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LESS wheat, more meat; also more vegetables, eggs, dairy products, vegetable oils; steady on cotton and tobacco. This in a nutshell is the array of goals for American farmers in 1943, as summarized in the annual report of Claude R. Wickard, Secretary of Agriculture.

It is quite different from the agricultural aims of the last war period, when all the accent was on wheat. Ever since 1918, wheat has been produced in excess in this country, and with the war-caused total eclipse of export markets it has been piling up. The national carry-over as of July, 1942, was 633,000,000 bushels, to which the year's huge crop of about 984,000,000 bushels was added. The total is enough to meet all our bread needs for two years, even if no wheat at all should be harvested in the meantime.

In response to urgings of the department and the stimulus of reasonably good meat prices, farmers and stock raisers have built up their herds to new highs. The cattle population reached nearly 75,000,000 head a year ago, and despite heavy slaughter is being maintained. Pigs topped the hundred-million mark with five million extra to spare —enough for nearly five sixths of a whole hog apiece for every person in the country, except that we're sending part of our pork chops and bacon overseas to our armed forces and our fighting allies.

Use of some of our surplus wheat for feeding livestock and chickens is recommended by Secretary Wickard, so that we may increase supplies of meat, milk and eggs, all of which need to be maintained at the highest attainable levels.

An additional outlet for wheat is the international pool set up by the four great wheat-raising countries, the United States, Canada, Australia and Argentina, for the eventual relief of war-ruined countries. This pool now consists of 100,000,000 bushels, and is to be increased as need arises.

With a cotton surplus of more than 11,000,000 bales on hand, and the mills unable to spin it up much faster than they are doing now, increases in cotton production are not being encouraged. Instead, cotton farmers are asked to shift over to peanuts (for oil) in so far as possible, and also to substitute long-staple for short-staple varieties. Lower yields of the important co-product, cottonseed oil, are to be offset by increased production of other vegetable oils, notably soybean, flaxseed and peanut.

Tobacco stocks on hand are so large that no increase in acreage in this crop has been held justified, except in two types, flue-cured and Maryland, on which lend-lease requirements call for increases of about 10 per cent. over the 1942 figures.

The greatest possible emphasis is being placed on vegetable production, both by large-scale professional growers and home gardeners. Military and lend-lease shipments call for immense quantities of dehydrated vegetables, and an intensive drive for the 1943 Victory gardens will soon be under way.

SEEDLESS TOMATOES

TOMATOES can be induced to produce seedless, more solidly meaty fruits by treating the plants with the fumes of a growth-promoting acid, naphthoxyacetic acid, at or before the time the flowers open. Experiments along these lines, which may have important horticultural applications, were performed in the greenhouses of the great experimental farm of the U. S. Department of Agriculture at Beltsville, Md., by Dr. John W. Mitchell and Muriel R. Whitehead, of the Bureau of Plant Industry. Results will be reported in the forthcoming issue of *The Botanical Gazette.*

Use of growth-promoting chemicals to induce formation of seedless tomatoes and other fruits had already been reported by other investigators. However, their methods involved the use of sprays, or even the direct application of the substances to the flower-parts with brushes or by other hand means. Getting similar results merely by subjecting plants temporarily to self-distributing fumes from a few milligrams of the acid obviously saves a great deal of time and labor in the treatment.

In their experiments, Dr. Mitchell and Miss Whitehead placed a number of tomato plants in a closed chamber, so that the exact concentration of the fumes could be measured. They used 250 milligrams (1/120 troy ounce) of beta-naphthoxyacetic acid per thousand cubic feet of room space, evaporating it on a hot glass plate over an electric heater. After exposure to the fumes overnight, the plants were taken back to the greenhouse, where an equal number of untreated plants were placed with them for comparison purposes.

As the flowers opened, both treated and untreated plants were all carefully hand-pollinated. When the tomatoes were mature, they were compared for flavor, vitamins and total mineral content. Except for the fact that the tomatoes from the treated plants were nearly or quite seedless, no differences could be detected between the two lots.

THE STUDY OF WAR METALS

BY bouncing a beam of light off a tiny metal mirror, metals can now be observed changing into alloys and the rate at which metals diffuse through one another can be ascertained in a few minutes.

Developed by Dr. Howard S. Coleman and Professor Henry L. Yeagley, physicists at the Pennsylvania State College, the new method replaces tedious processes which took months and years. It helps to speed the study of war metals, just as other phases of the war program have been accelerated. New information will be obtained about improving alloys, the metal mixtures so important in the war. Studies may reveal more about the resistance of metals to heat and suggest ways of improving this quality. This same process might be used to prevent metal corrosion. Fundamental things that occur in aging metals are being discovered.

