

CONSERVE THE SOIL FOR FUTURE GENERATIONS

James J. Hill Issues Warning That Scientific Cultivation Of Land Is Necessary To Insure Food Supply For Years

By James J. Hill

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It is well that the eyes of the American people should be turned on the farms of the country, as Mr. Davenport has so graphically depicted in the picture, for upon the future of the farm and the farmer depends in large measure the future of our country. It is as well assured as any future event can be that the population of the United States will be 300,000,000 by about the middle of the present century, or in less than 50 years. This is proved by the ratio of increase in the past.

It may come a few years later or a few years earlier, according to circumstances, for good times lift both the immigration total and the domestic birth rate, while depression decreases both.

However, this is immaterial. Millions of persons now living will see the 300,000,000 people here; and the first question is how they are to be fed. There will be many grave problems in such a human growth, but we may for the time being dismiss all the others until we have considered the primary one of the bare maintenance of life. The food problem itself has many collateral issues, but for the sake of simplicity we may here consider only the matter of bread. Where and how are we to obtain leaves enough to feed these coming millions?

to say that 550,000,000 bushels is our present average capacity. Of course, with increasing population may come a somewhat increased total production, though it will not advance as rapidly as many suppose.

We grew 554,185,470 bushels in 1882, when our population was a little over 52,000,000; and 624,087,990 bushels in 1907, 25 years later. The increase in wheat yield during these years, when much of the new lands of the west was being brought under the plow, was a little over 25 per cent, while population increased 33,000,000, or over 53 per cent. Obviously supply and demand for bread will not keep pace through the working of any law of nature.

Moreover, the increase of possible wheat yield by increasing acreage is limited. We have no longer an unlimited public domain awaiting the plow. There will be some grown upon reclaimed arid land, though this is mostly devoted to the raising of fruit and fodder plants. There will be some land drained, and there are a few acres of public lands left where wheat may be raised.

But a denser population makes new demands upon the soil; and it is more likely on the whole that the wheat acreage will be reduced, for raising all the other commodities consumed by 200,000,000 people, than that it will be enlarged.

Nothing but a material rise in price

of the department of agriculture said: "One of the most important causes of deterioration, and I think I should put this first of all, is the method and system of agriculture that prevails throughout these states. Unquestionably the soil has been abused."

The richest region of the west is no more exempt than New England or the south. The soil of the west is being reduced in agricultural potency by exactly the same processes which have driven the farmer of the east, with all his advantage of nearness to markets, from the field.

Within the last 40 years a great part of the richest land in the country has been brought under cultivation. We should therefore, in the same time, have raised proportionately the yield of our principal crops per acre, because the yield of old lands, if properly treated, tends to increase rather than diminish. The year 1906 was one of large crops and can scarcely be taken as a standard.

We produced, for example, more corn that year than had ever been grown in the United States in a single year before. But the average yield per acre was less than it was in 1872. We are barely keeping the acre product stationary. The average wheat crop of the country now ranges from 13 1/2, in ordinary years, to 15 bushels per acre in the best seasons. And so it is on down the line.

Nature has given to us the most valuable possession ever committed to man. It can never be duplicated, because there is none like it upon the face of the earth. And we are racking and impoverishing it exactly as we are felling the forests and rifling the mines. Our soil, once the envy of every other country, the attraction which draws millions of immigrants across the seas, gave an average yield for the whole United States during the ten years beginning with 1896 of 13.5 bushels of wheat per acre.

Austria and Hungary each produced more than 17 bushels per acre, France 19.8, Germany 27.5 and the United Kingdom 32.5 bushels per acre. For the same decade our average yield of oats was less than 20 bushels, while Germany produced 48 and Great Britain 42. For barley the figures are 25, against 33 and 34.6; for rye, 15.4 against 24 for Germany and 26 for Ireland. In the

wise nor safe to take these conclusions at their face value and declare, without further inquiry that everything is going to come out for the best in this best of all possible worlds without any forethought, care or direction on our part. And it is only ordinary business sense and sanity to analyze the returns and see where we stand with reference to the future.

Fluctuations in prices may change totals expressed in dollars into something very different when they are expressed in bushels or pounds. Wealth aggregates may be swollen by marking up goods as well as by adding to stock on hand. Congratulations upon prosperity are all right; but it is still better to make sure that the prosperity is real and that it will remain.

There are ten states in the Union in

Two Causes of Agricultural Decay. There are two ways in which the productive power of the earth is lessened. First, by erosion and the sweeping away of the fertile surface into streams and thence to the sea, and, second, by exhaustion through wrong methods of cultivation. The former process has gone far. Thousands of acres in the east and south have been made unfit for tillage. North Carolina was, a century ago, one of the great agricultural states of the country and one of the wealthiest. Today as you ride through the south you see everywhere land gullied by torrential rains, red and yellow clay banks exposed where once were fertile fields, and agriculture reduced because its main support has been washed away. Millions of acres, in places to the extent of one tenth of the entire arable area, have been injured so that no industry and no care can restore them.

