

TRENDS IN FERTILIZER

Production and Marketing

Big nitrogen increases, a rise in superphosphates, harder competition, and changes in fertilizer types are all important factors in the fertilizer industry today. AG AND FOOD's staff has conducted a coast-to-coast survey of facts and opinion to see just what the trends and thinking are

CONSUMPTION of commercial fertilizers in the United States continued its increase last year according to the annual USDA report, "Commercial Fertilizer Consumption in the United States" by Scholl, Wallace, and Fox. The total in the United States, Hawaii, Puerto Rico, and Alaska for the year ending June 30, 1953, amounted to 23,412,608 tons. This represented an increase of 4.4% over the 1951-52 season. The consumption of primary plant food elements included increased almost twice that for total tonnage of fertilizer. For the 1952-53 season, a total of 5,648,016 tons of primary nutrients was consumed. This was 8.6% more than the consumption for the previous fertilizer year. In some regions, however, particularly New England and South Central total consumption was down from last year. Percentage increases

were highest in the West North Central region, followed by the East North Central, the Mountain, and the Pacific regions, in that order. In the South Atlantic region, where the largest tonnage of primary nutrient fertilizers is used, increases in consumption have grown smaller during the past three years. The consumption of mixed fertilizers increased by 4.2%, about the same as the over-all consumption. The trend toward high-analysis fertilizers has continued. The averages for last year were: nitrogen 4.63, available P_2O_5 11.34, and K_2O 9.88%. Respective figures last year were 4.30, 11.14, and 9.42.

Among the more important basic trends for the future have been a strong increase in nitrogen production capacity over the country and a sharp growth in triple superphosphate production capacity.

Possibility of Overexpansion Worries Nitrogen Industry

THE FIRST HALF of this year has been a fast-moving one for the nitrogen industry. One by one the new nitrogen plants, started during the guns-and-butter mobilization of the Korean war, have been coming on stream and more are due for completion as the year goes on. Meanwhile, the Government raised its sights for the nitrogen industry and proposed a new and higher capacity goal of 3.5 million tons for Jan. 1, 1957. Under its new goal the government has issued certificates of necessity (see page 603) for rapid write offs of still more plants—an increase in capacity of another 278,000 tons of nitrogen a year. Already producing or about to produce at the rate of over 3.1 million tons a year, many factors in the industry are frankly worried that nitrogen may be headed for the troubles of overexpansion.

During the past few months, rumors and announcements of plans to build synthetic nitrogen plants have been coming out at the rate of one or two a week—a pace that most observers were a little hard put to keep up-to-date with. With the granting and denial of certificates of necessity at the end of last month, the situation may begin to lose some of its confusion—some of the plans, especially those for which certificates were denied, will undoubtedly be dropped. Some of those for which certificates were granted may also be dropped, for the application for a certificate requires only a declaration of intent to build and does not necessarily mean that plans are firm. Some proposed plants have already been dropped, notably Monsanto project for Texas City.

In the last six months, the synthetic ammonia plants that have come on stream make an impressive list. They include: Shell Chemical at Ventura, Calif.; Brea Chemicals at Brea, Calif.; Pennsalt expansion at Wyandotte, Mich.; Allied Chemical at La Platte, Neb.; and Lion Oil at Luling, La. Those expected to come on stream this year are: American Cyanamid at Fortier, La.; Atlantic Refining at Point Breeze, Pa.; Coop Farm Chemicals at Lawrence, Kans.; Deere at Pryor, Okla.; Grace Chemical at Memphis, Tenn.; Hooker Electrochemical's expansion at Tacoma, Wash.; Mississippi Chemical expansion at Yazoo City, Miss.; Phillips Chemical at Houston, Tex.; and San Jacinto Chemical expansion at San Jacinto, Tex.

In the nitrogen picture, the West presents one of the most interesting facets. That area, long nitrogen hungry, seems to be catching up with demand. Two plants have gone on stream in California in the past six months and the recently granted certificates of necessity promise the 11 western states with four more.

Added to these is the expansion of ammonia capacity at Calgary, Alta., by Cominco, which already supplies a

very substantial majority of the basic fertilizer chemicals for the Pacific Northwest. Cominco may move part of its ammonia as anhydrous into the Pacific Northwest, marking the company's first entry into the U. S. anhydrous field.

One of the companies granted a cer-

Synthetic Nitrogen Plants in Place, Under Construction, and Proposed
Tons NH₃/Yr.

	Tons NH ₃ /Yr.			Total Tons N per Yr.
	Present	Under Con- struction	Proposed	
West Coast				
Hooker Electrochemical Co.				
Tacoma, Wash.	22,000			18,000
Hercules Powder Co., Pinole, Calif.	50,000			41,000
Shell Chemical Co.				
Shell Point, Calif.	109,500			90,000
Ventura, Calif.	65,000			53,000
Dow Chemical, Pittsburgh, Calif.	7,320			6,000
Brea Chemicals (Union Oil)				
Brea, Calif.	86,000			70,500
Columbia River Chemicals, Inc.				
Pasco, Wash.		53,500		52,000
Utah Chemical Co.				
Mount Pleasant, Utah		94,000		77,000
Midcontinent and South				
Allied Chemical & Dye Corp.				
La Platte, Neb.	75,640			62,000
Coop Farm Chemicals				
Lawrence, Kans.		63,440		52,000
Spencer Chemical				
Pittsburgh, Kans.	178,000			45,000
Henderson, Ky.	79,000			65,000
Vicksburgh, Miss.	72,000			59,000
Phillips Chemical Co.				
Etter, Tex.	154,000			126,000
Port Adams, Tex.	156,160			128,000
Bureau of Mines, Louisiana, Mo.	36,000 (not operating)			28,100
Missouri Ordnance Works (owned by Hercules)				
Louisiana, Mo.	42,000			34,400
Deere & Co., Pryor, Okla.		65,880		54,000
Grace Chemical, Memphis, Tenn.		87,840		72,000
TVA, Muscle Shoals, Ala.	91,500			74,000
Alabama By-Products and Hercules Powder, Tarrant, Ala.			45,000	38,900
Lion Oil Co., El Dorado, Ark.	207,400			170,000
Luling, La.	107,360			88,000
Mississippi Chemical Co.				
Yazoo City, Miss.	43,600	22,400		54,000
Commercial Solvents Corp.				
Sterlington, La.	135,000			110,000
Dow Chemical Co.				
Freeport, Tex.	35,380		35,380	58,000
Midland, Mich.	Unrevealed			
Mathieson Chemical				
Lake Charles, La.	69,000	69,000		84,000
San Jacinto Chemical Corp.				
Houston, Tex.	27,000	10,000		30,000
American Cyanamid Co.				
New Orleans, La.		109,000		90,000
Pennsylvania Salt Mfg. Co.				
Wyandotte, Mich.	31,350			26,000
Allied Chemical & Dye				
South Point, Ohio	285,480			234,000
National Distillers Products Corp.				
Tuscola, Ill.		50,000		41,000
Mississippi River Fuel Corp.				
Crystal City, Ill.			66,000	54,000
East Coast				
Du Pont Co.				
Niagara Falls, N. Y.	9,800			8,000
Belle, W. Va.	231,800			190,000
Mathieson Chemical				
Niagara Falls, N. Y.	6,100			5,000
Morgantown, W. Va.	188,000			154,000
Allied Chemical & Dye				
Hopewell, Va.	350,000		50,000	328,000
Columbia-Southern Chemical Corp.				
Natrium, W. Va.		33,000		27,000
Atlantic Refining Co.				
Point Breeze, Pa.		33,000		27,000
Northern Chemical Industries				
Searsport, Me.	52,400			43,000

tificate is Columbia River Chemicals, which plans to make ammonia, ammonium sulfate, and urea at Pasco, Wash. The urea will mark its first volume production for western fertilizer markets. Cominco has also been taking a sharp look at urea, investigating processes at its own plants and in Europe and Japan.

Many people in the West are definitely dubious about the two plants being discussed for Utah—Utah Chemical, which has been granted a certificate of necessity, and Salt Lake City Chemical. Like many another project in the West, these two have seemingly stumbled on the natural gas hurdle. The principal natural gas utility in the area, Mountain Fuel Supply, says it has allocated as large a percentage of its capacity, even on an interruptible basis, as it feels is wise and will not guarantee supplies for any users at the present time. The future depends entirely on what expansions it is able to effect as a result of explorations now underway. Couple this natural gas hurdle with the double-barreled boost in ammonia by Shell and Brea in southern California and planned

production in the Northwest by Cominco and Columbia River Chemicals, and most fertilizer men want long odds before betting on either project. This view is apparently shared by Monsanto, which caused a flurry earlier this year with an expression of interest in Utah Chemical, but has since apparently dropped them.