Thin metal films only about a fourth the thickness of ordinary typewriter paper are being used. First, the metals are vaporized, then deposited on the top of one another as films on a glass slide, thus forming a mirror. They are then removed from the vaporization chamber, heated to the desired temperature and the diffusion rate observed.

The diffusion of these thin films usually occurs in a few minutes, compared to the many months often required by old methods which used larger quantities of metal. This also involved prolonged heating at a temperature of several hundred degrees while only slight heat is required by the new method. Sometimes even the heat of the hand is enough to start diffusion of thin films. To follow the speed of diffusion, the amount of light reflected from the mirror film is measured. A normal metal surface has a certain reflecting power. But as one metal spreads through another the amount of reflected light is changed. This change is measured by a recording instrument called a galvanometer.

TESTS OF PLANE ENGINES

MORE than half the power needed to operate an engine factory can be recovered from tests of plane engines, was reported by G. E. Cassidy, W. A. Mosteller and W. L. Wright, of the General Electric Company, at the New York meeting of the American Institute of Electrical Engineers.

The power-recovery method has helped the war effort by giving to the aircraft engine industry a testing technique that contains advantages not available in other methods. Testing can be done with greater ease and in less time on a basis that is economically sound.

Previous to the development of the new power-recovery system, energy produced during testing was dissipated by water brakes, propellers, electric brakes and other devices which involved complete wastage. Fuel consumed accomplished no useful purpose other than testing of the engine. Furthermore, engines became so huge that schemes to dispose of the power by wastage began to present difficult problems.

Starting with an inquiry for an improved method from Pratt and Whitney Aircraft, development of the power-recovery system has gone through several phases. Using an induction generator, one of the latest set-ups begins the test with a cold start and run-intest for checking mechanical operation and lubrication of the engine. Then speed is gradually increased. When ready to "fire" the ignition switch is turned on and the engine throttle adjusted to idling speed. As the throttle is opened, the generator speed passes through synchronism and load is automatically applied to the engine. Any desired values of load and speed can be established. From such a test, the engineers reported that 3,000 to 6,000 kilowatt-hours of energy may be recovered from each engine of current-large rating. It was pointed out that "the advantages of the power-recovery system applied to the testing of aircraft engines have not yet had time to be universally appreciated. It may be quite possible that with the passing of time the engine builder will point with more and more favor (toward wider use of the method) because he is already pointing toward larger aircraft engines—and the larger the engine the more advantageous power-recovery testing becomes."

SOURCES OF RUBBER

NOREPOL, the rubber-like material synthesized from soybean, corn and other vegetable oils by chemists of the U. S. Department of Agriculture at the Northern Regional Laboratory in Peoria, Ill., is now going into commercial production. Two companies are making it under trade names of their own, while others are producing it under the coined name given it by the department.

Norepol is a combination-word formed from the first syllables of NOrthern REgional POLymer. Technically it is a polymer of linoleic acid, one of the fatty-acid fractions of many vegetable oils. A polymer is a compound with big molecules, formed by welding together smaller molecules of other compounds. As a rule, polymers are "thicker," more solid, and harder or more elastic than the substances from which they are made.

Norepol, although rubber-like in its properties, is not a full substitute for rubber. It will stretch to only twice its normal length, instead of six times as in real rubber. Its tensile strength is only 500 pounds per square inch, as compared with 3,000 pounds or more. Nevertheless, it has good resistance to abrasion and aging and is impervious to water and alcohol, so that it can replace rubber in such uses as shoe heels, fruit jar rings, gaskets and tubing. Demand for norepol is estimated at 12,000 pounds or more for the current year. Since only the fatty acid from the oils is used in its manufacture, the other half of the oil compound, glycerin, is released as a co-product for the manufacture of explosives and other technical purposes.

Natural rubber from two other sources fostered by the Department of Agriculture is beginning to come in. More than 18,000 pounds of kok-saghyz roots have been harvested from the first experimental plantings, made possible by large shipments of seeds of this rubber dandelion rushed to this country from the beleaguered Soviet Union last spring, even while the Nazi armies were storming to new conquests. This harvest represents only a small fraction of the plants grown in many plantings over a large part of the country, to test the adaptability of the plants to American soils and climatic conditions. The greater part of the first year's crop has been left in the ground, to test the plants' over-wintering abilities in this country. In the meantime, labor-saving machinery has been worked out to harvest the first American-grown crop of seed.

It is emphasized that all the work thus far is experimental. No appreciable amount of dandelion rubber will be harvested in the immediate future, nor will any seed be available to farmers who may be thinking of growing the plant themselves.

The native American rubber shrub, guayule, is making a small beginning, on lands taken over from the Intercontinental Rubber Company by the U. S. Department of Agriculture. A mill operated by the U. S. Forest Service at Salinas, Calif., will turn out 600 tons of guayule rubber this winter, using older shrubs that were already growing before Pearl Harbor. Plantations being established this winter are expected to yield about 21,000 tons from the harvest starting late in 1944. Further extensions will put the figure up to a maximum of about 80,000 tons. Although this is not much more than a tenth of the annual rubber requirement in this country, it will be distinctly helpful.

