Ag and Food Interprets . . .

- **Soybean cyst nematode focuses attention on chemical controls**
- **New U. S. plants using European-developed H_3PO_4 processes**
- **Signs point to ending of secrecy about pesticide production**
- **Census of Agriculture reveals significant data on fertilizer use**
- **Customers or competitors? Either way co-ops are important**

Nematode Control

Soybean cyst nematode highlights seriousness of problems involved in nematode control. Pesticide companies pushing hard to find satisfactory chemicals

At Shell's workshop, popular feature was view of live nematodes under microscope

POTENTIALLY a serious threat to the nation's billion dollar soybean crop, the soybean cyst nematode has farmers up in arms in North Carolina, Missouri, and Tennessee. In surrounding states, officials have gone on record generally favoring a Federal quarantine; some urge that it be imposed immediately.

Here's what happened at a USDA public hearing in Washington on Jan. 31:

- North Carolina farmers opposed a Federal quarantine. If one is necessary, they would like a subsidy for not growing host crops (soybeans, snapbeans, vetch, and lespedeza).
- Missouri and Tennessee officials generally favored a Federal quarantine. Incomplete surveys in their states have definitely established presence of the nematode in soybean fields.
- Ohio and Nebraska representatives went on record by letter asking for a quarantine, although the nematode hasn't been found in their states.

Some growers say a quarantine in itself can never solve the problem, will serve only to slow down the spread. Farm machinery is probably the most common means of spreading the nematode. It can also be spread by normal surface drainage, blowing soil, floods, cars driving through fields, man and animals carrying infested soil on their feet, and through any other soil movement. It is unable to move great distances under its own power.

The soybean cyst nematode was first found in the United States in 1954, in North Carolina. There is no reason to believe that it spread from North Carolina to Tennessee (Lake County) and Missouri (Pemiscot County), since the infested areas are more than 800 miles apart. USDA thinks it got here before World War II in a shipment of Easter lilies from Japan.

North Carolina farmers are worried by other states' pressing for a quarantine. Intensive agriculture is practiced in North Carolina's infested area —New Hanover and Pender counties. Farmers there raise flowers and vegetables; they grow soybeans as cover for bulbs. A Federal quarantine any more strict than the one North Carolina officials have already imposed would cause economic hardship in the area.

Missouri entomologists believe use of a three or four year rotation may reduce the nematode's ability to damage a soybean crop. They suggest as an alternate or complement to quarantine that producers in infested areas plant no soybeans on land that has been in soybeans, lespedeza, or common vetch within three years.

But nematode quarantines aren't new. One was imposed on Long Island seed potatoes when the golden nematode invaded the area. If USDA officials now decide a Federal quarantine is necessary to combat the soybean cyst nematode, they will hold further hearings to determine what regulations will be imposed and in which specific areas.

Chemical Treatment Costly

Until 1940 it was believed that most nematodes were harmless; the damage they caused was attributed to "worn out soil." But nematologists have now identified more than a thousand species, and the list of harmful nematodes is growing rapidly. Some species attack only one plant; others attack more than 1700 different plants, including crops, flowers, and trees. Some types will die in a

Some Nematocides That Are Gaining Popularity

Company	Products	Chemicals
Carbide	Mylone	3,5-dimethyltetrahydro-1,3,5,2 H-thiadiazine-2-thione
Dow	Dorlone	1,3-dichloropropene and ethylene dibromide
	Dowfume W-85	ethylene dibromide
	Dowfume MC-2	methyl bromide (2% chloropicrin)
	Fumazone	1,2-dibromo, 3-chloropropane
	Telone	1,3-dichloropropene
Shell	D-D	1,3-dichloropropene and 1,2-dichloropropane and other related chlorinated hydrocarbons
	Nemagon	1,2-dibromo, 3-chloropropane and other halogenated C_3 compounds
Stauffer	Vapam	sodium methyl dithiocarbamate
Virginia-Carolina	VC-13	O-2,4-dichlorophenyl O,O-diethyl phosphorothioate

year in an unplanted field, while others (cyst nematodes) can hibernate in the ground for more than 30 years.

Nematodes destroy an estimated 10% of the nation's crops annually. Until soil fumigation came along, there was no really good method for controlling them other than crop rotation. Even today, farmers have but two choices: starve out the nematodes by removing their food (the crop), or kill them off with chemicals.

Crop rotation isn't without its limitations. There is usually more than one nematode species present in any field. A rotation designed to reduce the population of one is likely to increase the population of another. The limited availability of suitable economic crops, coupled with our lack of knowledge of crop susceptibility, complicates the problem of finding the ideal rotation. The practical answer may be that of combining chemical treatment with crop rotation.