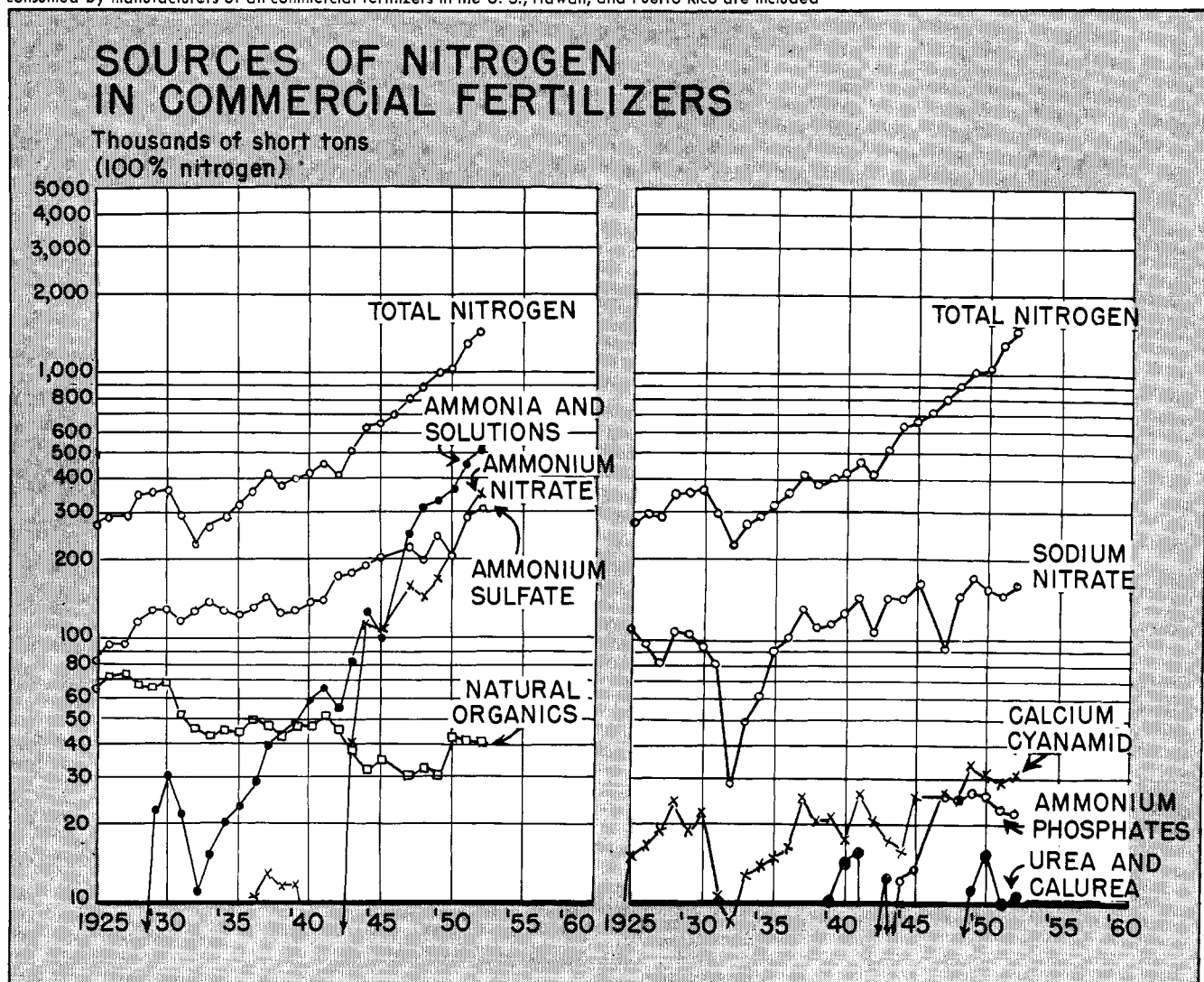
On the matter of nitrogen expansion, most people interviewed were definitely concerned. Some were openly quite pessimistic; some were worried but hopeful. That U. S. farms could use that much nitrogen no one doubts; but the real problem is will the U. S. farmers buy that much nitrogen. As one spokesman put it: "The key man in the nitrogen picture is not a representative of a government agency or an industry leader. The farmer alone is in the driver's seat. If he used the amount of nitrogen that USDA recommends, there probably would be no danger of a surplus. But the farmer currently is using only about half this much. What he decides in the future may well decide the fate of the new nitrogen plants."

Consensus among Southwest fertilizer

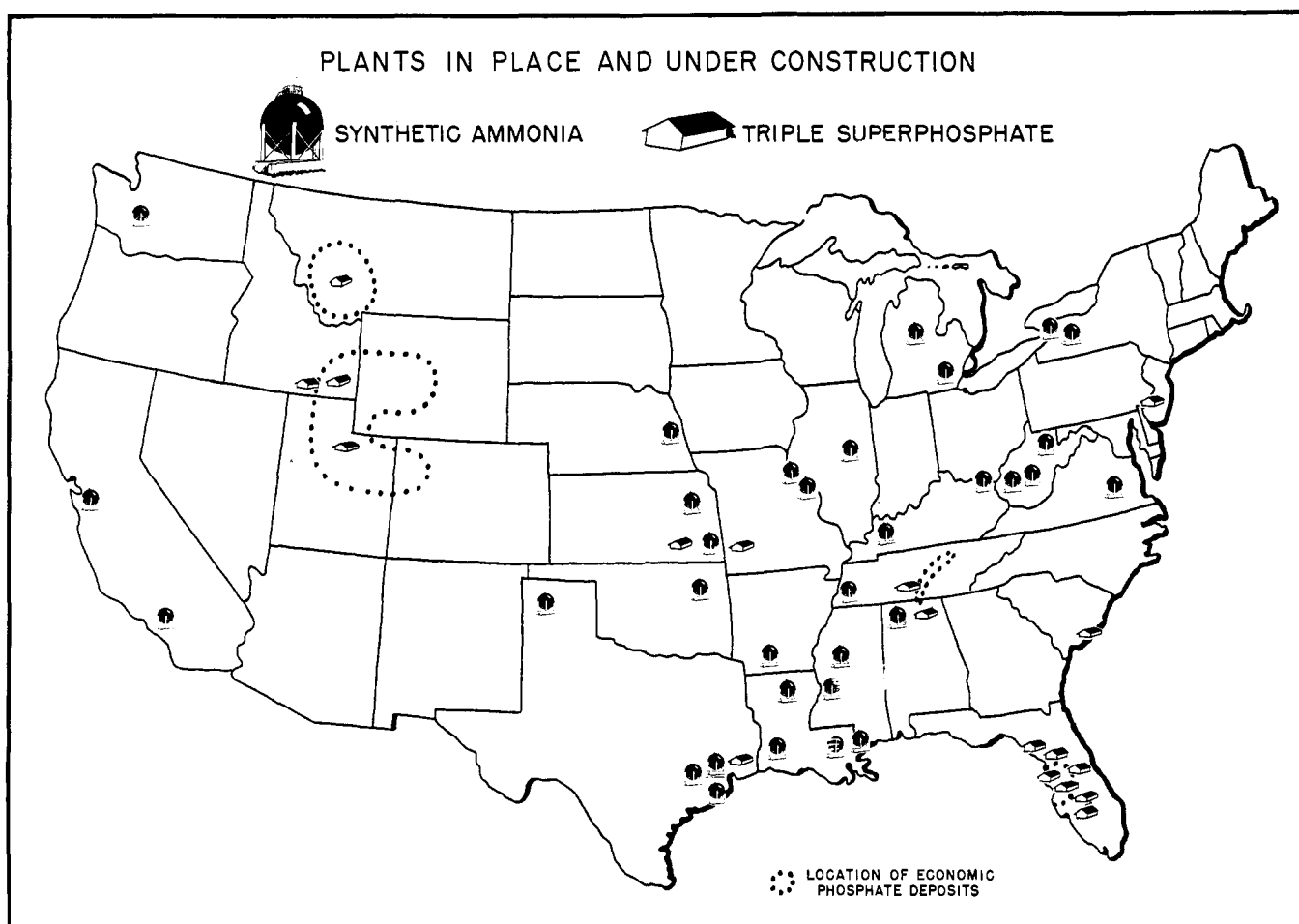
men is that markets will probably absorb additional expansion. Most pessimistic comment was that all fertilizers, including nitrogen materials, would be easily obtained on order within the next two years. Sales competition may be high during the expansion period, particularly during late fall and winter months when products move slowly if at all. Most optimistic opinion expressed was that "average salesman in Southwest could probably sell 1000 cars more of ammonium nitrate than at present."

In the Midwest, only one of the people interviewed said that increase in nitrogen capacity was not needed. Most thought that even with new plants to come in this year, the demand will not be completely satisfied. One comment was that there would be no excess of nitrogen, except in the areas immediately adjacent to the plants—a distribution problem in other words. This same source said that nitrogen is still the most critically needed element, and since there is still much to be learned about using it, growth could continue at an even higher rate than in the past few years.

Data for fiscal years ending June 30. Source is consumption data using accepted trade percentages in the various fertilizer materials. Nitrogenous materials consumed by manufacturers of all commercial fertilizers in the U. S., Hawaii, and Puerto Rico are included



Source: Stanford Research Institute, "Chemical Economics Handbook"



Triple Super Shows Biggest Growth in Phosphate Fertilizers

PROBABLY THE MOST SIGNIFICANT major trend in superphosphates is the strong rise in concentrated or triple superphosphate capacity. While total production of phosphate fertilizers has almost doubled since the war, the production of normal superphosphate has increased by only about 30% while triple superphosphate has increased by about 500%, thus taking over a much larger share of the total production. This does not mean that ordinary super is on the way out. It will continue to be the basis for the application of phosphorus as fertilizer unless sulfuric acid reaches a prohibitively high price. However, with the number of triple superphosphate plants more than doubled during the past 10 years, this production is becoming very important. A total production capacity in the neighborhood of 900,000 tons as P_2O_5 may be expected before the end of the 1954-55 year.

