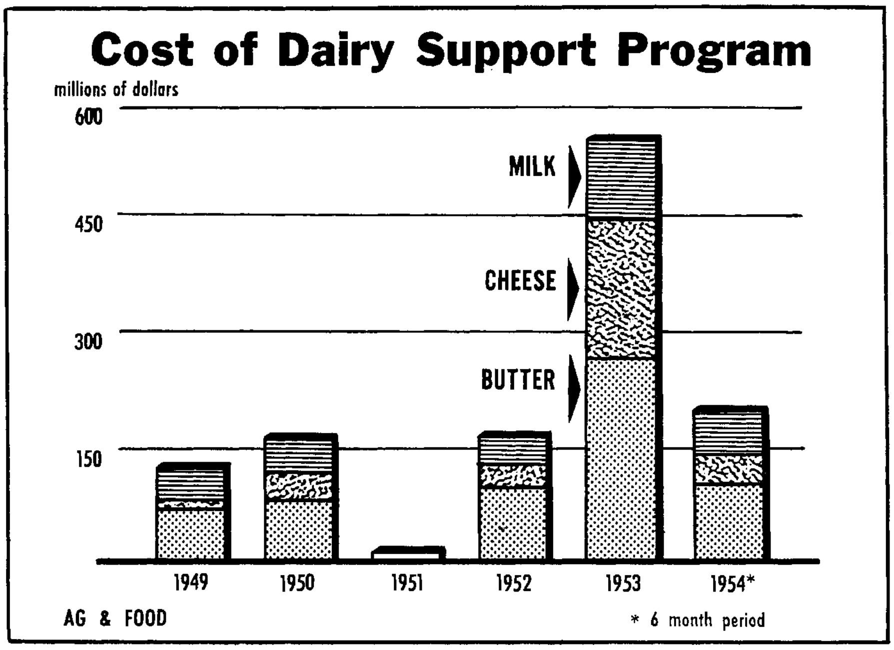


Congress must face the fact that the American public is becoming concerned over farm surpluses. Farmers are getting lower prices for their crops while consumers continue to pay high prices for food. This goes on while warehouses bulge with surplus crops acquired in former years.

Surpluses could shape farm legislation for years to come. Potatoes and eggs were removed from price support lists after a series of scandals. Dairy products might suffer a similar fate unless ways can be found to reduce present surpluses and to keep them low.

Secretary Benson suggested to Congress three courses of action to relieve the diary surplus problem in a report presented on the opening day of Congress. In the report he did not single out the method he thought best, but rather submitted them for Congress' study. Clearly, Benson was throwing some of the responsibility for solving the surplus problem right in the lap of Congress.

The first method is the current plan of a flexible support price ranging from 75 to 90% parity. In addition to supports, there would be an "educational program" designed to raise consumption of dairy products, particularly fluid milk. This is in reality the Benson Plan, but the Secretary did not stress it above the other two alternatives.

The "Brannan Plan" would be revived in substance by the second proposal, which calls for direct subsidies to farmers. Dairymen would sell their products on the open market at prevailing prices. Any deficits beyond certain levels would be made up by payments from the Government to the farmers. Wool already is supported in this manner, but extension of the system to other crops would cause a stiff fight in Congress. The original Brannan Plan was rejected by the lawmakers when it was first proposed.

The third method of getting rid of large dairy surpluses entails production and marketing controls. Benson has been opposed to controls on dairy products before and there is no reason to believe he has changed his mind. He admits they might be successful to some extent, adding, however, that their disadvantages may outweigh their advantages. In any event, it would be difficult matter to patrol the farms of the nation's 1.5 million dairymen to make sure each is getting his fair share.

In the report, Benson indicates that one solution may not be the answer to all problems. The problems of the dairying industry vary from section to section, sometimes even from farm to farm.

Dairy surpluses are but one of Benson's worries. He may find himself in the middle of foreign trade negotiations with Russia or her representatives. The proposal has been made that some of the surpluses be sold to Iron Curtain countries. From present indications these countries will buy when the prices are right. Caution will be the watchword in these dealings because of the potential resentment of American housewives who might have to pay more for domestic butter than their Russian counterparts.

The price "squeeze" on farmers will give the Administration another cause for concern. Farm prices have been dropping faster recently than production costs, which could mean disaster for farmers in bad years. USDA also will extend more help to the low income farmer, in line with the President's State of the Union Message.

On the other hand the price "spread" will get its share of attention, too. Some farmers are grumbling that they are getting sometimes less than 40 cents out of every food dollar spent. They want this price spread which occurs between the farm and the dinner table to be "realistic." There are some factors working against the farmer's reasoning, though. Much of the spread is taken up by improved processing and marketing techniques. These factors, although costly, may mean more money to the farmer because of increased sales and a longer selling season.