Other nonchemical methods have also been tried, generally without a great deal of success: trap-cropping, development of resistant crop varieties, flooding, and soil sterilization with dry heat, steam heat, and electric currents.

Soil fumigation with chemicals, too, still has a long way to go, but it promises to be the most expedient means of nematode control. At the recent nematology workshop sponsored by Shell in New York, A. L. Taylor of USDA reported that it is not unusual for an application of soil fumigant to increase by 25% the crop value produced by an acre of land. In North Carolina, he said, a nematode-infested acre might produce 1000 lb. of tobacco for a return of $500. Soil fumigation would normally increase output by 250 lb., or $125. This margin of improvement has resulted in an increase of soil fumigation in the Carolinas from nothing 10 years ago to nearly half the 900,000 acres of tobacco in 1956.

But USDA scientists say these treatments are too expensive for most field crops. They recommend that farmers try them on a small scale first before making any substantial investment.

So far there is no soil sample test that will reveal whether enough nematodes are present to make chemical treatment worthwhile, but many growers, especially producers of high-value crops, should investigate the possibilities. Broadcast treatment generally costs from $30 to $50 an acre. For a crop that brings $300 to $500 an acre, a nematocide should be able to raise the crop value by $100 to $150 an acre; otherwise, chemical application may not be worth the expense.

Row treatments cost about half as much as the broadcast method. It may pay farmers to apply nematocides this way for crops selling at $200 an acre. For crops selling at less than $200 an acre, chemical treatment must generally be considered with doubt, although in some instances chemical treatment has proved profitable even on low-value crops.

In the past year or so, many chemical companies have come to realize that no single compound will control all nematodes. The odds favor development of compound formulations of the various nematocides, the way in which insecticides developed.

Some people, too, are finding it difficult to "separate" nematodes from fungi and other soil diseases. There may even be a relationship between nematodes and fungus diseases. Compounds that control both nematodes and fungi hold a great deal of promise.

Already a number of companies have nematocides on the market. Stauffer has enjoyed a good deal of commercial success with its Vapam for seed beds, tobacco, ornamentals, nursery stock, and other uses. Shell, with D-D well established, has introduced Nemago, which can be used on certain growing plants. It has found ready acceptance among vineyardists in California, where it has given promising results against slow decline.

Recently Carbide announced that Crag Brand Mylone is now being used experimentally on nursery stock, tobacco, vegetables, and some flowers. It has been applied commercially on gladiolus. Formerly called fungicide 974, Mylone controls weeds, nematodes, and several diseases.

Late in January, FDA granted registration to Virginia-Carolina's nonfumigant nematocide (VC-13 Nemacide) for use on corn, cucumbers, peppers, strawberries, and tomatoes. VC-13 provides residual control (up to three years in some cases). First introduced commercially about three years ago, it is nonphytotoxic to most plants—safe and effective for control of nematodes attacking turf, bulbs, ornamentals, potted plants, and trees.

Effectiveness of 1,3-dichloropene against some nematodes, and of ethylene dibromide against others, led Dow into marketing a new product, Dorlone. The mixture will become Dow's general purpose nematocide, a fumigant that can be applied wherever ethylene dibromide has been registered. Dorlone was sold experimentally last year in North Carolina for tobacco only, but it will be marketed widely in 1957.

Dow and Shell both market products containing 1,2-dibromo, 3-chloropropane, a promising new nematocidal fumigant. So far, Dow's sales are confined to the West only. Dow officials say chloropicrin, an old standby, gained sharply in use in California last year on strawberries.

Meanwhile, research efforts are progressing at a fast clip. Olin Mathieson's laboratory at Port Jefferson, Long Island, has screening work under way on three types of compounds for nematode control.

