is little doubt that the yield on the loess soils was satisfactory for some years after other soils were exhausted.

The scarcity of labor which prevailed in these early years somewhat retarded the increase of wheat acreages. Land was so cheap that nearly every man owned or hoped to own a farm rather than to work for some one else. Other parts of the West were developing at the same time, and the immigration of laborers into any one area seldom equalled the demand for them. As a result of this labor shortage and the profits in wheat farming, labor-saving farm machinery was adopted rapidly. Sulky plows, disk harrows, seeders, reapers, binders, threshing machines, fanning mills and other machines found a ready sale when they were put on the market. In southeastern Minnesota the use of farm machinery was favored by the nearly level surface and the fine textured, well-drained loess and weathered drift soils of the upland prairies. Moreover the shortage of labor during harvest, when it was most acute, was solved, in part at least, by the importation of gangs of men who had previously worked in the wheat fields in states to the south. The extension of the wheat growing area northward simply prolonged the working period of these men and brought them near the Minnesota and Wisconsin forests where many of them were employed in the winter.

The use of this machinery and the adoption of this harvesting practice so increased the acreage of wheat on many farms that the profits earned enabled many men to increase the size of their farms. Consequently holdings of from 300 to 1,000 or more acres were not uncommon. The profits were so great in many instances that

[16] 8th Annual Report of Commissioner of Statistics for Minnesota (St. Paul, 1877), p. 36.

nearly every man in a community tried to own a piece of land. Storekeepers, shopkeepers, mechanics, and professional men bought farms which they partially worked themselves or rented "on shares" to farmers[17]. Quick returns led to speculation. Threshing outfits costing about $800 in some instances paid for themselves in two years[18]. Farmers ran store bills and bought machinery on time, and in many instances the returns from their crops more than warranted the outlay. There was small incentive for the farmers to use either their land or machinery carefully. Straw stacks were burned as the easiest way to dispose of them. Binders costing more than $200, and other machines and tools, in many instances were left in the field until wanted in the next season. As a result they rapidly depreciated in utility and value[19]. The prairie soils yielded so readily to the plow, wheat was relatively such an easy crop to grow, and yields were for the most part so satisfactory, that it is no wonder that farmers became a bit careless about expenses.

The acreage and production of wheat in southeastern Minnesota and elsewhere in the Spring Wheat Belt increased rapidly after certain developments in the marketing phase of the industry occurred. A notable one was the introduction of the "middlings-purifier" and other milling improvements which made it possible to produce a high-grade flour from the hard spring wheat[20]. The improvement of transportation to eastern markets was even more important. This was accomplished by (1) an increase of the number of steamboats on the river, (2) the introduction of river barges especially designed for carrying wheat, (3) the erection of warehouses and elevators along the railroads and at the steamboat landings, (4) the establishment of rail connection between the Mississippi and the Great Lakes, and (5) the construction of railroads westward from the Mississippi. The importance of these developments is reflected in the fact that in 1865, sixty-five per cent of the land under

[17] Schatzel, G. W.: Among the Wheat Fields of Minnesota, Harper's Magazine, XXXVI, January, 1868, p. 197.
[18] Ibid.
[19] Ibid., p. 200.
[20] Robinson, op. cit., p. 77.

cultivation in Olmsted County was planted in wheat[21], and that in 1870, Fillmore, Goodhue, Wabasha, and Winona Counties, each produced more than 1,300,000 bushels of wheat, and Olmsted County more than 2,000,000 bushels (Fig. 1). The relative importance of the southeastern counties is indicated by the fact that with one exception the counties mentioned were the only ones in the state to raise more than 1,000,000 bushels[22].

Climax of wheat raising. Bonanza farming in the southeastern counties culminated in the five years from 1875 to 1880. The largest acreage in the state as a whole occurred in 1878, when wheat was grown on 68.98 per cent of all cultivated land[23]. In the southeastern counties the largest crop was produced in 1875, when these counties produced 38 per cent of the state's crop. The production and distribution of the crop in that year by counties and townships clearly reflects the natural environment. In that year, Wabasha and Winona counties each produced more than 1,000,000 bushels of wheat, Olmsted and Fillmore counties more than 2,000,000 bushels, and Goodhue County more than 3,000,000 bushels[24] (Fig. 1). The three counties last named owe their large production to (1) their large size, (2) their nearly level surface, being much less dissected than Houston, Winona and Wabasha counties, and (3) their fertile loess and glacial soils.