Another development in the phosphate fertilizer field which is quite interesting, the significance of which is yet to be settled, is the manufacture of nitrophos-

phates, including the use of nitric acid in the treatment of phosphate rock. Also of interest is the gaining of uranium as a by-product of phosphate manufacture.

Changing Distribution

On the changing distribution picture in phosphate fertilizers, G. L. Bridger of Iowa State College has this to say:

"What are some of the reasons for this changing distribution in the production of phosphate fertilizers? One is the development of important new market areas, particularly in the Midwest. The greater freight haul of phosphate fertilizers and the raw materials from their sources give more concentrated materials such as triple superphosphate an advantage. Further, there is a growing demand for higher analysis fertilizers which can be better formulated from triple superphosphate. Doubtless another factor has been the fact that it is possible to recover uranium as a by-product in the manufacture of triple superphosphate.

"Declining reserves of some raw ma-

terials and increasing supplies of others also play a part in the choice of processes for making fertilizers. The severe sulfur shortage of a few years ago and the possibility of its recurrence must be taken into consideration before the decision is made to adopt any process which requires sulfuric acid. Since both normal superphosphate and triple superphosphate require sulfuric acid, many other processes which do not require sulfuric acid have been considered and some adopted. The sulfuric acid situation and the fact that nitric acid facilities were greatly expanded during and since the war led to the development and production of nitrophosphates" (see *Observation Post*, page 648).

Plant Growth

Activity in Florida has been very strong. There, Davison, International Mineral, Royster, and Virginia Carolina all have brought in extensive new capacity during the past two years or will do so soon. In the Middlewest, Thurston Chemical Co. has brought in triple capacity in Joplin, Mo., and the Missouri Farmers Association has a new plant in Galena, Kans.

Some 60% of the world's known phosphate rock reserves are in the West and

Triple Superphosphate Producers

Company	Location
As of Sept. 1951:	
Anaconda Copper Mining Co.	Anaconda, Mont.
Armour Fertilizer Works ^b	Bartow, Fla.;
	Siglo (Columbia), Tenn.
Gates Bros., Inc. ^c	Wendell, Idaho
Swift & Co. ^b	Agricola, Fla.
Tennessee Corp. ^{ab}	East Tampa, Fla.
Tennessee Valley Authority	Wilson Dam, Ala.
Thomas and Son, Co., I. P.	Paulsboro, N. J.
Virginia-Carolina Chemical Corp.	Charleston, S. C.

Since Sept. 1951:

Davison Chemical Co.	Ridgewood, Fla.
International Minerals and Chemical Co.	Mulberry, Fla.
Missouri Farmers Association	Galena, Kans.
Phillips Chemical Co.	Pasadena, Tex.
F. S. Royster Guano Co.	Bartow, Fla.
Simplot Chemical Co.	Pocatello, Idaho
Thurston Chemical Co.	Joplin, Mo.
Virginia-Carolina Chemical Co.	Nichols, Fla.
Western Phosphates, Inc.	Garfield, Utah

^a East Tampa plant is operated as U. S. Phosphoric Products Div., Tennessee Corp.

^b Some expansion since Sept. 1951.

^c Plant currently inactive. Company absorbed by Jefferson Lake Sulphur Co.

western phosphate rock production has increased since 1920 at an average of 14.5% per year, as compared with the national average of 4.4%. Some 40,000 tons on a P₂O₅ basis of production per year will come from Western Phosphate, which got into production early this year with ammonium phosphate, triple super, and phosphoric acid. Cominco, at Kimberly, came in in February with a new ammonium phosphate plant rated at 80,000 tons per year. Not to be outdone, Stauffer too shipped its first Rumianca process ammonium phosphate sulfate to the Pacific Northwest farmers in the same month from its new Tacoma plant. Present Stauffer production is 26,000 tons a year, with plans already formulated for upping this to 40,000 tons soon.

Nitric Acidulation

There seems to be variation of opinion on the potentialities of nitric acidulation phosphate processes. Nitrogen Division of Allied Chemical & Dye is optimistic. They are using nitric acid treatment of phosphate rock for the production of 12-12-12 to the extent of 200,000 tons a year at South Point, Ohio. Associated Cooperatives at Sheffield, Ala., soon will be ready with a 14-14-14 product using nitric acid treatment to make about 60,000 tons. However, one major supplier in the West says that this is definitely not significant for that area. Another Westerner says "Definitely no need as long as sulfur supplies hold up." The principal difficulty cited by these

as well as others is that the process yields a product unsuitable for Western soils—it gives a citrate soluble phosphate and citrate soluble phosphates are not suitable for Western alkaline soils.

Uranium from Phosphate

An interesting development in phosphate production stimulated by the finding that uranium occurs in certain types of marine sediments, particularly the phosphorite and black shale deposits, has been stimulated by the Atomic Energy Commission. The AEC actively sponsored basic research studies and process development projects in cooperation with the phosphate and fertilizer industries with the objective of producing uranium concentrates as a by-product of phosphatic fertilizer and phosphate chemicals.

At the present time four companies are actively participating in the production of uranium: Blockson Chemical Co., a producer of sodium phosphate chemicals was first to go into full production in September 1952; Texas City Chemicals, Inc., began producing fertilizer and animal feed grade of dicalcium phosphate last February; Virginia-Carolina Chemical Corp. recently completed construction of a by-product unit in conjunction with its new triple superphosphate fertilizer plant at Nichols, Fla.; and International Minerals is now operating a by-product uranium plant as a part of its new Bonnie phosphate chemical plant near Mulberry, Fla.

Little Change Expected By Potash Industry

POTASH PRODUCTION in the U. S. is concentrated in the far West, about 80% of the total production comes from five companies located near Carlsbad, N. M. Deliveries by the seven leading domestic potash producers last year reached new highs, equal to more than 1.7 million tons of K₂O, an increase of 9% over the previous year.

Current production levels of potash are about the same as last year, and production and deliveries are expected to continue near last year's levels. The increased production earlier scheduled for Carlsbad has now been set aside for this year.

Some industry spokesmen say: This summer the domestic potash industry is carrying over the biggest inventories in their history. Others say there is no appreciable surplus for this time of year.

The prospect of a potash surplus being valid is a new problem for industry for in recent years supplies have generally been more or less "tight."

Potash producers are caught in the middle of a situation in which consumption of their product is seasonal, while production is only economical if it is maintained on a continuous basis.

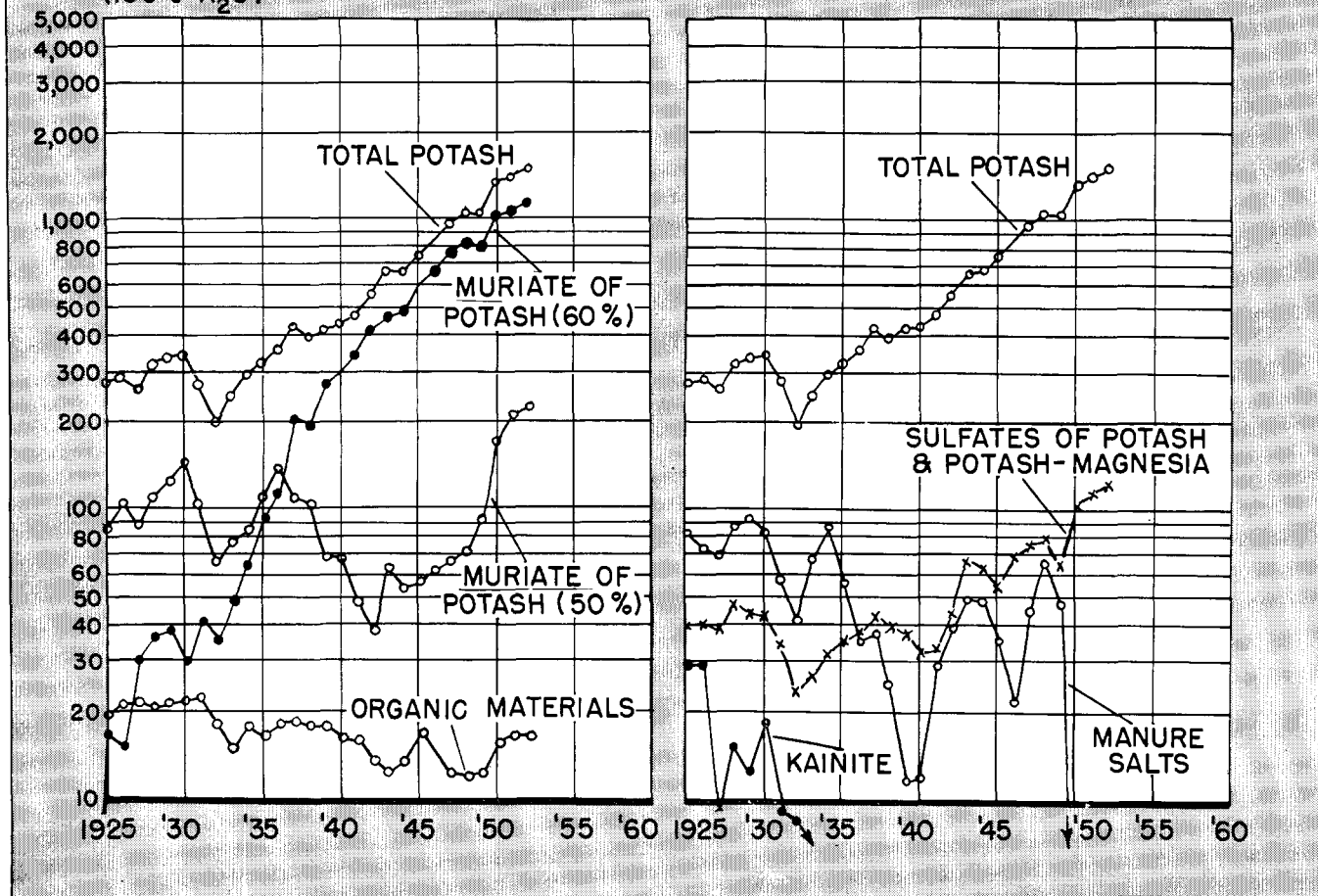
The practice has gradually developed in the industry to negotiate contracts for potash in June of each year. Customarily discounts have been given by the potash producers on contracts for the fiscal year which are signed before the end of June. Under this split discount system, a certain percentage discount is allowed on the contract when signed with the understanding that an additional discount will be made when the potash is delivered. Contracts signed between the end of June and the middle of fall customarily get about half the June discount. Between fall and the following summer, the peak season for the fertilizer industry, no discount is allowed by the potash producers. The discounts have been offered to offset the seasonal trends of the fertilizer business. The fertilizer manufacturers in turn have offered the same sort of discounts to the farmers and jobbers.