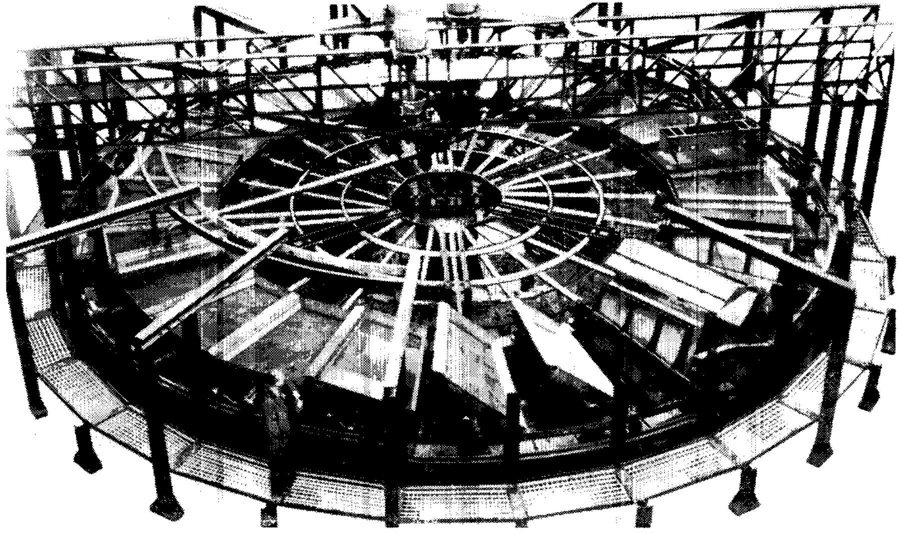
Stauffer, with research and development programs in New York and California, has several promising compounds said to be between the laboratory and commercial production stage, or at least near experimental production. Stauffer researchers are shooting at the tobacco market. Many others have research in progress.

Significant developments are shaping up in the direction of less phytotoxic nematocides, use of granular carriers for liquid fumigants, new application ideas, and more formulations containing several nematocides.

As any salesman can testify, things are moving fast, and "the field is getting highly competitive."

New Look in Phosphoric Acid

The Prayon and St. Gobain processes for H_3PO_4 gain foothold on this side of the Atlantic, with five plants operating or building



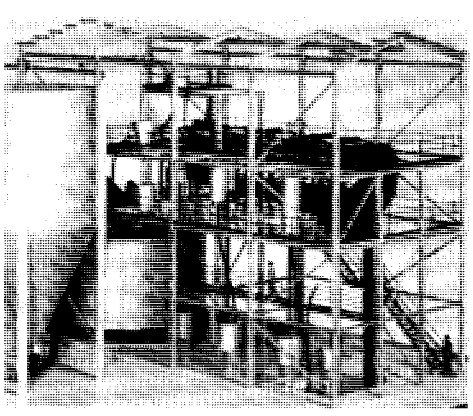
Rotating, pan-type filter is one of main parts of Prayon process for H_3PO_4

WET PROCESS phosphoric acid manufacture is taking on a new look—a European one. The Prayon and St. Gobain processes have both raised a great deal of interest as possible avenues to cheaper and more trouble free phosphoric acid production.

The trend toward Prayon process phosphoric acid for fertilizer manufacture appears to be getting stronger, with U. S. Industrial Chemicals now on stream at its Tuscola, Ill., plant. Ozark-Mahoning in Tulsa is currently constructing a Prayon plant, also expected to go on stream during the first half of this year. Already operating since 1953 is a unit at Smith-Douglass in Streator, Ill.

And while Prayon phosphoric acid is getting a good try, Northwest Nitro (Ltd.) has set up the first plant on this side of the Atlantic to use the St. Gobain phosphoric acid method in fertilizer manufacture. Northwest Nitro was organized by American and Canadian companies and is operated by Commercial Solvents, which holds a large interest in Nitro. The plant is at Medicine Hat, Alberta. A second St. Gobain phosphoric acid installation is under way at Coastal Chemical in Pascagoula, Miss. (AG AND FOOD, November 1956, page 901). Scheduled to go on stream late this year, the Coastal plant is designed to produce 70 tons of P_2O_5 per day from 75 BPL Florida rock.

Model of St. Gobain phosphoric acid unit. Large vessel in foreground is ground rock charge hopper



Both the Prayon and St. Gobain processes are claimed to diminish some of the operating difficulties in phosphoric acid production. Lower operating costs and decreased maintenance requirements are other benefits.

Process Differences

The Prayon process—developed in Belgium more than 10 years ago by the Société Anonyme Métallurgique de Prayon—consists of the three major operations involved in wet process phosphoric acid production: phosphate rock attack, filtration, and concentration. Key to the process is the design of the filter and concentrator. After phosphate rock is digested with sulfuric acid, the slurry is filtered by a continuous horizontal rotating vacuum filter made up of a series of filter pans. The pans are filled automatically as they rotate, the filter cake is washed three times, the pans tip over to dump the cake, and the filter cloths are washed and sucked dry. Filtrates and washes are recycled to the attack tanks to build up P_2O_5 content to about 30 to 32% (41 to 44% H_3PO_4).

The concentrator is a tower with hot gases running countercurrent to a downward spray of phosphoric acid. Acid entering the tower is concentrated from 30 to 50% P_2O_5 content.

In the St. Gobain process (by Manufacture des Glaces et Produits Chimiques de Saint Gobain of France, and Union Chimique Belge) a single-stage ore digester makes the difference. Claims are that this aspect makes for lower initial and operating costs because fewer and smaller pieces of equipment are needed. In rock preparation no calcining is required, whereas the Prayon process requires calcination of some types of rock.