All in all, the Administration's farm program looks much stronger now than it did a year ago. Then Benson was fighting for flexible supports and the rest of his program. Now these programs are working. The big question is how well will they work. On this point will Benson's work be judged.

Waxy Maize Starch

New multimillion dollar grain industry fostered by nongelling cereal starch from misnamed corn variety

A NEW CROP, waxy maize, is making itself felt commercially. Prospects for its future importance—in terms of million-dollar markets—are more than theoretical. Two years ago the crop was estimated at 2.1 million bushels and it is being pushed hard by corn products processors, who admit that they have behind them a decade of steady growth. The future looks promising as the number of farmers planting waxy maize is increasing. Amioca, the primary product, has earned itself a raw materials position.

The grain of waxy maize looks so much like that of ordinary yellow corn that the two are indistinguishable to any but an expert. Unstained starch granules from the two types appear nearly identical under the microscope. Yet few starches are actually so dissimilar as ordinary corn starch and amioca, the starch from waxy maize.

The basic difference lies in molecular structure. Amioca is 100% amylopectin consisting entirely of branched-chain molecules. Corn starch also contains amylopectin, but about 27% of corn starch is straight-chain amylose molecules. The familiar iodine test gives a reddish-brown color with amioca gran-

American Maize-Products Co. stirs farmer interest in waxy maize through display booths at county fairs

ules, instead of the deep blue obtained with common corn starch.

While all other cereal starch pastes are normally cloudy and tend to gel on standing, that from waxy maize is clear, fluid, and cohesive; its nongelling characteristics even permit its use as a stabilizer for other starches. In its behavior, it is much less like other cereal starches than like root starches, particularly tapioca.

This similarity to tapioca is largely responsible for development of the multimillion dollar waxy maize industry in this country. (The term "waxy" is inaccurate; the kernel's cross section presents a waxy appearance, responsible for the misnomer, but there is actually no unusual proportion of wax in the grain.) First brought to the U. S. from China in 1908, waxy maize was long regarded as a curiosity. A cross-breeding program was initiated in 1937 in an attempt to introduce into high-yielding hybrid corns the genes responsible for the waxy maize type of starch, but it was the World War II shortage of tapioca that hurried the program forward to its goal.

Starch chemists at Iowa State College, under the leadership of Ralph M. Hixon, had observed the similarity between amioca pastes and those from tuber starches. Laboratory and commercial trials in the late thirties and early forties, with participation by American Maize Products Co., National Starch Products, Inc., and Stein-Hall & Co., Inc., confirmed the suitability of amioca as a replacement for tapioca flour in most applications. The advancement of starch chemistry showed waxy maize starch to differ from all others, including even tapioca, making it a unique material never before available.

In 1942, American and National each grew its first commercial crop of waxy maize. Because of the relatively small amounts involved, the crops were combined and ground at the Roby (Ind.) plant of American. A larger planting followed in 1943, and the combined harvest was ground at the Indianapolis plant of National.

The participating companies have continued to cooperate on chemical and genetic research, but commercial adaptation has been handled on an individual company basis.

Production Figures Show Steady Rise

Amioca processors are chary with production figures, but admit that their sales of amioca have shown a nice steady growth over the past decade. Waxy maize acreage figures also are closely held, although because of economic pressures and uncontrollable variations in crop yields, these figures tend to fluctuate rather widely while pursuing a general upward trend. Late in 1952, the *Wall Street Journal* placed that year's planting at 30,000 acres, for a yield of about 2.1 million bushels. Some 600 farmers participated in the program. Current production is believed to be above the 1952 level. A new factor in the field, the Hubinger Co. of Keokuk, Iowa, is reported to be embarking on a waxy maize program this year.

Amioca has earned a position for itself in industry through its use in liquid laundry starches, in the manufacture of adhesives, and in textile printing and finishing. In the food field, it is widely used as a thickener and stabilizer in pie fillings, salad dressings, and canned foods. Because of the highly-developed processing and control methods practiced by this country's corn processors, domestic waxy maize starch can claim uniformity and high quality in contrast to the wide range of grades encountered in imported tapioca flours.

The extent to which amioca can compete with other starches often depends largely upon price. On this point, at least for the present, waxy maize is at a disadvantage. Contracts for acreage and seed must be arranged several years in advance, and the grain itself must be grown, harvested, stored, and shipped under special conditions of isolation, to prevent cross-pollination or contamination by ordinary corn. If waxy maize plants are pollinated with a nonwaxy variety, the result—through the genetic process known as xenia—is another nonwaxy type. Because of the special precautions required, selected growers are paid a 12% premium to grow waxy maize under contract. This initial cost disadvantage is augmented by the cost of additional special handling required in processing the grain for its starch content.