However this year the potash producers are discontinuing the usual discount system. This could lead to a confusion in the potash picture this fall, for the fertilizer manufacturers may decide to hold off on long range contracts until they have some indications of next year's demands.

Under these circumstances it would be almost impossible to make any quantitative statements about the potash business for the 1954-55 fiscal year until after June 30.

SOURCES OF POTASH IN COMMERCIAL FERTILIZERS

Thousands of short tons
(100% K_2O)



Source: Stanford Research Institute, "Chemical Economics Handbook"

Data for fiscal years ending June 30. Basis 1925 to 1945 is consumption of various fertilizer materials. Beginning 1946 data based on reports of deliveries by American Potash Institute. Materials supplying potash for all commercial fertilizers distributed in the U. S., Hawaii, and Puerto Rico are included. "Manure Salts" are impure muriate of potash containing from 20 to 30% K_2O

Another incentive in addition to the discounts has been the relative shortage of potash which had previously existed since the war. The fertilizer manufacturers were anxious to contract as much as possible of their anticipated demands early. The potash shortages which developed at various times led to fertilizer shortages which the farmers offset by off season buying. Now with supplies of fertilizer relatively plentiful the farmers have reverted to the old practice of seasonal buying, placing a strain on the whole fertilizer production chain from formulator all the way back to potash producer. Although the volume of imported potash is relatively small amounting to about 12% of the total tonnage consumed in this country, imports have spelled the difference between adequate and tight supplies of potash in recent years.

Last year industry spokesmen told Congress that the domestic demands could be filled by U. S. production plus

imports from France and other western European countries. At that time The House Committee on Agriculture investigated complaints by the domestic potash industry that potash originating in the Russian occupied zone of Germany was being dumped on the American market. The potash manufacturers warned at that time that the red potash could be a threat to the domestic potash industry, if the price practices on which they outlined were continued. However at the time of the hearings the imports of red potash had noticeably decreased and no action was taken by Congress.

In March of this year the question of red potash came up again, this time more vigorously. The domestic producers have asked the U. S. Treasury Dept. to investigate the importation of potash originating in Eastern Germany to determine whether these imports were in violation of the antidumping act

of 1921. Essentially the potash producers maintain that the East Germans are selling potash in the U. S. at less than the "fair value" and these selling prices are likely to injure the domestic potash industry.

American Potash Producers point to the wide variation in the export price of potash from East Germany. They also suggest the possibility that the Communists could manipulate prices with intent to disrupt the American potash industry.

Potash producers maintain that the availability of red potash at cut rate prices could materially upset the domestic potash industry. They believe that perhaps the possibility of cheap red potash may influence fertilizer manufacturers to hold off on potash purchases to see if they can get the imported material at a considerable saving. The producers are now forwarding additional information to the U. S. Treasury Department.



View Across the Nation

A direct-contact gathering of significant information by
AG AND FOOD's editors

West About to Catch Up with Demands

THE WEST is in the midst of its high nitrogen season resulting in tight nitrogen supply right across the board. One company indicates supplies "at an all-time low." Nitrogen solids such as calcium nitrate and urea are particularly short. Ammonium sulfate deliveries from basic manufacturers are as much as four weeks behind schedule. A delay in planting season of 30 to 60 days, because of late rains and the fact that growers expecting to be subject to acreage restrictions especially on cotton, held off on fertilizer purchases and produced a pent-up demand.

Despite generally optimistic views on nitrogen fertilizers in the future, one producer of by-product ammonium sulfate says that while the situation is "tight" this year it probably will be even more so next year. He reasons that more and more nitrogen is going into aqua ammonia, leaving less for sulfate. Nitrogen inventories are expected to increase seasonally in the third and fourth quarters. The phosphate season comes early in the West with the result that phosphate supplies, especially single super, range from "good" to "probably in slight excess." Concentrated superphosphate is on the low side. Regular grades of potash are in good supply. No over-all shortage of basic materials is seen for 1954-55 season. This is attributed to the volume of new production coming on stream or recently on stream. Ammonium phosphate stands out as a possible exception.

Expansions

Major expansions in basic fertilizer chemical facilities in the West will not be needed in the immediate future in the view of one major distributor. He points out a correlation in the past between farm income and fertilizer sales with sale changes lagging about nine months behind income changes. On the basis of present income with a possible further drop in the future, sales can be expected to hold their own or drop slightly. Western production is now such that it could take care of a 15 to 20% increase in sales without cramping present capacity.

Among the agricultural experiment stations where evidence indicates that farmers of many crops and in many areas are not using as much fertilizer,

particularly nitrogen, as would be profitable under present conditions, there is a feeling that need for nitrogen will continue to increase rather than decrease.

In the Pacific Northwest, available fertilizers have not met demand for several years. The start of major plants especially for nitrogen materials will be particularly advantageous for that area, say state agricultural officials. Several factors influence the need for nitrogen fertilizers: greater appreciation by farmers of the benefits obtained from heavy applications of nitrogen fertilizers in the humid areas; increased acreages being brought under cultivation in the Columbia Basin irrigation project; more extensive use of nitrogen fertilizer in the dryland wheat producing area.

With rumors and plans of still additional ammonia expansion, there seems to be an increasing tendency for companies planning new plants "to sit tight and see what the situation will be when Brea and Shell are in full production." Many feel that will take care of the western picture. Brea is more conservative, thinks the new plants completed or nearing completion should bring western production to a level where it will more nearly meet western demands.

Popularity Trends for Fertilizer Grades

Despite much discussion about the trend to complete fertilizers, in the Pacific Northwest only some 20% of sales are in this category, the rest being "simples." In California and the balance of the West, a similar though less marked discrepancy exists.

One official explains the difference as one of varying basic philosophy. In the rest of the country, the philosophy is to conserve soil and replace nutrients as removed. In the West the philosophy is to harvest from the soil, then replace a deficiency when it has definitely been created.

In Washington, for example, they say that mixed fertilizers available have simply not fit the need. In wheat producing areas, nitrogen is the only limiting factor in a major portion of the area. Responses to potash fertilizer have presently been obtained in limited areas of the state only.

In Oregon also, many soils show a

response to nitrogen but not to other nutrient elements. Nitrogen needs can be supplied more economically by using straight nitrogen fertilizers. Where both nitrogen and phosphorus are needed, which is true on certain soils, both 16-20-0 and 11-48-0 have supplied most needs.