Both processes claim additional advantages, including:

- Easy filterability of gypsum crystals during the phosphate rock attack stage.
- Successful application to many types of rock, including high grade materials such as Florida pebble phosphate, as well as rock with a high organic content.

A single Prayon unit (a large plant can be arranged as multiples of single units) can handle 90 tons of P_2O_5 daily in a two-vat, six-stage attack section, 180 tons on the filter, and 100 tons in the tower. Maximum capacity of a St. Gobain unit is 90 tons of P_2O_5 per day. The Medicine Hat plant is made up of two independent phosphoric acid units, each capable of producing 65 tons of P_2O_5 daily from 72 BPL Idaho rock.

Chemical & Industrial Corp., most recent American entry as a Prayon plant builder, estimates that one Prayon unit costs slightly over \$1.5 million. Without a concentrating tower, the cost is under \$1 million. The three existing American plants were handled from design to start-up by Singmaster-Breyer. The St. Gobain process is available in this country through Fluor.

Four of the five European type plants are parts of fertilizer operations in their respective locations, and the fifth, that of USI, will supply acid to other plants which manufacture fertilizers. USI has a complete unit including the tower, with a rated annual capacity of about 60,000 tons of 75% phosphoric acid. Smith-Douglass' three-year-old Prayon unit —which does not have a concentrator— produces acid containing 30 to 32% P_2O_5. Ozark-Mahoning is not installing a concentrating tower but will use a submerged combustion evaporator to concentrate the acid. Northwest Nitro's St. Gobain plant is part of a fertilizer works costing more than \$20 million, and the Coastal Chemical unit will be part of an integrated set-up for high-analysis mixtures.

Pesticide Statistics

Is secrecy about production figures worth it? Until recently the industry has answered yes, but there are signs it is reconsidering

Anyone who wants to get acquainted with the pesticide industry soon runs into the statistical barrier—a frustrating experience for one accustomed to the readily available statistics that give an accurate picture of past performance for most other industries.

Beyond such general facts as the yearly $250-million sales of pesticidal chemicals and the estimated $13-billion agricultural loss each year to pests, there are very few statistics available today that will tell the whole story on a given pesticide. If production figures for an individual pesticide are available, chances are that export figures are missing or incomplete. Result: It is almost impossible to calculate accurately United States consumption of a given product.

For many pesticides there are no production figures available at all. One reason for this is that for many individual pesticides there is only a single producing company. Under these circumstances, many manufacturers refuse to divulge figures on production, shipments, or sales.

In this highly competitive business, each manufacturer is constantly checking on his competition. As a result, industry spokesmen say, each manufacturer has on hand what he considers to be reliable, up-to-date figures on what his competitors are doing. At the same time, each manufacturer appears to believe that his competitors have no information on his own activities. This belief may account for the refusal of many pesticide manufacturers to reveal information on their operations.

Government statistics, usually a prime source of information, furnish only an incomplete picture of the pesticide industry. Besides, the data are scattered among a number of agencies. For example, statistics on inorganic pesticides, such as arsenates, are published by the Bureau of the Census. For some old standbys, such as copper sulfate, statistics are published by the Bureau of Mines. Statistics on organic pesticides are compiled and published by the U. S. Tariff Commission.

However, the government statistics that are published are inadequate in many ways. Some of the inadequacies stem from the rules under which Government operates. For example, unless there are three or more principal manufacturers of a class of compounds, no statistics on the class of compounds can be published. This eliminates from separate classifications all pesticides that are produced by only one or two manufacturers.

In other cases, individual statistics will not be published unless the dollar value of a group of compounds exceeds a certain amount. Unfortunately, the dollar value of many groups of pesticides, when they can be classed in groups, is not above this minimum.

To make things more uncertain, some chemicals for which figures are available have a number of applications other than as pesticides. Yet, the published data give no information on amounts for various end uses. Take the field of grain fumigants, for example. Figures are available for total production of such chemicals as carbon tetrachloride, carbon disulfide, and ethylene dibromide. But the amounts of these compounds used as fumigants are only unknown fractions of the totals. Five different men conducting market surveys on fumigants would probably come up with five markedly different answers.

Correlation Attempt by USDA

At USDA, the Commodity Stabilization Service attempts to correlate pesticide statistics. Here all the government statistics are brought together in one place. In addition, some manufacturers furnish data on production and export that can be integrated into the other statistics. This additional information is furnished on an informal, voluntary basis. USDA says more of this kind of information is coming in each year.

