

**HOBLITZELLE AGRICULTURAL LABORATORY
TEXAS RESEARCH FOUNDATION
RENNER, TEXAS**

Soil Fertility and our National Future¹

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WE ARE met here on a unique, if not probably a history-making occasion. Most folks may little note, nor long remember what we say here. But, doubtless, many folks of the future will often turn their commendation to what is being done here. For the first time in agriculture, agricultural science, and agricultural research, we are paying to a scholar in these fields the honors, equally as high and distinguishing as those awarded in any other field, for contributions to humanity on a broader scale. It is perfectly fitting and proper that scholars in agriculture—with their hands in the lowly earth—should be elevated to the high seats of distinction, alongside the leaders of the arts, the other sciences, and the humanities, so honored already for a long time past.

Clay Lands Award Honor to Scientist-Scholar of Clays

It is particularly signal, in the first place, that the idea of these Awards was conceived in the mind of Mr. Karl Hoblitzelle, a man active in the business world, but nonetheless, like the men associated with him in this Foundation, seriously concerned about the need for more research in the agricultural sciences. It is particularly signal, in the second place, that the Hoblitzelle Award is given its birth and nurtured in its future for the significance it can have to agriculture, not by an older Land Grant Agricultural Experiment Station apt to be steeped in tradition and involved in programs prompted by numerous organized pressures, but rather by a youthful Research Foundation, conceived and created within the last decade. This Foundation is attacking the problems of agriculture as an institution unhampered by fragmentation and departmentalization for academic propriety and administrative convenience, but as one challenged by the simple and singular responsibility of making the "Black Belt of Texas" bear and bring forth more and better than it once did.

It is particularly signal, in the third place, that here, where this young and seemingly traditionless Research Station has dared to undertake what

¹Address presented on the occasion of the presentation of the Hoblitzelle Agricultural Awards at the Annual Open House of the Texas Research Foundation at Renner, Texas, May 16, 1951.

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its seniors may have believed the impossible; where a few bold scientists have premised their program, for the agriculture of an area as large as the state of Kentucky, on their conviction that only the soil can be the foundation for any agriculture and for the enormous industry dependent on it; and where a research station has assumed as its initial responsibility the restoration of the black clay lands of Texas, should be the place and the occasion for Dr. Charles Edmund Marshall of the University of Missouri to receive the first Hoblitzelle Award for his distinguished contributions to the sciences of soils and plants, as these discoveries promise benefits to agriculture.

It is signal, in the fourth place, that it should be awarded for his researches that give understanding and fuller hope to the word "clay" in its services for the nourishment of microbes, plants, animals and man.

It is signal, in the fifth place, that the Award for contributions by a Texas farmer to the agriculture of this State should go to Russell N. Cash, a practitioner of the science of soil undergirding agriculture and giving encouragement by his successes for much more rural improvement than now is anticipated.

Here, for the first time, the scientist and the farmer are brought together to typify the scope of mental and manual effort required to guarantee the soil, and the agriculture on it, as the basis of our national existence.

We may well all congratulate ourselves on our own good fortune of participating today in what, we hope, will be a more significant occasion for our agriculture, far beyond the great State of Texas, than at this moment we may realize.

*Texas Research Foundation Undertakes Clay-Soil Research
As Major Problem of Agriculture and Industry*

It seems altogether fitting that we should here take note of the fact that, on July 1 of this year, the institution is marking only its seventh anniversary. It was brought into research action because the fact had finally dawned that agriculture offers ways of making a living; not because it barterers and trades in commodities, but because it uses the soil as a way of creating more wealth and more life. Unfortunately, and in spite of all our sciences, the mysteries of those life-creating processes are still about as unsolved today as they were several thousand years ago, when there prevailed the simple but fitting belief that any creation must start with a handful of dust.

The late birth of this Research Foundation into the nation-wide family of agricultural research institutions may be to the Foundation's good fortune, in that this fact has prohibited it from putting into its research program many superficial projects. By that late date the soil, as the basis not only for agriculture, but for industry also, had been brought into clearer focus. As a consequence, this Research Foundation was conceived, born, and consecrated to the major purpose of conducting research in restoring these clay soils, which had poured out their fertility as the lifeblood from which were built the major cities of Texas. That same purpose is also accepted by the industries in those cities which are underwriting the Foundation's opportunity to guide the rejuvenation of the soil.