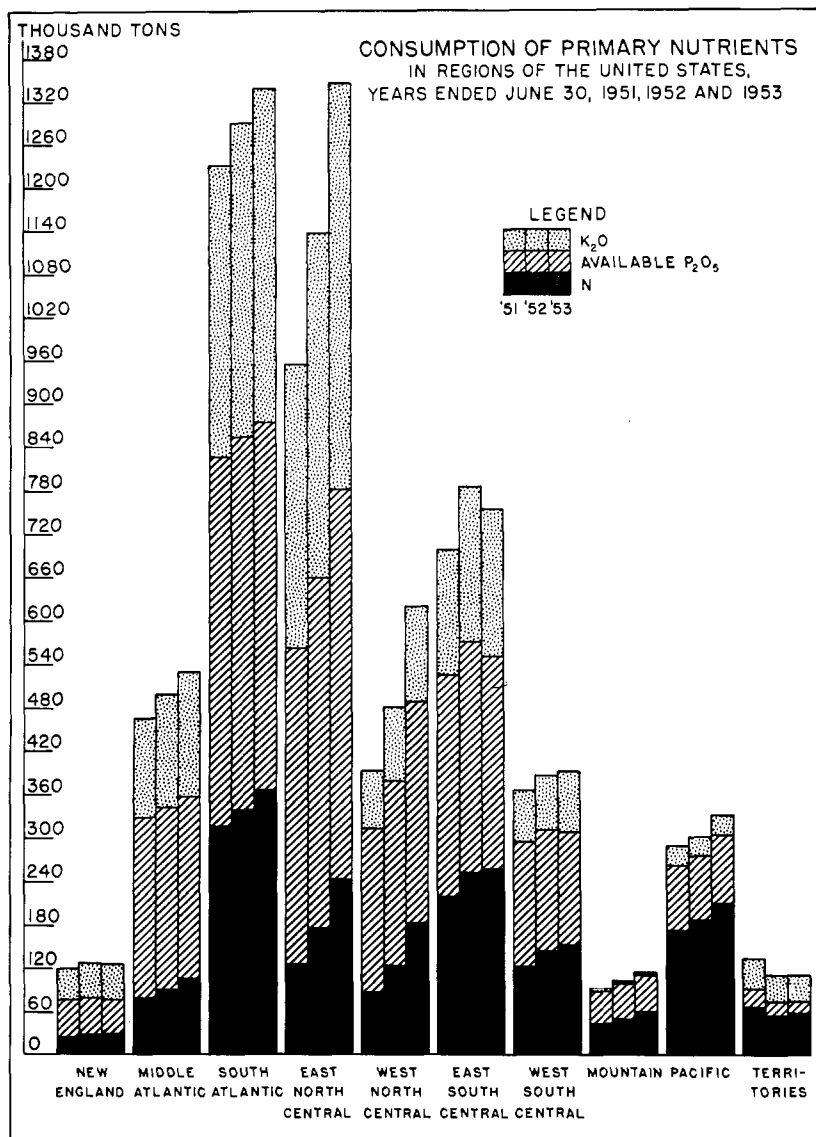
Another factor may be the youth of the large-scale industry in the West, it having developed when much more was known about the use of fertilizers and at a period when western soils were comparatively much less depleted. One fertilizer company president says the trend toward simples is partially a result of the farmers' attempts to pay the lowest cost per unit of plant food. Historically, basic manufacturers have supplied mixers who combine the single nutrients into the various grades of mixed fertilizers. These mixtures will definitely decline in the West in the opinion of several distributors, but there will be an increase of chemically combined fertilizer, such as ammonium phosphate and potassium phosphate. Others in the industry predict that the mixtures will fill a need for a number of years yet. Simples are expected to continue to receive the recommendation of "official agriculturists" as they have in the past.

Popularity Trends of Physical Forms

The obvious outstanding current trend here is toward use of fertilizer solutions. Brea, the first major producer of ammonia to go the aqua route is accelerating the changeover. Reason for its action, Brea says, was result of exhaustive study of economics of storing and handling fertilizer in its various forms—solid, liquid, gaseous.

Brea believes there are important economies in both handling of liquids which can be stored in ordinary tanks and handled by pumps and pipes with a minimum of labor, as well as advantages in metering and placement of solutions. Ordinary tank storage makes possible buildup of large point-of-use inventories.

In the Pacific Northwest, the use of liquid nitrogen solutions and anhydrous ammonia has increased manifold over the past few years. Reduction of manual labor on the farm seems to account for their popularity. Added impetus to the trend toward liquid materials is expected if phosphorus and sulfur are added to the list of ingredients.



Source: Commercial Fertilizers Consumption in the United States, 1952-53, by Scholl, Wallace, and Fox, USDA

Definite also is the trend to granular and pelleted products that are dustless and free-flowing. Some say it is only a matter of years before the entire production of solid fertilizers will be either pelleted or granular. One fertilizer institute man states that every company is now producing pelleted forms or looking seriously into doing so, although pelleted forms are not needed where granulation is properly done.

Fertility Depletion

Westerners generally feel that the fertility of the soil is being well cared for. There is much opinion that we should not be overly alarmed at the balance between nutrients removed and those returned, provided sufficient nutrients are being returned to maintain a high level of available fertility in the soil, so that maximum crop yields can be obtained. From Washington State, for example, officials point out that with the exception of nitrogen, phosphorus and some of the minor elements, fertility levels of western soils east of the cascades

are very high. They see no reason for trying to replace, for example, the calcium and magnesium removed by crops where the available supply is high and reserve is sufficient to last many years. American Potash Institute points out that potash is being removed more than twice as fast as it is being replaced. In California only 30 of the state's many crops remove 52,000 tons of K_2O per year while only 14,000 tons are being replaced. More attention is being given to this depletion than in the past.

By far the greatest body of opinion is that the rate of depletion of soil fertility becomes less important as more knowledge and means to apply scientific soil nutrients is gained. As one official of a large company says, "We believe the importance of natural soil fertility is decreasing while the potentials of scientific soil nutrition by external application increase."

Prices

Prices are holding firm at the moment, with a drop normally expected to come

during the declining use period of summer and fall. Any price declines are expected to be at the mixer and dealer level rather than by basic producers, although some cuts by basic manufacturers are looked for early in 1955. From Colorado comes an opinion that any price increases will be strongly resisted by growers of the region, as farm prices are leveling off.

Many companies are taking lower margins of profit on a number of products. Some price cutting by Midwest basic ammonia manufacturers is reported for the Imperial Valley and Arizona regions. However, the cuts are on storage allowances rather than on posted prices. There is some fear that nitrogen prices could fall as a result of the west being used as a dumping ground by Midwest or off-shore sources—a trend increasingly noticeable, but believed temporary until those sources develop demand in their own local areas. Potash prices are expected to continue notably stable.

Acreage Restrictions

Crop acreage restrictions were expected to have a very noticeable effect on fertilizer sales, particularly in California where the cutback in cotton was about one third. General feeling is that harm to the industry simply did not develop. Substitute crops, chiefly barley, flax, sugar beets, and corn, all relatively high fertilizer users, have held demand for fertilizer up. In addition cotton growers are apparently "doubling up to catch up" on their lower acres. One fertilizer company claims acreage restrictions have helped the industry. While this feeling is not shared by all, one representative says that sales this year have in general been equal to or better than prior years.

In Colorado a great majority of fertilizer is used on irrigated land and crop acreage restrictions will not affect that sale. Limitation of acreage on wheat will be largely on nonirrigated land and there is only a limited amount of fertilizer principally nitrogen, used there. In Oregon wheat is the main crop upon which acreage allotments were made. In some areas barley acreage has increased and will use less fertilizer than would wheat. A Washington state spokesman says that acreage restrictions had little effect on fertilizer use. That area has been deficient in fertilizer and has been using all it can get. Barley has replaced much of the released wheat acreage with little change in fertilizer requirements.

Pastures, Ranges and Forest— Future Frontiers

Superlatives are the only words fertilizer men—manufacturers, brokers,

mixers, dealers, and agricultural extension agents—use for range fertilization. According to results about to be released in California, awakening of western ranchers may not be far off.

Several range test plots in California show carrying capacities from two to four times that of unfertilized range and gains in weight have been up to 200 pounds per acre more than on unfertilized range.

Growth of fertilizer use on this new frontier is not expected to be spectacular. But in 1956 and 1957, really large application should begin. California alone has some 12 to 13 million range acres on which fertilizers are of potential value. Impressive results have been achieved with fertilization of pastures. It is generally expected that this demand will grow steadily but not at a sensational rate too.

Forests, meanwhile, remain as only a remote possibility at the present time. As one expert points out, we really have little knowledge about forest fertilization. This will probably remain in experimental stages for some time.

Basics Versus Distributors

The traditional "chain communications" in the fertilizer industry—basic manufacturer, broker, mixer, local dealer—is undergoing several changes in the West. Probably most notable and of more far-reaching consequence, is that one of the region's big mixers is definitely moving to set itself in the "basic" field—Best Fertilizer, of Oakland, Calif., a company respected in fertilizer circles as an aggressive and expanding organization. Most industry observers believe that Best has sparked a trend and that others in its size class virtually will be forced to go the same route to meet competition. However, many of the present mixers cannot afford relatively extensive equipment to go basic or to make chemically combined multiple-nutrient fertilizers. They will continue to fill a need by blending for local markets and by handling the chemical mixtures and granular products of the larger companies.

Meanwhile, basic manufacturers are taking a slightly different tack. Instead supplying mixers with compounds containing single plant nutrients for formulation, basic manufacturers are turning more and more to supplying fertilizers with two or more major nutrients in chemical combinations—ammonium phosphate, for instance. This tends to put them in a field traditionally held by the mixers.

With the tremendous growth in fertilizer volume, some think it a natural and economical development for manufacturers to handle distribution to the major growing areas (Shell Chemical and Brea). This supposedly results in

more reliable routing of supplies to meet seasonal demands in the various areas, improves inventory, and should result in a more stable price structure. Also this makes available a larger technical staff than could be provided by a smaller company. As major producers enter more and more into distribution, some former distributors have and will move into certain of the basic fields which do not require exceptionally big capital investment in plant as noted in the foregoing. Even so, the need for efficient local dealers service is still important and will continue as a definite part of the picture.