Oil Content Increased

To improve waxy maize's competitive position, plant geneticists have been asked to increase its oil content as partial compensation for the growers' premium and the processors' extra handling costs. The first crop of high-oil waxy corn of any importance was grown last season.

"As is the case so frequently in research," comments Iowa State's Hixon, "related results may prove more important than the original objective." The increase in corn oil (which occurs in the germ) is accompanied by an increase in the germ protein. On that basis, says Hixon, the high-oil corn should have a higher feeding value, although there will be a limit beyond which the increased oil would produce soft pork. That limit, thought to be about 9%, is currently under investigation. Preliminary evidence indicates also that some improvement can be made in the amino acid balance of the endosperm protein.

Aside from its price disadvantage in comparison with ordinary corn starch, amioca still must compete with tapioca, since the two are essentially interchangeable for many uses.

Since the war Brazil is the main source of imports. Brazil has been building up its plantations of the tropical plant cassava, the root of which is the raw material for tapioca flour. While most of the increased output doubtless will be marked for domestic consumption, the program could lead to greater quantities of tapioca for export—probably at a better price and of better quality—and conceivably with considerable impact on the sturdy, but still relatively small, waxy maize industry in this country.

Research Liaison

Regain of loss to synthetics is stimulated by agriculture's liaison with protective coatings industry

WITH FARM PRODUCTS losing to synthetics in the race to supply the protective coatings industry, interested industries and USDA have moved to reverse the trend. About 65% of the 1.1 billion pounds of vehicle solids going annually into protective coatings still comes from the farm, but the percentage is falling. Industry and agriculture both have a big stake in better coatings. Industry can do applications research. USDA's Agricultural Research Service can supply basic data and ideas. There has been effective liaison for many years, but interested parties in both camps have seen opportunity for improvement. Positive action came in mid-1953 with the formation of the Informal Industry Committee on Protective Coatings. Leaders in this action now believe it is paying off.

The committee has no official ties with USDA. Nor is it officially tied to the National Paint, Varnish and Lacquer Association, whose assistant technical director, Francis Scofield, is presently committee chairman. Besides Scofield, the committee includes five representatives from the paint industry, three from fats and oils processors, and one each from the synthetic resins, floor coverings, and printing inks industries.

The group has met three times, once each at the Northern, Eastern, and Southern Utilization Research Branches of ARS. Each meeting has featured brief, formal papers on pertinent work afoot in ARS and in industry. The December 1954 gathering at the Southern Branch in New Orleans is typical. ARS scientists told of progress in fat-derived plasticizers and in application of countercurrent distribution techniques to linseed oil research. They discussed also new rosin derivatives and Diels-Alder reactions of tung oil. Industry speakers in turn dealt with fundamental colloid and emulsion theory as applied to protective coatings and with recent developments in acrylonitrile type coatings.

Such formal exchanges are perhaps more useful than one might suppose. G. E. Hilbert, director of utilization research of ARS, remarks that he has been surprised at times by the lack of industrial familiarity with ARS work in progress and, in fact, with results already in print. Committee chairman Scofield has noted the same situation. Scofield believes also, however, that improved personal relationships and mutual understanding developed in committee meetings are equally as important as formal exchanges of data.