But, although this additional information broadens the statistical base somewhat, the same governmental limitations on publishing the information still apply. Classes of pesticide compounds must be arranged so that figures on individual manufacturers are not revealed. For example, although total production figures for a group of chlorinated hydrocarbon derivatives, including such compounds as toxaphene and aldrin, can be published, these figures are of little help in trying to arrive at production figures for individual compounds.

How can the pesticide industry get better statistics? There is no simple answer to this question. Several committees of the Advisory Council on Federal Reports are actively working on ways to improve government pesticide statistics. These groups are not seeking to expand government collection of statistics, but are attempting through classification changes to make current statistics more useful to industry.

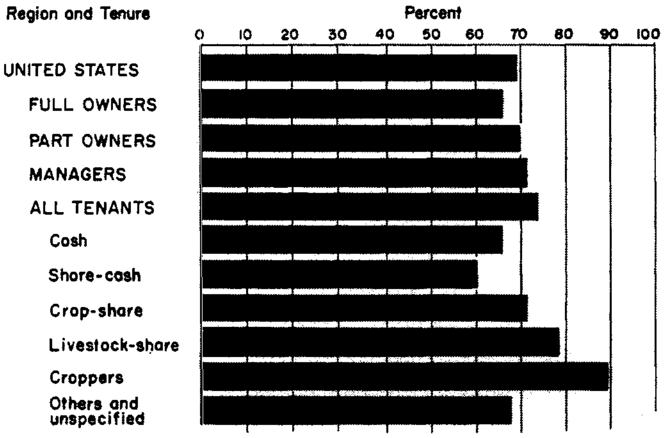
The suggestion has been made that a central organization in which industry could place confidence be established to gather and publish pesticide statistics. This group might be a government agency, a trade association, or a separate institute. That this approach is feasible is shown by the detailed statistics on the wood preserving industry published cooperatively by USDA's Forest Service and the American Wood Preservers' Association. But unless secrecy loses its charm, this type of organization does not appear practical for the pesticide industry.

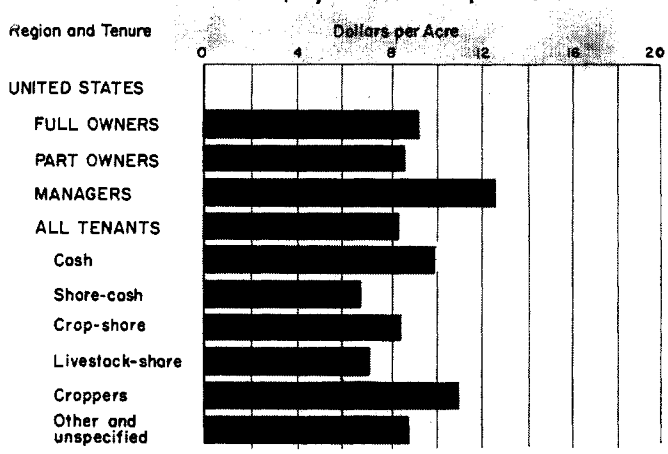
For the long term, it seems unlikely that pesticide statistics will improve markedly until the need to know outweighs the present belief in secrecy. A process of change in this direction is going on now, but it is far from complete. It may accelerate if present "spying" and "security" practices become too unreliable to provide a basis for planning. Perhaps the trend toward more complexity in the industry, brought about by addition of new products and more competition, will help to impress upon individual members of the industry the need for more accurate data about the whole industry. A need to know should stimulate a mood to tell.

Farm Use of Fertilizer

Census of Agriculture reveals 25% of acreage was fertilized in 1954. Top fertilizer customer is corn

About 60% of U. S. farms received some application of fertilizer in 1954. But only 25.6% of the total cropland and improved pasture received fertilizer in 1954, which was the peak year for fertilizer sales. Farmers payed $8.79 for the average of 309 pounds they applied to each of those acres.





These figures come from the 1954 Census of Agriculture, now available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. The report on use of fertilizer and lime (Volume III, Part 10) costs $1.75.

With data from the report, the fertilizer industry should be in a good position to make accurate evaluations of its present sales efficiency and its future potential. For instance, considering acreage alone, the Census data would indicate that the potential is four times the industry's present sales. Add to that the fact that farmers on the average apply less plant food than agronomists recommend, and it becomes apparent that the growth potential is tremendous.

Farmers spent a total of $1079 million for fertilizer in 1954. (The Census data do not include totals for basic slag, dried manures, secondary and trace elements, nor plant food sold for nonfarm uses. Thus, Census data run about 15% lower than those in the annual Scholl-Wallace-Fox reports issued by USDA.)

