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AUTOMOBILES
and
SOY BEANS

An interview by
ARTHUR VAN VLISSINGEN, JR.
with
HENRY FORD

[[Industrial chemists are finding new ways for
factory and farm to cooperate in turning
by-products and surplus crops into dollars.]]

An interview with Henry Ford explaining his interest in

"THE SOY BEAN"

and describing the work done by

"THE EDISON INSTITUTE OF TECHNOLOGY"

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OFFHAND, there seems very little connection between automobiles and soy beans. As yet indeed there has been very little connection. If you bought a new Ford car last winter you got, in unrecognizable form, a handful or two of soy beans. If this summer you bought a new Ford of one entire class you got—but it is too early in this article to come to that point. We must cover a good deal of other ground first.

Whatever theory for ending the depression may be your favorite, you will agree with the other professional and amateur economists that a basic cause of all our troubles is the dislocation of exchange relationships. Nowhere is this dislocation more pronounced than between agriculture and industry. The farmer cannot get enough money for his crops to permit his spending any considerable amount for the products of industry. Consequently, the factory hands work short time or for low wages or perhaps do not work at all. Their unemployment curtails their ability to buy farm products, which, in turn, increases the surplus on already glutted markets. The farmer's purchasing power once more sinks. And so on, apparently without end.

This maladjustment of purchasing power is, of course, the evil at which the administration is aiming its strokes through the manifold programs of the New Deal. The NRA is set up on the one hand to rebuild the purchasing power of the wage and salary earners. On the other hand, the federal establishments dealing with agriculture are working to bring the farmer back as a mass consumer of industry's products.

Henry Ford has made no claims to knowing exactly how to end the depression. But he does know that his business, like that of thousands of companies the world over, is dependent for a profitable volume of sales on two changes for the better which must be brought about. Farmers must again earn enough money to enable them to buy industrial products. And the other great section of population, which depends upon industry for its living, must have employment at wages high enough to enable its members to pay proper prices for farm products. When farmers and workmen can once more come into the market and purchase each other's goods and services, every business with managers smart enough to offer good values in products that people need and desire will again be able to sell goods and earn profits. Moreover, and

from the standpoint of society this is far more important, the economic human misery which now oppresses this disjointed world will diminish. It will practically cease.

"Can agriculture provide jobs for factory workers?" asks Henry Ford. And he answers, "Yes, if at the same time industry provides a wider, steadier market for farm products. Agriculture needs a greater market, industry needs steadier jobs. If these two ailing groups can somehow be united for their common good, we shall see improvement in the world economic situation as well as in the condition of farmers and factory workers. How can this be brought about?"

"I do not know the answer for the world at large. But we are getting a glimpse of the answer as it touches our own industry. Business is only exchange. If we want the farmer to be our customer, we must find out how we can become his customer. This is where the soy bean enters the plan as one product of agriculture which is finding a place in our manufacture of automobiles. It serves as a very interesting illustration of the whole question, both because of its lowliness and because of its many separable elements.

"We know beyond a doubt that supplying the American dinner table is no longer a full-time job for the American farmer. There is a surplus of almost everything that the farm produces. Now, the effect of a surplus on peoples' thinking is very interesting to observe. Some demand that crops be limited. The farmer instinctively spleens against this. His partnership is with sun and soil and shower and he doesn't like to play tricks on them. He likes to see every acre produce its best and utmost.

"But that still leaves us with the surplus. Well, what is wrong with a surplus? It is only through a surplus that we learn new uses for things. How do we know about the many things we can do with corn until we have so much corn that it goes to waste? The way to handle a surplus is to invent new uses for it.

"THERE is another reason for this urge to use rather than curtail. Why use up the forests which were centuries in the making and the mines which required ages to lay down, if we can get the equivalent of forest and mineral products in the annual growth of the fields? I

know from experience that many of the raw materials of industry which are today stripped from the forests and the mines can be obtained from annual crops grown on farms. Besides being an advantage to the farmer and to everyone else in the providing of added outlets for farm products, industrialization of crops will also have the advantage of making a considerable saving to the manufacturer who learns how to accomplish it.

"As to soy beans, I have no particular bias for these little legumes, although I do believe that they are the result of several thousand years of experiment by wise men of Asia. I would just as soon talk about celery, or turnips, or watermelons, if experiments show them to have materials suitable for industrial use. It happens that just now soy beans display the broadest possibilities. And it is only as an example of what can be done, rather than as a model exemplifying what has been done, that we ever consent to discuss our experiments.

"When any one thinks of soy beans, he is likely to think of Manchuria, for that corner of the globe is the soy bean center of the earth. Probably this fact is in large measure responsible for the prominence which the district has lately attained. Yet the soy bean has been rather generally grown over most of that portion of Asia which fronts on the Pacific and Indian oceans. It is perhaps best known to Americans, if they know it at all, as the source of the soy sauce which is used in most chop suey restaurants.

"Asiatics use this bean in scores or hundreds of ways. It is bread, soup, milk, and cheese to them. They grind it up in mills and put it through presses to obtain its oil, which they use for cooking, for salad oil. They even hydrogenate it into a form of vegetable lard much as cotton seed oil is treated in other parts of the world. The cake that is left after the oil has been removed they grind and use as food for man and beast. Most of the soy bean oil processed in Europe is used in soap making and as a drying oil in paints, the oil cake being shipped to Denmark and other dairy regions as feed for cattle.