Shipping, Distribution

Recent expansions are making the West more nearly self-sufficient in basic material. Phosphate formerly from Florida is now expected to come from

local plants using western phosphate rock. Furthermore, California will be more nearly self-sufficient from imports from northwest Canada, although Canadian producers are optimistic of retaining or even increasing California business. New nitrogen facilities will supply more of the current demand for the West, Hawaii, and Mexico. More foreign materials have been available in the past season on the West Coast, chiefly nitrates and phosphates from Japan, Belgium, and Norway. A year or two ago, most of the West Coast's fertilizer urea was supplied from eastern U. S. plants. Now, however, most of the material is being imported principally from Norway, Germany, United Kingdom, Japan, and Italy. Despite new urea plants east of the Rockies, imported material is expected to maintain a price advantage through ocean freight costs.

Tonnage Down, Nutrient Content Increased Across the South

FERTILIZER SALES were down slightly in the South and Southwest last year. There was a definite drop in Texas (last six months of 1953 were 17,000 tons below same period in 1952), and Alabama (1953 sales down 83,093 tons from previous year). Louisiana consumption increased about 8000 tons. In spite of this general decline there was an increase in plant nutrients added to soils because of higher analysis mixtures and high guarantee fertilizers distributed. Sales of materials continued a downward trend, principally because of decrease in normal superphosphate. Nitrogen materials sales increased, particularly ammonium nitrate and sulfate. Anhydrous ammonia sales have been increasing over the past three years. Texas consumption for 1953 in actual tonnages was twice as much nitrogen materials, four times as much nitrogen-available phosphoric acid materials, and less than half as much superphosphates as were sold in 1949.

Nitrogen consumption percentage-wise in Louisiana is about typical of the South: 11% as sodium nitrate, 19.2% as ammonium nitrate, 32.3% as anhydrous, 0.9% as sulfate and 36.3% in mixed form. Southwest figures are comparable except for a reversal of sodium nitrate and ammonium sulfate figures.

High Analysis Trend

There is a definite trend toward higher analysis and high guarantee fertilizers. Fertilizer representatives here believe this is largely the result of modernization

in new plants and also the result of a more scientific selling approach on the part of many companies. Where 5-10-5 mixed fertilizers were offered last year suppliers are now pushing 10-20-10. Triple superphosphates of 45% available P_2O_5 are receiving more attention. There seems to be little tendency to shift in marketing between nitrate and ammonia, or ammonia and nitrogen solutions. Most plants are not designed to handle this situation. Some, such as Spencer's Vicksburg plant, can shift with the market. More are rounding out their sales program, and reducing the numbers of different grades of fertilizers. Tendency is to standardize upon fewer and more concentrated grades, generally in the Southwest. Mixed goods suppliers are distributing anhydrous, particularly in irrigated sections of western Texas. Ammoniating solutions are being used largely by mixture formulators. Feeling is that shipment of extra water is prohibitive over about 150 miles. There is little active interest in direct application of nitrogen solutions to soil in the Southwest. It seems to be taking hold to some extent in Virginia and the Carolinas.

During recent weeks there has been an excess of ammonium sulfate on southern markets. Price cutting has been active. One producer, Phillips, is planning to make up for some of this demand drop by retail marketing through filling stations. Other fertilizer people are watching this with more than casual interest. Some estimates of excess sulfate capacity run from 25 to 50%. Inventories are high now.

Home-Mixing Not Favored

There seems to be little tendency for farmers and co-ops to buy their own mixing equipment in the South. In fact, in the Southwest, an opposite trend is shown. Many who were mixing their own materials are buying premixed grades. Fertilizer men say this isn't so much a matter of economics as it is one of quality control. Large-scale mixers are able to make a more accurately proportioned and better blended formula with large-scale equipment at about the same cost to the farmers.

Many farmers are demanding granulated fertilizers. Most large producers are offering granulated materials or are planning to do so. Some who aren't are the first to cut prices to compete with the granulated producers.

There seems to be less interest in direct application of phosphoric acid than a year ago. Some has been applied in irrigation water in western Texas and New Mexico. Control is reported to be more difficult than with anhydrous ammonia and phosphoric acid does not have the advantage of being the cheapest source of P_2O_5 as anhydrous ammonia is of N_2 .

"Net Farm Cash Income" is net income from crops livestock and government payments using Consumers Price Index of the Bureau of Labor statistics to get 1952 dollars. "Total Plant Food" is total available N_2O_3 and K_2O

Education Needed

Farmer's interest in fertilizer is still big challenge to fertilizer salesmen. Most of the people interviewed think that farmers are recognizing the value of fertilizers in depleted soils. Oddly enough, some of the "blackland farmers" in the South, especially in Texas, are most difficult to convince of fertilizer value. Many still believe the land is "rich" and when fertilizer applied in dry seasons does little real good they are even more dubious. If they use fertilizer during a normal or wet season, many fertilizer men hear the story that the rain did the good and not the fertilizer. Several fertilizer men here believe that farmer acceptance is generally better in the deep South where farmers have seen value of application demonstrated.

Acreage limitations have apparently had little effect on fertilizer consumption. Drought last year reduced application and generally heavy rainfall in Southwest has delayed some spring applications. Apparently about the same amount of fertilizer will be used on reduced acreage. This combined with selection of most profitable land for

planting and better care of crops will probably result in production nearly as great as on greater acreages. For example, Reeves County, Tex., had a cotton acreage cut of nearly 50%, but because of a rise in the water table and greater application of fertilizers on this irrigated land, production estimates run 90 to 95% of last year's. Nonirrigated lands may get increased fertilizer application this fall following good rains early this year. Heavy rainfall in Southwest "washed out" some crops. When these lands are replanted, principally with cotton, there may be some additional application of fertilizers, such as side dressing with anhydrous ammonia.

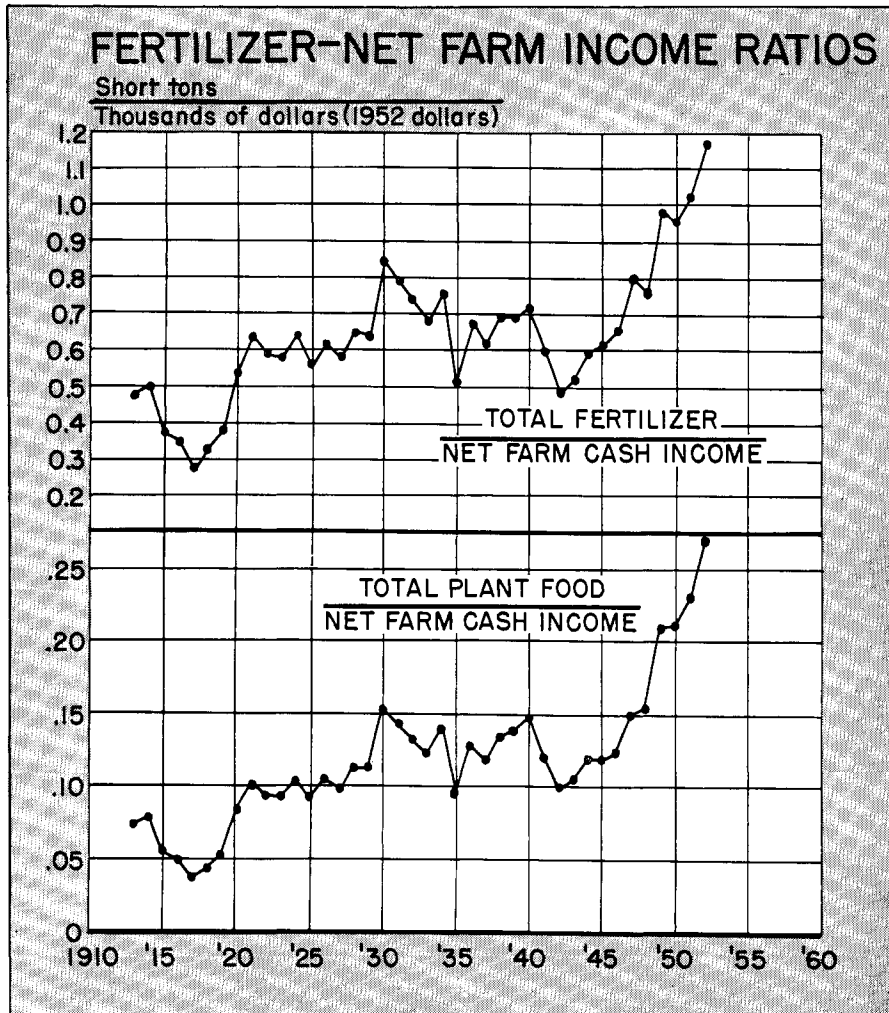
Inventories High

Inventories are high on just about all fertilizers except anhydrous, ammonium nitrate, and perhaps urea. Mixed fertilizers were normally high at start of season, and most distributors are living off them now. Ammonium nitrate inventories are generally low throughout the South now.