During the period since 1944, the year of the previous Census which took fertilizer information, expenditures for fertilizer have nearly doubled. Greatest growth in fertilizer expenditure was experienced in the West North Central States, which increased their purchases of fertilizer by a factor of 11—from about $14 million to over $162.7 million.

Comparing crops as consumers, the Census found that corn was the top fertilizer customer. Corn consumed over 6 million tons, nearly one third of the total fertilizer used in the U. S. About a third of that 6 million tons was applied to corn grown in the Corn Belt, although only half of the corn acreage in that area received any application of plant food.

Top crop in terms of percentage of acreage fertilized and intensity of application per acre was tobacco. Almost all of the tobacco acreage—97%—was fertilized. The average rate per acre fertilized was 1347 pounds.

Fruits, vegetables, and potatoes ran a fair second. Those crops consumed a total of 2.7 million tons, with 68% of the acreage devoted to those crops receiving some fertilizer. Average amount used per acre treated was 850 pounds.

Breaking down the data by generalized type-of-farming areas, the Census Bureau finds the cotton area on top—with 4.4 million tons. But in terms of amount applied per acre, the tobacco area was on top with 563 pounds applied per acre fertilized.

North Carolina farmers used more fertilizer—in tons and in dollar value—than those of any other state. Their total was 1.4 million tons worth $69.5 million. California growers ran them a close second in dollar value however, paying $63 million for the 814,742 tons they used. In value of fertilizer applied per acre fertilized, California outranked North Carolina—$16.26 vs. $14.25—and the rest of the nation. In one area of California, fertilizer costs averaged $33 an acre. These differences between California and North Carolina reflect the greater use of higher analysis materials in the western state.

The Census also turns up interesting correlations between the use of fertilizer and the economic class of farm. Class I farms (those registering $25,000 or more in gross value of products sold) represent only 3% of the total number of U. S. farms; yet they applied nearly 25% of total fertilizer used in the U. S. They applied 361 pounds of plant food for every acre fertilized, at a cost of $11.60 per acre. Class I and II farms together (those that sold $10,000 worth or more) consumed 43% of the total U. S. fertilizer, and accounted for 43% of the total U. S. acreage fertilized and 46% of the total dollar value of fertilizer sold. These two classes of farms are 12% of the total number of farms, but they produce nearly 60% of the total dollar value of farm products.

The patterns that show up when comparisons are made between use of fertilizer and type of tenure of the farm operator seem to give the lie to the oft-heard comment that the most efficient farmer is the man who owns his own land. If fertilizer use can be considered as an index of efficiency, then managers, croppers, and cash tenants are the more efficient farmers, for those groups all used more plant food per acre than did owners or part owners (see graph).

Irrigation and Fertilizer Use

Irrigated farms tend to use more fertilizer than do nonirrigated farms. For the 20 states (17 in the West plus Arkansas, Louisiana, and Florida) in which irrigation questions were asked, those farms that were irrigated received fertilizer on an average of 7.5% of the total acreage, using 349 pounds per acre fertilized. Nonirrigated farms in the same states, on the other hand, were fertilized to the extent of only 4.8% of their total acreage, with 205 pounds of plant food per acre. However, there was wide variation in plant food use throughout the 20 states. In one area of Florida, for instance, 90% of the acreage on irrigated farms was fertilized at an average rate of 1636 pounds per acre. And in one area of Colorado, irrigated farms received fertilizer on only 0.3% of the total acres.

Only 2.2% of the total farm acreage received any lime in 1954. Total use was about 17.3 million tons, double the use in 1939, but considerably below the peak of 1947. Total expenditure was $69.5 million.

Farm Co-Ops

Like corporate industry, co-ops consolidate and diversify. In 1954-55, they did nearly 25% of the nation's business in fertilizers and pesticides

THE TREND toward greater volume achieved by fewer units in the agricultural industry is not restricted to farming itself. Farm cooperatives, too, appear to be increasing in size while decreasing in number, in the drive for more efficient—and hence more profitable—operation.