*Decline of Fertility in Texas "Black Lands" is History
Duplicated Almost Everywhere*

Lest we regard too light-heartedly the guardianship of the 26½ million acres accepted as their responsibility by the few scientists here, while some of us may say, "Texas, those clay soils are your problem", and lest we fail to see the larger problem of other millions of acres of exhausted soils in our many states, let us take a few moments to trace the history, the origin, of the problem in this locality. We may well do so for its deeper implications, not only those agricultural, but also those industrial, economic, and political. Such thought ought to stir us to see our separate responsibilities toward conservation in the fuller meaning of that term.

As late as the 1870's*, the wild buffalo were still slaughtered in this section. This was then still part of the Midcontinental belt along the 97th meridian of longitude, of which the protein-producing soils once nourished great herds of those herbivorous, massive hulks of muscle and bone. Less than a century ago, buffalo meat was plentiful here under the agricultural direction of the Creator, by whose management all the fertility taken from the soil by all the crops and animals was fully returned. Soon after the last buffalo was gone, myriads of cattle moved to, and multiplied on, the ranges to give us more meat, more hides, horns and hoofs. Here then, there was meat a plenty for three meals a day in such abundance that other than choice parts of the carcass were feed for the wolves.

That abundance, however, could not perpetuate itself. The soil that created it was then not yet numbered among the natural bodies warranting academic attention by the sciences, much less agricultural and industrial consideration as a natural resource deserving scrupulous conservation. Soil then was only "dirt." Its perpetual production of crops was considered "natural." No one thought it would so soon be "worn out."

But with the advent of the longhorns, the Herefords, the Angus and other breeds of cattle, there came man, too. With more folks coming, there began the traitorous treatment of the soil. Attention and concern were centered on the herds of cattle, and none was given to the crops of grass. Later there was concern about the failing grass, but no attention went to the soil under it. While taking the soil's creative capacity for granted (we do scarcely different today), there was put underway the mining of the soil's resources rather than the managing of them. There was started the flow of soil fertility, to rob the open country but to build our congested cities. Rural population of large percentage shifted into its decrease to put urban population on the rapid increase. Human efforts in diligence for earning a living by production shifted to little effort and indolence in collecting a living by speculation. While oblivious to the devastation of our own national security in the soil, we boasted about our building an American prosperity and pushed up our standard of living to the envy and jealousy of ourselves by the other peoples of the world.

* The Texas Almanac for 1945-1946, Stuart McGregor, Editor.

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Plows that Take Soil Fertility Away Must Also Put it Back

Much as the buffalo dwindled in numbers and disappeared in this area, so the range cattle passed out too. The plow, with tilled crops as its company, came along as replacement. Ere long, cotton was king. Plows were stirring the soil to give it draft that would fan the microbial fires and burn out its organic matter. Those black soils shifted toward an ashy color. The nitrogen there was burned out. With this element characterizing crude protein going and gone from the soil, could the crops be much more than cellulosic fiber? The mineral wealth was being mined rapidly out of the surface soil. Soon there was also mineral wealth pumped up from the great depths of the soil. It powered the tractors to mine the surface soils faster, to bring more prosperity, to build bigger cities, and to permit more coupon-clipping from the flow of wealth that was not recognized as a flow of fertility out of the soils and away from the farms. Under such a move toward soil exhaustion, even the reign of King Cotton was short-lived, especially under one of those disturbed experiences known in the economist's terms as a "depression."

While Texas is the biggest state, even then its great total area, of 168 million acres (262,398 square miles), is no complete buffer against the shock that would result from blotting out of that area the creative production by 26½ million acres of black land, or of an equivalent of the State of Virginia. Could even such a big state as Texas take the agricultural and industrial loss of what some Texans would consider the "heart out of the state"? The declining agricultural production in this "heart" section represented a soil problem from which the Texans could not escape. Their major cities would be emasculated. They would be separated from their agricultural production, as the nourishing support other than which they had not very much.

When "Texas is where a man is judged by his behavior, his capacity . . . his integrity and his courage" and when a Texan "stands on his own feet and asks no man for quarter," can you imagine such men in such a state resigning themselves to the fate of exhausted soils? We need only to recall that it was a Texan delegation that went to Washington, D. C., and started the first real action on a national scale against soil erosion. Should we not expect, then, that there would come from this same state the first combined action by agriculture and industry in the fundamental research to interpret the fertility exhaustion by which soil erosion was brought about?