"In our search for annual crops which could be raised in the United States and which might yield valuable industrial materials, we have investigated a good many plants. Soy beans have been grown in this country for years, chiefly to be pressed into oil for soaps and

paints, and oil cake for cattle feed. Many farmers raise them for dairy silage. But they have been unimportant as a source of industrial raw material and they have cut no really large figure in American agriculture.

"Our chemists began to study soy beans from many different angles. For one, they discovered that the oil extract is quite as effective for mixing with sand to make foundry cores as linseed oil. Core-makers actually do not know which oil they are using. So far, we have used a good many thousand gallons in this way and at present market prices, this means a substantial saving in core oil costs.

"Research on the meal left after extraction of the oil suggested that it might be incorporated in what are known as molding compounds, the resinous materials which are formed into such small parts as the button you press when you sound the horn, the ball on top of the gear-shift lever, and so on. This residual meal proved excellent for the purpose. Today these parts are made from this material chemically changed into a homogeneous compound. There are other places in the automobile where molding compounds are used for which the bean meal resin has so far met all tests. We are trying these parts out in actual service on company cars, and checking them periodically.

"The oil is the most valuable part of the soy bean. In several varieties of soy beans grown under various conditions, the percentage of oil is usually between eighteen and twenty-two. The standard method of extracting it hot under pressure leaves a great deal of it still in the cake. We have adapted a method (advanced elsewhere) that extracts practically all the oil by means of a solvent."

The most startling development in the soy bean experiment at Ford's has to do with making a new body finish from the oil. The laboratories have worked out a process for producing from the oil a synthetic resin which can be made into an enamel. Exhaustive tests prove this enamel superior to lacquer in every respect, from the original gloss to its complete resistance to deterioration. It costs less by the gallon, uses less to the job, saves tremendously on labor. To match its qualities the chemists are working on a better finish for fenders, employing soy bean resin as a coating and soy bean oil as a carrier of pigment.

One entire class of cars was last winter scheduled to carry this finish. The only reason Ford did not shift over on his entire line was that he had not as yet enough oil-crushing equipment to do it.

"LAST summer," says Mr. Ford, "we had almost ten thousand acres of land under cultivation, most of it in soy beans. The yield is approximately fifteen bushels to the acre. Last year's planting is equivalent to about two million pounds of soy bean oil. About fifteen pounds are needed for finishing one of our cars. Think what this signifies as an outlet for farm products when the new enamel becomes standard for the industry, as it probably will!

"Soy beans have some very important advantages over many types of crops. For one thing, they improve the soil by adding nitrogen to it. Moreover, they take little cultivation—just enough to give the plants a start up to six inches' height and thereafter only enough to control the weeds. On our farms we cultivate with tractors along rows twenty-eight inches apart. The stalks usually grow about four or four and one-half feet high. Another big advantage to the farmer is that soy beans do not need to be harvested when other crops press him. The vines stand up straight and stiff—except on certain types of heavy soil. Their leaves fall off at frost and the pods remain. The crop may be harvested any time during the winter; this enables the farmer to employ his time profitably during the months when work is lightest. Some of our crop was harvested in sub-zero weather last December.

"Another advantage to the farmer (and one on which we are working), is closely tied up with my firm belief that the best possible working plan for any man in our civilization is to have one foot on the soil and the other in industry. Our extracting plant for separating the oil from the meal is purposely neither large nor expensive so that it may serve the needs of several farmers in a community. Thus the men who raise the crop can give it its first processing; after which they can sell to industry the oil and the meal, and feed the residue to their cattle. This industrial employment during the light season for farm work will permit the farmer to keep busy the year round and will at the same time bring him an additional cash income.

"Soy beans are the crop with which we have so far attained the greatest success in our experiments. We are running a small agricultural experiment station for determining the best varieties of this legume and the most profitable methods of culture and fertilization. We are likewise investigating many other crops for their industrial possibilities. The sunflower has many promising qualities, some of which, however, can be adapted more economically from the soy bean. Our laboratories have quantities of such experimental materials as oils made from cantaloupe and watermelon seeds and pulp from sugar beets. Grain straws, corn stalks, and sugar cane pulp have yielded experimentally a felted material on the general order of paper which is sufficiently strong for several uses in an automobile body. This material is pressed, coated, and formed so that it fits exactly in any desired place. It is weatherproof, mold-proof and even proof against those tropical ants, the termites.

"We do not as yet know how much of the modern automobile can be grown annually on the farm to conserve the products of mines and forests. We know more about it today, however, than we did five years ago. We have been experimenting each year with new ways in which to employ farm products profitably. Indeed, as every week discloses new opportunities of exploitation, we are sure only of one conclusion: No matter what we may guess as to the proportion of automobile parts that can be built from the fruit of the field, our guess will fall far short of the eventual result.

"Anything that can be grown to provide industry with manufacturing materials will bring new revenue to agriculture, will help to raise the prices of the old-line, conventional crops. And just as industrialization will eventually double the purchasing power of the farmers, so it will likewise directly increase industrial activity and employment.

"Let me repeat that while claiming no ready-made panacea for the world's economic ills, I believe this project of helping the farmers and the industrial workers to help each other is about as good a starting point as any I could suggest."