Par more ruinous, because universal and continuing in its effects, is the process of soil exhaustion. It is creeping over the land from east to west. The abandoned farms that are now the playthings of the city's rich or the game preserves of patrons of sport bear witness to the melancholy change. New Hampshire, Vermont, northern New York, show long lists of them. In western Massachusetts, which once supported a flourishing agriculture, farm properties are now for sale for half the cost of the improvements. Professor Carver of Harvard has declared, after a personal examination of the country, that "agriculture as an independent industry, able in itself to support a community, does not exist in the hilly parts of New England."

The same process of deterioration is affecting the farm lands of western New York, Ohio and Indiana. Where prices of farms should rise by increase of population, in many places they are

falling. Between 1880 and 1900 the land values of Ohio shrank \$50,000,000. Official investigation of two counties in central New York disclosed a condition of agricultural decay. In one land was for sale for about the cost of improvements, and 150 vacant houses were counted in a hamlet area. In the other the population in 1905 was nearly 4000 less than in 1858.

Practically identical soil conditions exist in Maryland and Virginia, where lands sold at from \$10 to \$20 an acre. In a hearing before the industrial commission the chief of the bureau of soils

eroded and filled up a channel from 40 to 50 feet below its present level. Measured at its lowest estimate, the Thames bed has been lowered and raised at least 170 feet since the upper terrace of gravel was laid down in post glacial times. Seeing how little the level and aspect of the valley have altered since the Roman period, and that there is no reason to presume the antiquity of the Galley Hill remains may be estimated at 170,000 years—Probably an underestimate.

A consideration of the parts of the skeleton found at Galley Hill shows how old the modern type of man is. The Galley Hill man, although differing in several features, is essentially modern in type, and is the only representative known of the thousands of generations of Englishmen which span the vast period of human life in this country from glacial to neolithic times.

tillage has been to select the crop which would bring in most money at the current market rate, to plant that year after year and to move on to virgin fields as soon as the old farm rebelled, by lowering the quality and quantity of its return. It is still the practice, although diversification of industry and the rotation of crops have been urged for nearly a century and are today taught in every agricultural college in this country.

The demonstration of the evils of single cropping is mathematical in its completeness. At the experiment station of the agricultural college of the University of Minnesota they have maintained 44 experimental plots of ground, adjoining one another, and as nearly identical in soil, cultivation and care as scientific handling can make them. On these have been tried and compared different methods of crop rotation and fertilization. Together with systems of single cropping.

The results of ten years' experiment are now available. On a tract of good ground sown continuously for ten years to wheat the average yield per acre for the first five years was 20.22 bushels and for the next five 16.22 bushels. Where corn was grown continuously on one plot, while on the plot beside it corn was planted but once in five years in a system of rotation, the average yield of the latter for the two years it was under corn was 43.3 bushels per acre.

The plot where corn only was grown gave 20.8 bushels per acre for the first five and 11.1 bushels for the second five of these years, an average of 16 bushels. The difference of these two plots was 22.2 bushels, or twice the total yield of the ground exhausted by the single crop system.

The corn grown at the end of the ten years was hardly blip high, the ears small and the grains light. But the cost of cultivation remained the same. And the same is true of every other grain or growth when raised continuously on land unfertilized. We frequently hear it said that the reduction in yield is due to the wearing out of the soil, as if it were a garment to be destroyed by the wearing. The fact is that soils either increase or maintain their productivity indefinitely under proper cultivation.

If the earth, the great mother of hu-



DRAWING BY HOMER DAVENPORT

The average yearly consumption of wheat per capita varies considerably with seasons and prices, but it rises steadily with our constantly advancing standard of comfort. During recent years it has been either slightly under or slightly over seven bushels for bread and seed. Suppose that it is six and one half bushels per capita, which is certainly within the mark.

Future Bread Supply. It will then require, unless we are to fall to a lower scale of living, a total product of 1,800,000,000 bushels of wheat for our bread supply, if we did not export any. From 1880 to 1906 inclusive our crop averaged 621,733,000 bushels annually. Twice only have we exceeded the 700,000,000 bushel mark. It is fair

could accomplish this; and we may, perhaps, assume that a steady and certain price of \$1.25 per bushel for wheat may raise our total annual product to 900,000,000 bushels, which would be 50 per cent more than its present average. This is the extreme limit of probability.

The country could, under present methods, do no more unless it took land just as necessary for other purposes, and devoted it to wheat raising. In that case it would only imitate the man who tried to make the legs of his trousers longer by cutting strips off the bottom and sewing them around the waistband.

We are left, practically, with a shortage of 400,000,000 bushels in our wheat supply, even supposing that we consume every grain that we raise. This amount we should have to procure from some other source. Where are we to get it, and how is it to be paid for?

This is the vital question, and as an answer is imperative it is well that some of the brightest minds in the country be turned toward the farm and the solution of this and other problems connected with the farming interests.

Changed Methods Imperative.

The true statement of the broad general fact which it is most desirable that every one should understand it this: That this country cannot feed the population which it must necessarily have within a comparatively few years, if it does not change its agricultural methods. The emphasis is all on that conditional clause.