Few producers are becoming distributors as a matter of policy. Some go to direct sales when under pressure of high stocks. In the deep South much fertilizer is sold by direct sale. Fall merchandizing programs are being tried to offset some seasonal problems. Contracts are written on equal monthly basis with premiums on off-season deliveries as high as 50%. For each car delivered in December, buyer receives an extra half car in March. Some ammonia producers are increasing conversion to sulfates during off-season to gamble on later markets. Producers are very interested in recent experiments in Texas on fall application of anhydrous ammonia, which has been tried successfully for two years. Anhydrous can be applied with success only when soil temperatures are below 54° F. which delays until nearly December in South.

Prices Are Problem

One producer describes price situation as demoralizing. This is especially true in case of normal phosphates and low analysis mixed goods—particularly powdered grades. Situation is about the same for low analysis granulated goods. Price conditions resulted from virtually a complete breakdown in dealer type distribution by producers of low analysis materials, and desperate attempts to prevent "hot" trucker operations and other price chiseling activities. "Hot" trucker activities in Texas are those of independent truckers who buy a load of low analysis fertilizers and peddle them for best price anywhere they can sell. This unethical marketing, illegal as usually practiced in Texas, is considered a serious problem by some fertilizer men here. Otherwise price situation is



Source: Stanford Research Institute, "Chemical Economics Handbook"

firm. Most estimates are it will remain so for about a year because of stability of production, raw material, freight, and labor costs. There may be a 3 to 5% decrease in nitrogen prices in adjustment with new plants coming on.

There has been very little use on pastures and range lands. This standstill resulted from drought conditions in Southwest until early this year, tightening of PMA funds, and also from low cattle prices. With better grassland coming on from recent rainfall, fertilizer men are hoping for more sales activities here in next year to 18 months.

Rice farmers are probably coming nearest to following recommended use of fertilizers of all southern farmers. High support prices and operating costs promote these efforts. Present Indo-China crisis may lead to stockpiling of rice and maintenance of present acreage or perhaps increases which would lead to even greater consumption in southern rice lands.

Little concern is shown here for potash imports from Europe. Perhaps it is just talk, but several commented on low quality of imports—that they would absorb moisture and set-up in the bag. If they begin to feel the pinch they will probably meet the port prices in the Southeast and use Carlsbad prices in the Southwest.

Use Still Below Need

It is generally agreed that soil nutrients are not being replaced in Southern soils as rapidly as they are being depleted. Ag Experiment Stations recommendations still call for application of 500 to 1000 pounds of fertilizer per acre per year to maintain soil nutrient level. Average use of fertilizers is estimated to be about 150 pounds. Apparently the Southern farmers here again have a better appreciation of the value of fertilizers. Consumption last year was about the same in Georgia as in Texas, which has considerably larger farm acreage.

Significant trends are movement of producers into the South near large consuming areas and along water routes. Several producers commented on the changing approach in selling fertilizers. Many representatives are scientists trained in agriculture or chemistry and are in many cases acting as technical service representatives. Some of the newer companies, who incidentally are those moving toward fewer grades of high analysis materials, predict this will benefit the farmer, fertilizer industry generally, and certainly the company in winning farmer acceptance. Some manufacturers may become distributors to offer complete package fertilizer service and offset high capital investment required for additional production facilities. A few predict some of the older plants may be on the way out when new

ones come on stream. Many will have their sales area contracted to serve farmers who are neighbors acquainted with the producer. Some producers have had shortages of skilled labor during peak production season, but this has

Midwest Supplies Good, Nitrogen Need Critical

FROM THE MIDWEST the view seems to be that inventories are at a satisfactorily normal level for the most part. There is an excess of ammonium sulfate and not enough nitrate. Plenty of 18 to 20% superphosphate, but not enough triple super. There has been a shortage this year in 60% granulated potash, and not enough potassium sulfate. A buildup of inventories is now expected which some believe will be normal by the fall demand, but, in some views, they may remain low unless there are some price reductions by basic producers.

For the long run, supply promises to be good but not excessive. At present nitrogen is still the most critically needed element. Ammonium nitrate continues to be scarce in the corn belt area during the seasons of heaviest demand. As a whole the use of fertilizer has lagged slightly behind the growth in crop production, but this year was better than it has been during the past few seasons, particularly for nitrogen fertilizer. Probably the most severely needed expansion in the Midwest during the next few years will be in the production of concentrated superphosphates. Demand may not meet supply by the spring of 1955 but will be nearer to a sufficiency than it has been during the past years.

Despite the considerable growth in nitrogen production capacity in the Midwestern area, there still seems to be more opinion that a moderate shortage rather than excess will persist. Nitrogen is expected to continue to break into new fields because of the ease of application of anhydrous ammonia. Also there is some growth in the application of nitrogen solutions directly to the soil. Lower farm prices should stimulate fertilizers further as more and more farmers are realizing that it is the best way to lower costs and achieve economical production.

Mixed Fertilizers Increase

The use of mixed fertilizers is rising to a certain extent in the Midwest. At present about 75% of all fertilizers sold there are of the mixed type. The Midwest is still lower than the East in this percentage but is above the West. While there is not a strong trend toward further increase in the percentage of mixed fertilizers used, there is a definite trend toward higher concentrations in their make-up.

Again speaking on a long-term basis, it

eased somewhat this year. Big question seems to be, can major chemical companies and petroleum companies who have entered fertilizer business in recent years continue to show a satisfactory investment profit?

seems reasonable to expect the use of fertilizers to continue to rise in the Midwest. A great deal has been learned about the use of fertilizers during recent years and there is a realization that soils are being depleted. On a nation-wide basis on cultivated lands, the ratio of materials being added to materials being removed in the crops are approximately P_2O_5 , 1.5; K_2O , 0.8; and nitrogen, 0.6. This situation is not as bad in the Midwest as in some areas in the country, but fertilizer usage is gradually increasing with better farming education. One specialist in the field made a rough estimate that in order to keep up with the removal of various nutrients by crops in the Midwest, the average minimum application of fertilizer per acre each year should be about as follows:

Phosphorus—34 pounds per acre
Nitrogen—75 pounds per acre
Potassium—50 pounds per acre

Another estimated that really complete utilization of fertilizer may be a generation away.

Liquid Fertilizers

The use of liquid fertilizers has been growing somewhat but opinion for the future varies. There has been a trend toward anhydrous ammonia because of its economies but on the other hand a considerable capital investment in application equipment is required. This may mean that the use of anhydrous ammonia will be limited to the large farms, and those farms where economical custom application is available, but will grow as the average farm continues to grow in size. Pelletized materials are being well received and promise to move very rapidly.

Price Situation

Prices are soft. They are not as bad in the Middle West as in the West and South but it is generally agreed that they are soft and may get softer as the year goes on. Unseasonable coolness in some places delayed the season and resulting pile-ups caused some panic and price cutting. Some material was sold in some areas at less than production cost. Again the Middle West has been favored as prices have been most stable in those areas relatively new to fertilizer, many of which are found in the Middle West. Ammonium sulfate has already

dropped, earlier than expected. At present there is too much on hand for mixing and the price is too high for straight use. Ammonium nitrate should remain steady for at least another year, after which it seems not unlikely that it may drop. The outlook for prices generally for the next few months is rather doubtful. It is generally considered that once prices go down it is hard to bring them up.

Although some doubts are expressed that acreage restrictions have had very much influence in the total fertilizer sales picture, there certainly has been an increased rate of use. Farmers are attempting to grow more per acre under restrictions so as to take advantage of support prices. This means more fertilizer per acre. Some people believe it may even be enough to discount the reductions in acreage. Looking south to cotton land where acreage restrictions have been accepted, there has been decidedly more fertilizer sold for cotton than when more acreage was being planted. Total cotton production is expected to be about the same as before the cutbacks.

Pasture Fertilization

A likely field for expansion of fertilizer use is pasture fertilization. The biggest problem is that pasture management is not of a uniformly high quality and in many places, growers livestock on the grass too soon, expecting miracles from the fertilizer before it has had time to take effect. Also there could be some effect in the reduction of the use of special feeds, particularly corn. This could hit the corn fertilizer market in the Midwest. It will have to be balanced. There has been a noticeable push in Wisconsin in promotion of fertilizer use for pastures. There it seems to be growing into general practice. Some pasture fertilization is being done in Ohio and in Missouri, but it probably will be at least five years before the advantages of pasture fertilization are fully realized in this area. There is a great deal of inertia to overcome before bringing this into standard practice.

Geographical Effects

The Middle West probably will see more change in the geographical flow of fertilizer than will most areas. The Midwest is behind some other areas in building mixing plants and as more of these plants come in there will be a decrease in the amount of fertilizer that will flow into the area from the South and East. Nitrogen is expected to come in from the South for some time, as production is relatively higher down there. The northward flow of nitrogen may slow down somewhat when new nitrogen facilities go on stream. There is an increase in bringing potash from the West and phosphorus is coming from the Southeast. Cheaper power for crushing the

hard Montana phosphate rock could alter phosphate patterns somewhat but this probably is some distance in the future.