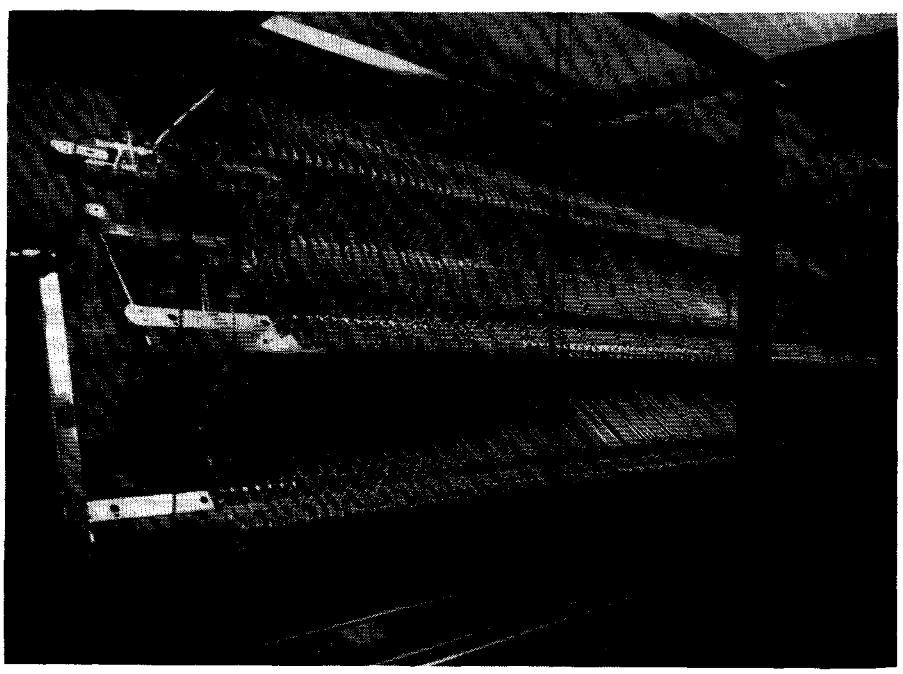
While concrete results cannot be expected from activities of this kind within the short space of a year and a half, some progress can be reported. Scofield believes that copolymers of vinyl stearate and vinyl acetate are much closer to industrial acceptance than they would have been without committee activity. These polymers, developed at the Eastern Branch, are proposed as internal plasticizers for polyvinyl acetate films.

Linseed oil research may yield another early return. The Northern Branch recently obtained an H. O. Post automatic, 200-tube, countercurrent distribution apparatus. Such equipment had not been used to any extent in fats and oils research, a field to which it seemed well adapted. A number of problems were at hand. One was glyceride distribution in linseed oil, an important component in many protective coatings. The Post apparatus was put to work first on linseed oil. The choice was based in part on the importance attached to this problem by the committee. The other contributing factor was the need, in the first experiment, for a suitably complex system with which to assess the resolving power of the new equipment.

Results of this study to date were reviewed by J. C. Cowan of the Northern Branch at the November 1954 meeting of the Federation of Paint and Varnish Production Clubs. Cowan spoke at the committee's invitation. During the past few years, he said, some investigators have questioned the long-held theory that linseed fatty acids are distributed evenly on the glyceryl radical. The Northern Branch work confirms that distribution is not even. It appears rather to approach a random pattern. While the specific value of such data to the coatings industry remains to be seen, Cowan believes that a bigger pool of such basic information on linseed and other oils is quite likely to increase their usefulness to and consumption by that industry.

Industry has definite ideas about USDA research. It is firmly opposed to USDA's doing applications research, feels instead that it should be a source of basic data and ideas. As it happens, USDA has followed this line of its own accord and to good effect. Some polyamide resins, one of many USDA sparked developments, are now used in "gelled" paints and enamels, in glossy coatings for paper, and in heat-sealing resins. Epoxidized oils and esters, used to plasticize vinyl chloride polymers, came out of basic USDA research; they are currently giving dioctyl phthalates a battle. Acetoglycerides, already used in cosmetics, are on the verge of commercial use as edible protective coatings.

The automatic countercurrent distribution instrument recently installed at the Northern Utilization Research Branch, USDA, is making a contribution to the use of agricultural products in protective coatings



News of the Month . . .

INDUSTRY

Grace Chemical's Nitrogen Plant at Memphis on Stream

Grace Chemical officially dedicated its $20 million ammonia and urea plant near Memphis, Tenn., on Jan. 6 and expected the plant to reach top capacity of 250 tons a day of ammonia and 150 tons a day of urea in the near future. The first tank car of ammonia left the plant on Dec. 21 for Swift & Co.

Ammonia, most of which will go to the agricultural market, is to be sold as anhydrous for direct application, as solutions for mixed fertilizers, and as a nitrogen supplement for ruminant feeds. Urea is to be produced in two grades, for fertilizer and feed supplements and for chemical manufacture.

The new plant produces synthesis gas by the Texaco partial oxidation process, ammonia by the Italian Casale process, and urea by the French Pechiney process.

Organized in 1952, Grace Chemical's president is William P. Gage, formerly vice president in charge of Shell Chemical manufacturing; vice presidents are William Haude, former president of Pittsburgh Agricultural Chemical Co.; and Ralph Lulek, former director and vice president of Heyden Chemical. Charles E. Wilson, former president of General Electric, vice chairman of the War Production Board during World War II, and Chairman of the Defense Mobilization Board during the Korean war, joined Grace Chemical as chairman of the board of directors and the parent firm as chairman of the executive committee in 1952. John G. Carriere, who managed engineering and construction of the Hanford Works of AEC, is plant manager.