While you have been recounting the decline in the fertility of the black soils of Texas, which was the handwriting on the wall to bring the Research Foundation's attack on this problem, you were perhaps saying in your mind, "The situation here is just a facsimile of that of most of our soils." Just as they must rebuild this inland agricultural backbone of Texas, so almost all of our agricultural soils must be rebuilt. They cannot be continually mined of their mineral wealth, under the impending threat of bringing on disaster, and disaster much more severe for the 84.4 percent of our people in the congested urban centers than for the 15.6 percent in the rural areas.

Mining our soils has been going on unwittingly under our westward march. Instead of recognizing and paying the costs in labor and fertilizers to maintain the soil at maximum sustaining fertility, each generation has mined more out of the soil. Each generation on the farm took enough fertility to pay the increasing taxes and meet the needs of a bare living. It threw the fertility resources from the soil into the bargain of sale of the agricultural products, and left an abandoned farm in its wake while it moved on west for another one to be treated similarly.

Our Westward March Has Been Halted

Our continued westward march is no longer possible. Our cities are still building themselves bigger. But the stream of soil fertility as the lifeblood to support them is threatening to go dry. Already saddled on our rural real estate and its income is a tax burden premised on the erroneous assumptions (1) that the soil fertility can be liquidated under the economist's classification as profit, (2) that the virgin fertility purchased in the soil of land dare not be put into the same category as the stock of goods originally purchased for a store on Main Street, where 40 cents of every dollar sale are not taxable profit, but are deductible costs for replacement of the goods initially purchased, and (3) that there is no soil fertility depletion and that consequently, for income tax purposes in agriculture, the only allowable deduction is three percent per year on the 33-year life of buildings and fences. Can the leaders of the industries which are mining coal, mining limestone, mining gravel, mining crude oil and other mineral wealths (many purchased by agriculture) accept their annual depletion allowances—mounting as high as 25 percent—stand by in silence, with clear conscience, without shame, and see no depletion allowance made for the minerals mined out of the soil when the productive life of virgin mineral delivery by a farm is scarcely one generation? Can the series of increasing and accumulating “mark-ups” for profit by the manufacturer, by the jobber, by the wholesaler, and by the retailer all be absorbed by the farmer, who has no “mark-up” privilege for his sale? Can he keep up the fertility of his farm when he has no other alternative than to mine and sell more soil fertility, and to exploit more of his family labor to cover his costs? The ignorance—if not the viciousness—of such economics, which give no value, and no cost considerations to the soil fertility of our acres feeding us, has brought us all too near to a political impasse kept cleverly covered by shifts in monetary standards, increasing income taxes, and emergencies of undeclared wars.

Now that we are going West no more, while our population is yet mounting in geometrical ratios, shall we fail to see the declining mineral delivery from our soils—the fertility that feeds us—as the major cause disturbing our human behaviors? Can all these disturbances be so lightly considered as thinking them to be nothing but political party manifestations? Multiplying populations living on dwindling soil resources, in our humble judgment, were the provocations of two world wars. They are the threat of a third one, all within the time span of one generation. All too late are we realizing that, underneath these murderous massacres of one segment of population by another, there is the simple, natural law of

human behavior which tells us that "an empty stomach knows no laws." All too late will we recognize declining soils as causing empty stomachs, hidden hungers, and law violations. Better government will come when our lawmakers do less of filling our statute books with regulations, and do more to help guarantee the future food resources kept secure in the soil.

Instead of seeing this deep-seated cause of political troubles working up from the soil, we have kept ourselves politically embroiled in the beliefs that we were ordained (a) to make the world safe for democracy (by means other than food), (b) to carry on the struggle for the four freedoms, and (c) more recently, to rid the world of communism. We have been so extensively stewed politically until it is now a question of whether our own democracy can survive against political concepts of any degree of red color. There is grave doubt whether it can survive against the mounting criminality amongst even those who, because of the vote by the rest of us, have taken the oath to defend our freedoms and our democracy.