In Goodhue County wheat was raised on 30 per cent of its area and occupied 81 per cent of its cultivated land. Such a production led early writers to describe Minnesota as one continuous wheat field[25] and to claim that Red Wing was the "leading primary wheat market in the world[26]". Vasa, Belle Creek, Goodhue, Wanamingo and Zumbrota townships each produced more than 190,000 bushels of wheat in the year in question. All of them have a nearly level surface, a loess soil, and little waste land. In the northern part of the county the pro-

[21] Annual Report of the State Auditor, Session of 1867, Minnesota Ex. Docs. for 1866, p. 61.
[22] 9th Census of the United States; Robinson, op. cit., pp. 260, 261.
[23] Robinson, op. cit., p. 79.
[24] 8th Annual Report of Commissioner of Statistics (St. Paul, 1877), p. 36.
[25] Geol. and Nat. Hist. Surv. of Minn., Vol. I, p. 337.
[26] Hancock, R. W.: Past and Present in Goodhue County, (Red Wing, 1893), p. 187.

duction was small, reflecting the dissected surface and less productive soils of that section. Likewise the acreage and production of wheat was relatively small in northwestern Olmsted County where the surface is dissected by the South Branch of Zumbro River, the drift is thin, loess is absent and the soil derived from the sandstone or limestone formations is poor[27]. The two leading townships in wheat production in the state in that year were Farmington township in the northeastern part of Olmsted County and Elgin township in Wabasha County, which joins it on the east, each of which produced more than 200,000 bushels. These townships cover a broad and nearly level stretch of prairie with a deep and fertile loess soil[28].

In Fillmore County the townships in which the yield was less than 100,000 bushels were in the dissected lands contiguous to Root River and its tributaries. In Winona and Houston counties the townships along the bluff lands of the Mississippi and Root valleys, and the upland ridges produced less than 100,000 bushels. The townships of maximum production were those occupying Wilmington Prairie in Houston County and Lewiston Prairie in Winona County[29]. In all of these counties, the townships in which more than 100,000 bushels of wheat were raised are on the uplands. In general, the greatest yields came from townships with a minimum of dissection, and from those which have loess over much of their surface.

After 1880 the acreage and production of wheat in southeastern Minnesota declined rapidly and the acreage and production of oats, corn, and barley, and the number of livestock increased. Although this change in the farm system was due to several conditions, the most important were the low price for wheat which prevailed after 1880 and a gradual decrease in the yield per acre.[30] The average yield per acre for the six counties in this area in 1875 was 18.6 bushels; by 1880 it had dropped to 11.5 bushels. Moreover, weeds became such a menace

[27] Geol. and Nat. Hist. Surv. of Minn., Vol. I, pp. 337-338.
[28] 8th Annual Report of Commissioner of Statistics, pp. 29-34.
[29] Ibid.
[30] Robinson, op. cit., p.

on account of consecutive wheat crops on the same land, that it was necessary to plant other crops in order to get rid of them.[31] The locust plague, which partially destroyed the crop in the central and western parts of Minnesota from 1872 to 1877, did not affect the southeastern counties in any large way.[32] On the other hand, the chinch-bug appeared first in the southeast, and in 1877 destroyed two-fifths of the crop in Houston County.[33] The ravages of this insect were sufficient to make profits from the wheat crop uncertain.

By the middle of the decade, from 1880 to 1890, railroad mileage was extended so that most farms were within 10 miles, or nearer, of a station, and it was possible to market other farm products profitably. During the same decade, breweries began business in LaCrosse, Winona, Wabasha, and Red Wing, and a local market for barley was created. In addition, the losses incurred in wheat farming had led many farmers to mortgage their farms, so that progressive farmers realized that a change must take place. The Commissioner of Statistics and other state officials, the scientists from the State Agricultural College, the State Dairy Commissioner, the State Dairymen's Association and other agricultural societies combined with the state press in a protest against the old method of farming. Gradually the change to a more diversified crop system took place.

[31] Bull, C. P.: Barley Investigations, University of Minnesota Agricultural Experiment Station, Bulletin 148, p. 7.

[32] Statistics of Minnesota, 1873, p. 192; 1874, pp. 7-9; 1875, pp. 19-22; 1876, pp. 49, 80, 88; 1877, pp. 17, 19; 1878, p. 9. Fifth Report of Agricultural Experiment Station, pp. 96-97.

[33] Statistics of Minnesota, 1877, pp. 18, 94.