W. R. Grace, the parent firm of Grace Chemical, has become in a few years the fourth largest producer of mixed fertilizers. Two years ago, the company's only chemical interest was the Naco Fertilizer Co. Since then it has acquired Davison Chemical Co., under which is organized Naco and the recently acquired Thurston Chemical. Grace Chemical and the also recently purchased Dewey & Almy Chemical are the other chemical divisions. W. R. Grace was organized in 1854 in South America as an import-export firm. Some 60 companies now form the Grace organization with interests in ocean shipping, air transportation, trading, banking, and various diversified manufacturing operations in South America. Now it is rapidly expanding its industrial interests in the U. S. J. Peter Grace, president of the parent company, speaking at the dedication ceremonies, said that the company is concentrating its efforts on locating in the South, Southwest, and Far West.

NCI Proceeding with Maine Ammonia Plant

Northern Chemical Industries has announced that plans are now complete for its anhydrous ammonia plant to be built in Searsport, Me. Plans have been under way since the company was awarded a certificate of necessity about a year ago.

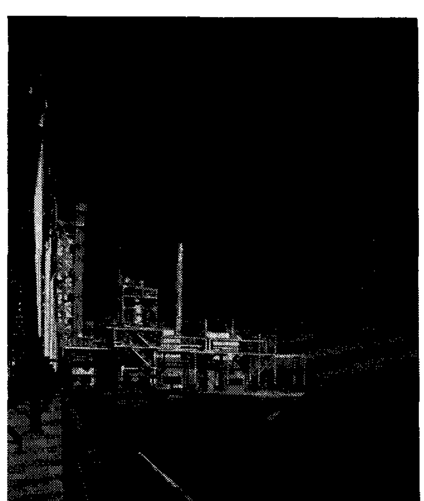
Funds for the $9 million plant are being provided by the sales of first mortgage bonds, subordinated debentures, and common stock.

Northern Chemical Industries, founded in 1943 as an affiliate of Summers Fertilizer Co., will sell about 48% of its rated 43,000 tons of ammonia to the parent company. About 18,000 tons of the ammonia will be used to produce some 32,000 tons of nitrogen solutions for making mixed fertilizers. The remainder will be sold to sulfite pulp producers located close to Searsport, and for general industrial use in New England.

The plant will use the Texaco-Hydrocarbon Research process for producing ammonia synthesis gas from Bunker C fuel oil by partial oxidation with oxygen. The fuel oil will be used as a source of both hydrogen and power.

The 125-ton-per-day ammonia plant will be built by Girdler, as well as the 60-ton-per-day nitric acid plant, the nitrogen solutions plant, and the 7500-kw. power plant.

Although New England soil is not suitable to application of nitrogen as anhydrous, NCI believes that farmers in the area will increase nitrogen usage, via nitrogen solutions and ammonium sulfate, which the company plans to manufacture. Lack of an ammonia plant in New England, and the consequent high cost of nitrogen brought in from Virginia, is thought to have prevented many farmers from making maximum use of nitrogen fertilizer.



View of Grace Chemical's recently dedicated $20 million anhydrous ammonia and urea plant near Memphis, Tenn. The first tank car of ammonia left the plant on Dec. 21 and was assigned to Swift & Co.'s plant food division

USI Dedicates 50,000-Ton NH_3 Plant at Tuscola, Ill.

U. S. Industrial Chemicals dedicated its $7 million ammonia plant at Tuscola, Ill., on Jan. 21 and the first tank car of anhydrous was delivered to Central Illinois Fertilizer Co., distributor in the area around the plant.

USI, a division of National Distillers Products Corp., has a sulfuric acid plant on the site and takes its raw material hydrogen from the National Petro-Chemicals plant, also in Tuscola. Production capacity of the plant is 50,000 tons of ammonia a year, part of which will be used in manufacturing nitric acid, ammonium nitrate, and nitrogen solutions.

Mid-South Building NH_3 Storage-Distribution Center in Memphis

Mid-South Chemical Co. has announced plans to expand its anhydrous ammonia storage facilities at Memphis, Tenn., to provide it with river, rail, and highway distribution facilities. The company has planned a distribution center on an eight-acre site on Presidents Island, off the Memphis river front, with harbor facilities for Mississippi River transportation and truck and rail loading docks.

A specially constructed barge with six pressurized tanks will hold 800 tons of anhydrous. Fifteen 30,000-gallon tanks for storing ammonia will be located on the island. In addition, the company will have 100 railroad tank cars, each capable of holding 25 tons of ammonia.

The additional capacity, plus facilities at 85 other points in six states, gives Mid-South a total storage capacity for ammonia of 12,000 tons (5 million gal-