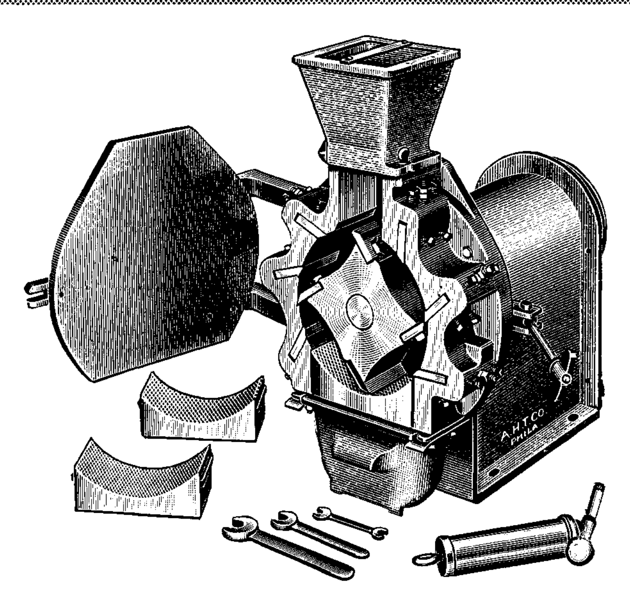
Two years ago (January, 1955), AG AND FOOD reported in a survey on co-op activities and attitudes that the co-ops themselves anticipated increasing size and diversification paralleling those of corporate industry. The latest annual survey by the USDA's Farmer Cooperative Service indicates these expectations are being realized.

The total number of co-ops has been sliding almost without interruption since the peak year 1930–31, when approximately 12,000 were in business. By 1954–55, the latest year for which statistics are available, the total was down to 9887. By contrast the total volume of business transacted by co-ops (including receipts from marketing, purchasing, and service functions) has risen during the same period from slightly over $2 billion in 1930–31 to $9.6 billion in 1954–55.

Estimated Business of Farm Cooperatives in 1954-55[a]

Item	Number of co-operatives	Gross business ($1,000)	Net business[b] ($1,000)
Products marketed for patrons:			
Beans and peas (dry edible)	68	38,939	32,242
Cotton and cotton products	533	452,833	394,874
Dairy products	1,968	2,862,961	2,384,889
Fruits and vegetables	751	1,031,411	680,330
Grain, soybeans, soybean meal and oil	2,677	2,338,457	1,567,716
Livestock and livestock products	600	1,443,283	1,316,754
Nuts	83	80,481	46,273
Poultry products	651	393,935	343,026
Rice	62	174,582	140,182
Sugar products	62	132,278	132,278
Tobacco	33	216,946	216,946
Wool and mohair	290	31,767	29,039
Miscellaneous	260	99,901	93,376
TOTAL FARM PRODUCTS	7,098[c]	9,297,774	7,377,925
Supplies purchased for patrons:			
Building material	1,457	99,901	67,255
Containers	1,114	50,281	22,640
Farm machinery and equipment	1,776	93,595	64,773
Feed	4,292	1,071,155	807,420
Fertilizer	3,810	396,877	249,898
Meats and groceries	921	53,716	46,374
Petroleum products	2,681	731,210	465,668
Seed	3,556	139,017	99,683
Sprays and dusts (farm chemicals)	1,874	44,731	31,857
Other supplies	4,311	239,613	164,286
TOTAL FARM SUPPLIES	7,208[c]	2,920,096	2,019,854
Receipts for services:			
Trucking, cotton ginning, storage, grinding, locker plants, miscellaneous	4,802[c]	195,479[d]	195,479[d]
TOTAL BUSINESS	9,887[c]	12,413,349	9,593,258

[a] Preliminary.
[b] Does not include business between cooperatives.
[c] Adjusted for duplication arising from multiple activities performed by many cooperatives.
[d] Charges for services in which no duplication occurs.



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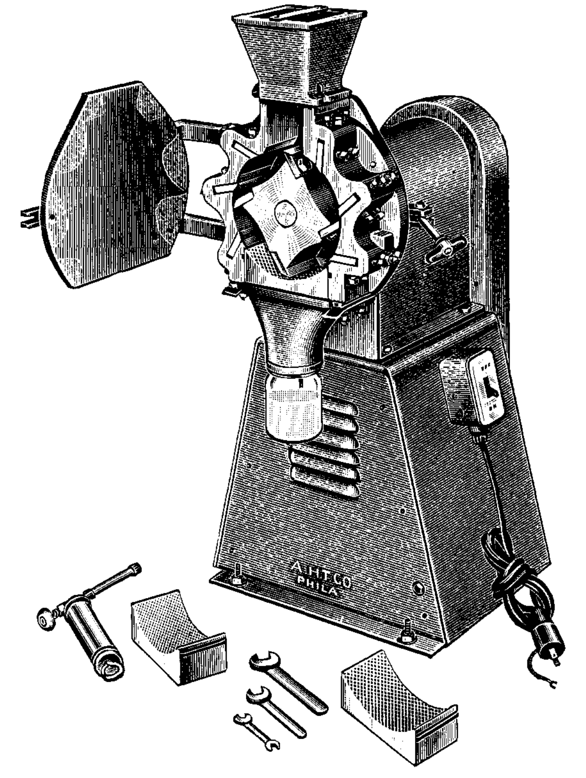

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New Standard Model No. 3

WILEY LABORATORY MILL

Wider range of use . . . ***Quieter operation . . .*** ***Increased safety . . .***

For the preparation, with minimal loss of moisture from heating, of a wide variety of materials for laboratory analysis. Principal advantages of new Model No. 3 are: harder cutting edges on the knives, making it suitable for a broader range of materials, including Teflon, polyethylene resins, etc.; quieter performance with less vibration; greater safety because of enclosed moving parts and latest U.L. approved wiring; greater ease of installation and maintenance; and improved appearance, i.e. Hammertone gray enamel with parts subject to abrasion chromium plated.