Germany, which sets the pace for the world in commercial expansion abroad, and industrial activity at home, has 300 inhabitants to the square mile. There are less than 30 per square mile in the whole United States. It could support 100 to the square mile as easily as any

depends upon two factors—land and labor. It may be increased so as to meet these needs of the future if the area or the product per acre of the land can be increased. There is no other possible solution.

Area is nonelastic. Our public lands are mainly exhausted. A few more years will see the last of them. And, lest they should not be squandered quickly enough, we not only offer them to everybody under conditions that invite and reward fraud, but when the government finds itself burdened with a particularly choice and valuable tract of farm land it holds a lottery and distributes it among Tom, Dick and Harry, no matter whether farmers or speculators, after they have been collected from the distant parts of the country by appealing to the passion for gambling.

The areas to be obtained by reclamation work would not, all told, take care of our increase for two years. So there are final limits already in sight to the quantity of tillable land.

The productivity of the soil and the food supply as compared with acreage and with population both decline. Our total agricultural product has been growing so rapidly and so immensely that we find it hard to realize that this may be entirely consistent with failure, at the same time, to keep pace with the growth of national needs.

The public is impressed by the statement that the increase in the value of farm products in the eight years from 1889 to 1907 was from \$4,717,000,000 to \$7,412,000,000, or 57 per cent, and that from 1897 to 1907 the strictly agricultural crop—corn, hay, wheat, cotton, oats, potatoes, barley and rye—increased in value nearly two billion dollars, or 95 per cent.

which the wheat crop was less in 1908 than it was in 1888. Twenty years have cut this staple food product, in many cases, more than one-half. They are not all the oldest and poorest soils originally. Both the total crop of this country and its yield per acre have been maintained by resort to new soils not yet robbed of their fertility.

The yield per acre, with singularly few exceptions, is falling in ordinary years. Consumption per capita tends to increase, and new population adds from 13,000,000 to 15,000,000 bushels every year to the demand. This is not

Nothing New About Mere Man

From the London Post. At the Royal College of Surgeons Professor Arthur Keith, conservator of the college museum, delivered recently the first of a series of lectures on "The Fossil Remains of Man." He described the human remains found in the upper (100 feet) gravel terrace of the Thames valley at Galley Hill, near Northfleet. These remains, which are now in the collection of Frank Corner, were found by the late Robert Elliott toward the end of 1888 and although at first a considerable number of geologists refused to regard them as equal to the 100 foot terrace in point of time, yet a fuller consideration of the evidence produced by E. T. Newton, F.R.S., recently convinced experts, both at home and abroad, that they were embedded when the level of the Thames was 90 to 100 feet higher than it is today.

United Kingdom, Belgium, the Netherlands and Denmark a yield of more than 20 bushels of wheat per acre has been the average for the last five years.

Impoverishing the Soil.

When the most fertile land in the world produces so much less than that of poorer quality elsewhere, and this low yield shows a tendency to steady decline, the situation becomes clear. We are robbing the soil in an effort to get the largest cash returns from each acre of ground in the shortest possible time and with the least possible labor. This soil is not more dead matter, subject to any sort of treatment with impunity.

Chemically it contains elements which must be present in certain proportions for the support of vegetation. Physically it is made up of matter which supplies the principal plant food. This food, with its chemical constituents in proper admixture, is furnished by the decomposition of organic matter and the disintegration of mineral matter that proceed together.

Whatever disturbs either factor of the process, whatever takes out of the soil an excessive amount of one or more of the chemical elements upon which plant growth depends, ends in sterility. Any agricultural methods that move in this direction mean soil impoverishment, present returns at the cost of future loss, the exhaustion of the land exactly as the animal system is enfeebled by lack of proper nourishment.

Our agricultural lands have been abused in two principal ways: first, by single cropping, and, second, by neglecting fertilization. It is fortunate for us that nature is slow to anger and that we may erect 100 consequences of this ruinous policy before it is too late. In all parts of the United States, with only isolated exceptions, the system of

man and animal life, is to "wear out" what is to become of the race?

Two Available Remedies.

The two remedies are as well as accurate as is the evil. Rotation of crops and the use of fertilizers act as tonics upon the soil. We might expend our resources and add billions of dollars to our national wealth by conserving soil resources, instead of exhausting them, as we have the forests and the contents of the mines.

For there is good authority for the assertion that the farmer could take from the same area of ground in four years grain crops out of a total of seven years as much as the whole seven years now give him, leaving the products of the other three years when the land is rested from grain as a clear profit due to better methods.

While I have here dealt only with wheat, the same is true of staple crops, cotton, tobacco, corn and the like. Not only the economic but the political future of the country is involved. No people ever felt want of work or reaching out violent hands against their political institutions, believing that they might find a change some relief from their distress. Although there have been moments of such restlessness in our country, the trial has never been so severe or so prolonged as to put us to the test.

For many this day has passed. But since the unnecessary destruction of our land will bring new conditions of danger, its conservation, its improvement to the highest point of productivity promised by scientific intelligence and practical experiment appears to us as a first command of any political economy worthy of the name.

SONG FEATURE FOR NEXT SUNDAY

"Does Anybody Want a Little Girlie?" as Introduced by Ward and Vokes in "The Trouble-Makers."

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