Shrinking soil resources have been causally connected with a shrinking rural population and with increasing urban numbers, all of which are combined to foster our mounting troubles in governing ourselves. More people and less land are always bound to cramp—if not to delete—somebody's freedom, regardless of its classification. As long as each one of us was free to "go West" (according to whatever definition you may choose); free to take over more land for the mining of it; free to be selfish in grabbing natural resources for exploitation in place of stewardship; and free from any responsibility of conserving them, was it much of patriotism to boast about democracy by saying, "This is a free country"?

Hungry Hordes Are Driven on by Failing Soils

Our westward march was no philanthropic performance guaranteeing the four freedoms for the rest of us who followed. It was quite the opposite. It was every one for himself, for his special privilege for possessions, if not to escape some crime trailing him. It was the vanguard of a great horde going westward. It was a *hungry* horde. That horde came not only from our own eastern rock-bound shores and coastal plains sands, but from the eastern shores of the Atlantic, and points beyond, with our forbears included. It was a crowd pushed away from soils much more worn out, looking for fertile soils to feed it. Our Pilgrim Fathers, too, made much talk about freedoms. But even only a cursory examination of the passenger lists of those early westward sailings reveals a disturbing percentage of jailbirds, and all too few men of agricultural experience.

Our present political turmoils tell us that too large a majority of us believe our democracy still the one defined by the folks once going West, rather than defined by those appreciating the present day's limited natural resources, including those in the soil. Those quiet forces in the soil, which will either feed us or fail us as we either choose or refuse to conserve and manage them, are now putting the handwriting on the wall. It is one which is still a foreign language for our Belshazzars, but is simply interpreted by our soil prophets telling us that "you can no longer go West, young man."

Just as the soil and its fertility must come into more serious consideration by our statesmen, so must our economists see its significance in budgetary matters not yet so set up. In establishing costs of urban business and production, the final figures include allowances for perpetuation, improvement, and even expansion of them. Prices of urban commodities (many of them luxuries) include the costs of perpetuating all the different businesses ever in contact with them. Federal controls are set up to work with those businesses, as help to guarantee them.

Quite the opposite is the case for the prices of commodities (not luxuries, but foods) created in the rural areas. Prices here are not costs. Instead, they are only what the public will offer. In setting the price of a bushel of corn, for example, our economic valuations and taxation procedures take no account of the fact that, for every bushel of that grain, there must be mobilized out of the soil as nitrogen, phosphorus, and potassium, the fertilizer cost equivalent of 33 cents. There is also very little chance for any of that fertility ever to be put back into the soil or for its costs to be recovered in cash transaction. Instead of taking those facts into account and guaranteeing the prices of the farm commodities accordingly, Federal controls are set up to "roll farm prices back."

Such costs, amounting to the liquidation of our soil assets under the guise of calling them profits, are the price the farmer pays for destruction of the perpetuity of his business, for the privilege of being a farmer, and for selling the products of his ingenuity and the family labor at prices he dare not set. Such is an economy that conducts post-mortems of depressions, pays off government loans with inflated monetary values, and refuses to see the possible remedies for some of our troubles by applying them at the starting point of the creation of our national wealth, which is the soil.

Rural Folks Must be First to Determine Policies of Conserving our Land

All of us in agriculture must first assume our responsibilities. We must clarify our own thinking in this larger problem regarding the necessity and the methods of maintaining fertile soil, if we are to inform the statesmen and the economists so that they can appreciate the necessity of fertility conservation and soil rebuilding. Agriculture has too long been nomadic, and has been going West too. Only recently have more folks come to appreciate the damages from soil erosion. While we have accepted mechanics to throw up terraces against runoff rainwater, extra soil fertility has not yet been brought in widely to restore that soil's capacity to grow continuous cover for Nature's nakedness. Much less have we added enough fertility and organic matter to restore the soil structure so that the water will go into the soil instead of hammering it into slush, and runoff carrying that slush with it. Terraces on badly broken land have been accepted like splints tied around a broken leg. But in broken land we dare not forget that, for good farming, as for good walking, the healing process must make it possible to get rid of the splints in due time. For that, the fertility of the soil must be brought back far enough to prevent the erosion. Erosion came, originally, because the fertility was taken out.