The old problem of getting distributors and farmers to store more fertilizer, which has not been solved, coupled with the increasing year-around use of fertilizers, indicates that the basic producers may go further into distribution, somewhat in the way the big fruit processors have to go into super markets and chain stores. There is some reluctance on the part of the basic producers to get into the distribution for fear of antagonizing present wholesale customers. Opinion varies as to how far any such trend will go, but it is clear that if basic manufacturers establish themselves as distributors, it is important that they provide good service to buyers and maintain an adequate follow-up service in order to be sure that the materials are used in proper amounts and applied properly.

Handling and Shipping

Among trends in handling, storing, or shipping of fertilizer in the Midwest, one development which comes in for a lot of interest is the use of nitrogen solutions. This means particularly aqueous solutions of ammonium nitrate or nitrate with urea, which can be used without pressure equipment and have some handling advantages. As the use of such material increases, there will be a definite need for more storage at country points in order to permit prompt unloading of tank cars keeping the distribution system working at maximum efficiency.

With the standard fertilizer there is more warehousing on a local level and more bulk delivery, and bulk distribution. With the increase in bulk distribution, pelletized materials are becoming more important and continuous equipment for producing pelletized mixes seems to be the coming thing.

Direct Phosphoric Acid

A recent development in the Midwest is direct application of a 75% solution of phosphoric acid, applied in the same manner as, and usually simultaneously with, anhydrous ammonia. Monsanto is already selling acid to a number of users who have added an extra tank and dispensing tube to the ammonia applicator for direct application of phosphoric. A number of farmers in the Midwest are applying phosphoric acid in this way on a strictly empirical basis; sales are already large enough to be interesting. Monsanto has shipped tankcars of phosphoric acid from St. Louis to users as far away as Texas and Colorado.

Another trend which has appeared almost entirely within the past year is a trend toward "home-formulating" of fertilizer mixtures for "prescription-filling." Increasing numbers of far-

mers, it appears, are buying their own mixing equipment, and mixing their fertilizers from high strength materials to ratios indicated by "prescriptions" based on soil tests. The initial investment required, some \$35,000 to \$40,000, provides enough mixing equipment for the farmer to handle his own needs and perhaps those of a few near neighbors.

Large-scale development of either of these trends would make important changes in the over-all complexion of the fertilizer industry. It would also mean some important changes for chemical companies which produce the raw materials involved. Development of direct application of phosphoric acid solutions on a scale comparable with that now enjoyed by anhydrous ammonia could mean serious transportation headaches for acid-producing companies.

The big problems for the fertilizer industry in the midwestern view are price and distribution. Better merchandising is needed as is better farmer education. While agricultural education has been good in the Midwest during the past 10 years, there still is a surprisingly high percentage of farmers who have not yet bothered to have their soils analyzed. In addition to the need for higher and higher concentrations of fertilizers, there is a definite need for a fertilizer which can be easily handled in bulk all the way from the mixing plant to application in to the farmer's field in uniform free-flowing fashion. With the trend toward purer materials in fertilizer making, many important trace elements are eliminated. These will have to be made up in some way and a perfect solution is not yet at hand.

Better Service Needed

In addition to farmer education, there is also a need for education of the fertilizer distributor. The manager of an important fertilizer firm said that less service goes along with fertilizer than with any other commodity sold.

Another problem is to achieve greater bank interest in the farmer. This has been on the increase in the Midwest but tight money in the South and Southeast has slowed sales there this year.

The farmer cooperatives are integrating and are expected to do much more of it. Many of them appear to be rather in need of administrative organization but if this is strengthened and more freedom is allowed at the top to tighten up distribution and promotion, then they become a very strong factor in the fertilizer industry.

The general point of view in the Midwest on the fertilizer industry is optimistic. R. P. Thomas of International Minerals and Chemicals summed it up by saying that the fertilizer industry has one of the brightest futures of any industry in the country. The surface, he said, still has hardly been scratched.

East Sees Buying Habits Change as Result of New Pricing

IN THE EAST, the greatest excitement relative to fertilizers during recent weeks has been caused by the action of Allied Chemical & Dye last month in issuing a graduated scale of prices for fertilizer ammonia. This is expected to change buying habits in the fertilizer industry, as consumption is confined to four or five months of the year. It means that the ammonia industry may be following some other fertilizer divisions in offering discounts for early shipments.

The new price schedule puts agricultural anhydrous ammonia at \$85 per ton during July, August, and September. During October to December the price is \$88 per ton, and January to June 1955, it will cost \$93 per ton. Spot purchases in any of these months will be the same as the contract shipment price. An order placed during January for anhydrous ammonia for immediate delivery, for example, will cost the buyer \$93. Buying habits are not changed overnight in the fertilizer industry. But the new policy of offering discounts for early shipment of agricultural ammonia is expected to find adoption by others.

It is a strong step to overcome the fertilizer industry's great problem of seasonal selling. It might be said that through these early pre-season shipments, the problem of storage is shifted in the main from the producer to the consumer. The idea may work out very well from the East and those areas in the South where direct application of ammonia has been gaining fast. Erection of storage facilities has not kept pace with the expansion in ammonia producing capacity.

East Coast nitrogen interests look for expansion in urea, which has the highest nitrogen content of any fertilizer material apart from ammonia. The expansion is expected to include the use of urea in solutions and also in its dry form. Up to now, the per unit cost of nitrogen in this form has been prohibitive in fertilizer mixtures.

Anhydrous Ammonia

Chemical Enterprises, Inc., New York, organized last year to operate in the anhydrous ammonia field through subsidiaries and associated companies, reports that facilities for storing and applying ammonia have increased substantially throughout the nation. There is still a need, however, for storage tanks, applicators, and for financing. Daniel B. Curll, its president, shows that use of ammonia in this manner has increased considerably. Its growth up to 1946

resulted in sales of only 20,000 tons in that year, whereas sales in the 1953-54 season may approach 300,000 tons.

The EDA would have expanded even faster had ammonia capacity been available, according to Mr. Curll. Chemical enterprises now embraces some 35 subsidiaries and units of subsidiaries, operating in the South, Midwest, and West Coast.

Steel shortages in postwar years was a barrier to construction of ammonia tanks and equipment, but this has now been alleviated. Capital also is available, and the need right now is for technology to assist in this development. Ammonia is a product which must be used at 250 pounds pressure.

Mixed Fertilizer

Mixed fertilizer is moving toward higher concentrations, as the farmer realizes that he is buying in units of nitrogen and that excess material only adds freight charges. 12-12-12 now being brought out by allied soon may be replaced by 14-14-14. Nitrogen supply never seems to get far ahead of demand and any dislocations are expected to be temporary. The long-term need for more production from the same acreage makes the fertilizer picture look good.

Inventories

Over the East generally, inventories are low at present. While in some areas reports were that inventories had built up a little, for the most part and particularly in the south there was indication that an effort is being made to keep a very close inventory. The price picture generally is somewhat softer than last year, particularly in the Southeast. There price cutting has been on the increase and in some cases has even reached the bigger companies. Basic producers so far do not seem to be having so much trouble, but some complaining is being done by the actual distributor or dealer.

There seems to be no doubt in this area that acreage reductions have stepped up the per acre use of fertilizer. Even in the cotton areas where acreage reduction was particularly stiff, it appears that the total consumption may be close to what it was last year.

In the East, soil depletion is recognized and has been for many years. As a result careful attention is given to fertilizers and generally at least as much plant nutrient is put back into the soil each year as is taken out. The input of

potash may be slightly lower than its use. One major exception to this is in pastures, where a great deal needs to be done. It is now getting very active attention in certain spots but a great deal needs to be done and particularly so if high level beef production is to continue. Grasslands need attention not only from the point of fertilization but also through general management.

Opinion varies in the East on evidence of a trend of basic manufacturers moving toward more distribution. Some in a position to view the situation broadly say that there is not a great tendency along this line. However, where the competition is hard, those involved in the competition say that they can see definite evidence of such a trend. The direct application of aqueous solutions of ammonia nitrate or ammonium nitrate and urea has not taken hold in the East to any extent except in certain spots toward South, particularly Virginia and North Carolina where it is finding considerable use in certain areas. There it is being put on cotton, corn, small grains, and pastures.

Application Techniques

Some effort is being made to encourage the plowing in of fertilizer in the fall in order to even out the heavy seasonal demands. This is particularly true for calcium cyanamide which can be satisfactorily plowed in.

There is some trend toward the use of individual chemicals by the farmer other than a prepared ready-mixed fertilizer mixture, encouraged by the growing popularity of such machines as the gandy spreader. The machine contains three troughs as much as 16 feet wide. One chemical containing each plant food component is placed in each trough and all three are applied at one time. It has the advantages of more concentrated coverage, elimination of mixing costs and greater all around economy.

On-the-farm mixing is not making any headway in the East. Some years ago there was talk about such a thing but for the most part it has died out. The big problem on farms today is the cost of labor which would make such mixing prohibitive. Therefore the farmer prefers to buy fertilizers already mixed, ready for application.

The growing trend is quite in the opposite direction. Farmers are getting fertilizer distributors to spread the fertilizer over their farm land for them. The distributor dumps the stuff off the back of a truck, thus saving the farmer work and further labor problems in this connection, at least.

Direct application of phosphoric acid to the soil is not making headway in the East. The farmer usually expects to buy his phosphorus in the mixed fertilizer or to apply it as indicated above.