As in the earlier model, four hardened steel knives on a revolving shaft work with a shearing action against six knives bolted into the frame. The shearing action of the cutting edges, between which there is always a clearance, tends to avoid changes in the sample such as temperature rise, loss of moisture, liquefaction, contamination, etc., making this mill satisfactory for many materials which can not be reduced by other mechanical means. A sieve is dovetailed into the frame so that none of the material comes from the grinding chamber until it can pass through the mesh.

Furnished with interchangeable receivers, i.e. either a deep, cast aluminum drawer with rounded inner corners, 28 oz. capacity, or a chute for collecting the sample directly in a standard screw neck glass jar, 16 oz. capacity, or in a bag, table drawer, etc. Either receiver slides into a new, spring-loaded holding device which is adjustable for tight closure against bottom of grinding chamber to prevent loss of sample. Mill without motor or base is 21 inches high and occupies table space $14\frac{1}{2}$ x 19 inches. Motor driven model is mounted on enclosed base $16\frac{1}{4}$ inches high.

4274-T. Wiley Laboratory Mill, Standard Model No. 3, with chute as shown in illustration of 4275-H3, three 1-pint glass jars with metal caps, and three sieves of 0.5 mm, 1 mm and 2 mm mesh, respectively. With pulley for V-belt, set of wrenches for adjusting knives, gun-type grease injector with 1 lb. of lubricant, but without drawer or motor. . **576.50**

4274-V. Ditto, but with drawer in place of chute and glass jars; without motor or base. **567.00**

4275-H3. Wiley Laboratory Mill, Standard Model No. 3, identical with 4274-T, i.e., with chute, but complete with $\frac{1}{2}$ h.p. motor with starting switch and thermal overload cutout, $\frac{1}{2}$ inch V-belt and belt guard, mounted on enclosed base. For 115 volts, 60 cycles, single phase a.c. **886.00**

4275-R3. Ditto, but with drawer in place of chute and glass jars. **876.50**

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It is noteworthy that the entire decrease in the actual number of cooperatives has occurred among those devoted to marketing; the number of purchasing co-ops active in the U. S. has been increasing fairly regularly for over 30 years. Both groups, however, have—with minor fluctuations—registered steady growth in the dollar volume of business transacted. Purchasing co-ops account for about one-fifth of the total annual volume.

As in corporate industry, mergers and consolidation have been frequent among co-ops during the last decade. The trend toward consolidation, in fact, accounts almost entirely for the decrease in number of cooperatives.

Between the years 1953–54 and 1954–55, the number of individual farmer memberships in cooperatives slipped almost imperceptibly (less than 0.1%), from 7,607,660 to 7,602,140. In view of the much more rapid decrease in number of farms, averaging more than 2% yearly since 1950, it is evident that cooperatives are actually becoming more, rather than less, popular. Bigger and better co-ops, it appears, go hand in hand with bigger and better farms. Indeed, much of the reason for co-op growth has been the need of farm operators to reduce costs.

The East North Central states led all other regions in dollar volume of co-op business in 1954–55, with a net total of slightly under $2.5 billion. In number of cooperatives, this region —with 2026—ranked second to the West North Central. The latter's 3890 co-ops did a net business of over $2.4 billion, running a close second in dollar volume. Among individual states, California placed first in dollar volume ($829 million), and Minnesota second ($645 million). Minnesota led in number of cooperatives (1296).

That the fertilizer and pesticide industries have a vital interest in the performance of farm co-ops, particularly those in the purchasing category, is clearly indicated in the table. The $250 million worth of fertilizer supplies purchased by co-ops for their patrons represents a hefty chunk—roughly a quarter—of the nation's total. And the $31.9 million expended for sprays, dusts, and other farm chemicals, while perhaps a smaller fraction of the total pie, still constitutes a sizable portion.

Arguments concerning tax advantages of co-ops continue, and are likely to for some time. The fact remains that co-ops are important to private industry's manufacturers of chemicals for agriculture, whether as customers or as competitors.