Agriculture has too long assumed that it needed only to mine its soils. Our better crops as feed and food have failed because of that assumption. Instead of fertilizing for the better crops, considered "hard to grow", we have substituted crops considered 'hay crops but not seed crops.' When those exotic crops could not find enough fertility in the soil for the protein production required in seed and their own reproduction, even some of our pseudo-agricultural leaders suggested that they be used as animal feed to encourage diversified agriculture. It is those same leaders who are the propagandists for a grass agriculture to cover eroding soils, but do not realize that grass on a soil so infertile that it erodes might be cover and vegetative bulk, but is not apt to be nutritional values worthy of a cow's attention. Grass agriculture or any other agriculture can create body-building values, as fitting protein supplements to fuel values in its vegetable matter, only when the soils under it supply the necessary elements of fertility.

While crop-juggling to escape the responsibilities to soil fertility may give crop bulk for sale, it does not guarantee complete nutrition. Feeding such crops to animals calls for importation of more protein supplements. It means robbing some other farm, or farmer, of the corresponding fertility. It is such a superficial criterion of crop values, in terms of only tons and bushels rather than of complete food values, that has lowered the protein concentrations of corn, wheat, grasses and other products. There are increasing troubles in growing young animals and having older ones reproduce. Instead of raising the young animals ourselves, we expect some one else to grow them so that we can speculate by hanging fat on them. It is the declining soil fertility that has pushed agriculture more and more out of production and into speculation. Cannot the growing attention to agricultural economics, and increasing monetary manipulation in it, be laid on the doorstep of declining fertility in our soils? Cannot the establishment of more veterinary schools be ascribed to more starving animals on soils not fertile enough to feed them well enough to keep them healthy? Is it too farfetched to inquire whether the human health irregularities, especially the increase in degenerative diseases, are not deficiencies in health going back to deficient plant and animal nutrition on deficient soils?

Restoration of Soil Fertility is Responsibility of Urban Folks Too

Perhaps we shall come eventually to see that it is not an easy matter to fit an increasing number of people on a land area that is no longer expanding. It will be even more difficult to keep those multiplying numbers of people contented on a land area shrinking through abandonment of farms, and becoming less productive per acre through declining soil fertility. To the soil scientist, we must look for information as to how that soil fertility can be rebuilt and most efficiently utilized to create the foods to feed us. The soil scientist can, however, only *lead* our thinking, and then only toward the better understanding of the means by which more and better food is possible. Agriculture, that is, the farmers, are ready to think with him. But we dare not expect these two minority parts of our Society, that is, agricultural research and agricultural production, to

rejuvenate our depleted soils, to deliver our foods and to satisfy our wants in that respect, at prices which we as consumers dictate.

Matters of providing a regular national food supply, which in turn is premised on maintaining a soil fertility supply, are not matters to be accomplished merely by a majority vote, especially when the rural and producing population on the land makes up 15.6 percent and the urban or consuming population away from the land constitutes 84.4 percent. The urban majority was built up so rapidly because we were moving soil fertility so speedily, and even without charge for it, to the city. Our economists must help in adjustments of prices to include soil maintenance. Our statesmen must aid in formulating statutes, by which this majority of urban population will soon carry its proportionate share of the burden of maintaining the fertility of our soils. Our statesmen and our politicians, too, must take their responsibilities not only as to the national problem of soil conservation as food provision, but they must also become concerned about the size of our population, the immigrations to it, and any other jeopardy to the future supply of food for all of us.

Conservation of the fertility of our soils is not the responsibility of the soil scientists alone, noble as their accomplishments, recognized by awards here today, may be. Nor can that duty be shouldered wholly by research foundations and experiment stations. Activities by those in research and education are already pointing the way. We are told that the annual expenditure of a quarter-million dollars by the research here represents a potential annual increased earning of many-fold millions of dollars, when the facts already brought forth at this early date are applied to all the black lands of Texas. But researchers also remind us of the cold fact that past rates of soil exploitation dare not continue long before rates of fertilizer production and visible supplies of such materials will fall far short of maintaining our soils for sufficient food production.

Our soils are the major means by which we create our foods, irrespective of our collection of some from the sea. Without ample food supply, man ceases to be a sociable human, and is no longer amenable to the laws of a stable society and government. When we view our soils in that light, there will come from all of us our best efforts in conserving and maintaining our soils and in giving us the best means of maintaining ourselves in our democracy. It is fitting that the awarding of the Hoblitzelle honors in agriculture made this occasion for us to take inventory of the agricultural assets in our soils in relation to our national future.