CAUSES OF LOST TIME AMONG SHIPYARD WORKERS

FLASH burns of the eyes and cinders or other foreign bodies getting in the eyes are among the most serious and frequent causes of lost time among workers in shipyards, was reported by Dr. Philip Drinker, of the Harvard School of Public Health, to the Congress on Industrial Health meeting at Chicago sponsored by the American Medical Association. The report was based on findings of a survey he and Dr. John M. Roche, serving as consultants on safety and health for the U. S. Navy and U. S. Maritime Commission, made of selected shipyards with government contracts in all parts of the country.

These eye injuries are obviously preventable, Dr. Drinker said, but he pointed out that ships are now being built in yards which cover very large areas with welding going on everywhere in them. It is very difficult to prevent flash burns of the welder's neighbors. The danger extends even to the experienced welder who lifts his shield momentarily and happens to be near another man welding.

A serious risk of lead poisoning also exists in the shipyards because of modern high-speed construction schedules. It is common shipbuilding practice to paint all metal surfaces as soon as possible with red lead. Generally this is done after the metal plates are in final position, but to keep fast construction schedules, some pieces are painted in the yards. Welding these painted surfaces brings the danger of lead poisoning, against which special care must be taken for workers' protection.

Special ventilation to control welding fumes is necessary for the men working on the fore and after plates and double bottoms where, because of prefabrication type of construction, the men must work in relatively small spaces.

Paint sprayers, their assistants and those working in the immediate vicinity require special protection. To make sure that the men are provided with efficient protective equipment, only such masks and respirators as have been approved by the U. S. Bureau of Mines may be used in shipyards with government contracts.

In general, Dr. Drinker found the medical and safety departments of the yards well organized and well run, although the high proportion of "green" workers complicates the safety problems. Many yards have as few as one or two per cent. of experienced men who had worked in shipyards before the war.

"We have been badly hit by the shortage of doctors in some districts, especially in rural communities," Dr. Drinker said, "but probably we are no worse off than many other industries. We doubt if our position in this respect represents any new problems."—JANE STAFFORD.

ITEMS

FOUR bushels of Cayuga soybeans, a variety developed by plant breeders at Cornell University, have been shipped to the Soviet Union through the Russian War Relief for trial plantings as a feed and food crop. Cool weather and short growing seasons in Russia resemble conditions of New York state. The Cayuga variety matures in any part of New York up to 1,600 or 1,800 feet elevation. Soybeans of the Corn Belt will not mature in New York or in the cool areas of Russia. The Cayuga's yield is from 20 to 25 bushels or more of dry beans to the acre.

BLACK cotton is a new variety recently originated by Russian plant geneticists, according to a bulletin of the Soviet embassy. One advantage which this cotton has, together with other varieties with colored lints ranging from reddish to green, is the eliminating of the dyeing process. It is believed that the natural black will be a faster color than the black of dyed cottons. American cottons with green and brown tints have been known for some time, but are not grown on a large scale because their yield is considerably lower than the white-linted varieties. Our colored cottons are used principally in certain regional handcrafts industries.

HOPES of greatly increasing vegetable and field crop yields through chemical treatment of seeds are somewhat damped by a report in *The Botanical Gazette*, on negative results of a large number of experiments by Dr. William S. Stewart and Charles L. Hamner, of the U. S. Department of Agriculture. A number of growth-regulating substances, including several commercial preparations intended for seed treatment, were tried on the seeds of a considerable assortment of plants, ranging from field crops like corn, wheat and soybeans to garden vegetables such as radishes, carrots and squashes. They were grown under a wide variety of soil and climatic conditions in three places—the Experiment Station at Beltsville, Md.; the University of Chicago, and Lake Geneva, Wis. In all cases, significant increase in yield as a result of the chemical treatment of seed could not be detected.

SOYBEANS are used to produce laminated board, valuable in aircraft and other war industries, in a new method announced by Dr. George H. Brother, of the Regional Soybean Industrial Products Laboratory of the U. S. Department of Agriculture. Sheets of unsized kraft paper or other fibrous material are soaked with a formaldehyde solution of soybean protein. After drying, stacks of these plastic sheets are united into laminated board by heat and pressure. This method promises to augment the nation's limited supply of high-priority phenolic resin now being used. Low water-resistance of the resultant board created a problem. Single sheets of the more waterproof phenolic resin placed on the top and bottom of the stack of soybean sheets before pressing, was the solution. Production of laminated board has been speeded by the new process, according to Dr. Brother, since pressing time for phenolic resin board is about five times as great as when soybean-protein-phenolic material is used.